

# **PI Bien-être**

## **The report**





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The responsibility for all conclusions drawn from the data lies entirely with the authors.



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# 1. Executive summary

How is quality of life in Luxembourg? “Le Projet PIBien-être”, conceived by the joint commission formed by the *Conseil économique et social* and the *Conseil supérieur pour un développement durable* with the support of the *Observatoire de la Compétitivité*, **monitors the quality of life of the residents in Luxembourg** analysing the distribution of 63 indicators – covering 11 areas of life of the population – from 2009 and beyond.

The Luxembourg Index of Well-being, a synthetic index summarising the many indicators of the PIBien-être, suggests that the **quality of life in Luxembourg remained substantially constant**. Over time, after an initial decline, probably due to the effects of the economic crisis, quality of life has returned to its 2009 level with **a modest decrease of 0.8%** (see figure 1.1). The picture from the Luxembourg Index of Well-being (LIW) is at odds with the information provided by income-based measures of well-being, such as the Gross Domestic Product per capita which basically follows a positive trend.

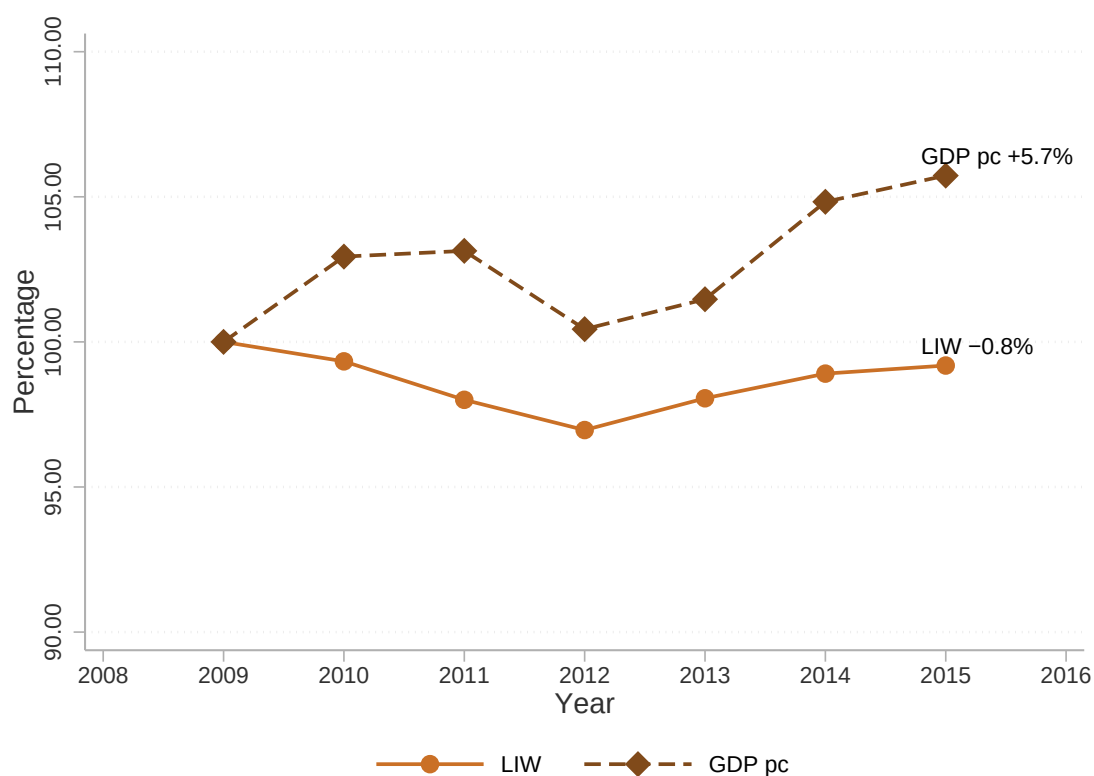
Available figures indicate some important improvements for people’s life in areas such as the Environment (+13%), Income and wealth (+10%), Education and skills (+1.5%), the frequency of social connections (+1.5%), and work-life balance (+1.5%). Various measures of income and wealth increased since 2009 and placed Luxembourg above the European average<sup>1</sup>. The nearly 2% increase in the share of renewable energy out of total consumption, and in the share of municipal waste that is recycled are among the changes that positively contributed to quality of life in Luxembourg. However, these changes are not sufficient to place Luxembourg above the European average, and in case of noise pollution, use of renewable energies, and organic farming Luxembourg ranks in the bottom 25% among Western European countries. Additionally, some environmental indicators, such as the PM10 – an indicator of air pollution – have increased over time, and this raises concerns about the quality of the living environment.

The improvements in the Education and skills domain are the outcome of two con-

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<sup>1</sup> Please, refer to table 8.1 on page 221 for the detailed list of countries used for international comparison.

**Figure 1.1:** Luxembourg Index of Well-being and Gross Domestic Product per capita from 2009 to 2015. Income based measures indicate an improvement of quality of life, whereas the synthetic index of PIBien-être dashboard of indicators points to a flat trend.



**Note:** The numbers on the vertical axis are percentages, whereas years are reported on the horizontal axis. All indexes have been normalized to 100 for ease of comparison.

**Source:** Indicators of the PIBien-être project, own elaboration.

trasting trends: on one side, we observe an increase of people with tertiary education, especially among women, while on the other side, the share of people who left education early increased by about 8 percentage points from 2009 to 2015. These changes require particular attention: Luxembourg is in line with the European average as regards the proportion of people with tertiary education, but it scores below the average for the statistic on early school leaving. Table 1.1 summarises Luxembourg's position compared to other European countries by indicator.

However, there are aspects of people's life in which Luxembourg can do better. This is the case for Health (-10%), Personal security (-10%), Housing (-6%), Governance (-6%), Employment (-3.5%), and Subjective well-being (-2.5%) for which twelve indicators out of twenty-five show worsening trends. For instance, in 2009, 75% of the residents declared to trust Luxembourg institutions; in 2015 the share was 62%. In the same period the ability to face the housing demand of a growing population diminished, as indicated by the decreased number of new dwellings available.

The health domain requires particular attention: the proportion of adults declaring to be in good or very good health decreased from 74% in 2009 to 70.5% in 2015. During the same period the proportion of adults declaring to be limited in their daily activities due to health reasons increased from 20% to 25.7%, whereas the share of deaths due to mental health problems increased from 20 to 43 per 100,000. The decrease in the number of healthy years, i.e. the number of years that a person can expect to live free from chronic diseases, confirms the worrying trend of health in Luxembourg: between 2009 and 2012 women could expect to live 66 healthy life years. After 2012 this measure was reduced by 3 years. The same happened also to men, although to a smaller extent: men enjoyed about 65.5 healthy life years before 2012, and about 64 afterwards.

These changes require a careful monitoring, but how urgent are they? To answer this question we compared Luxembourg's scores with those from other Western European countries. Only in two cases Luxembourg performs worse than other countries, where the scores are below the European average. These 2 cases are: feeling of safety while walking alone at night (for which we do not have a time-series), and the proportion of adults declaring to have chronic diseases. The latter is particularly worrying because it does not change over time, indicating a persistent situation of poor health. In most cases, Luxembourg is in line with the European average, especially for the remaining health indicators.

Luxembourg's quality of life indicators are in line with the European average also with respect to various measures of income inequality, environment quality (air pollution and recycling rates), occupation, social security, and work-life balance. It should be pointed out that, despite declining confidence in the institutions characterizing practically all developed countries, Luxembourg ranks above the European average. In other words, if Luxembourg is not doing well in this facet, other European countries face a deeper political crisis.

Some areas require more work for a better measurement, as well as an extension of the analysed strata of the population. For example, some studies suggest that the living conditions of immigrants may be different from those of nationals. Future quality of life monitoring may try to refine this aspect of the analysis. In addition, this report has revealed that some indicators are observed only once over time. This is insufficient for a correct monitoring and evaluation of the quality of life in Luxembourg. This is the case, for example, with indicators concerning the knowledge of languages, or social connections,

such as trust in others, the availability of someone to talk when needed and to ask for help.

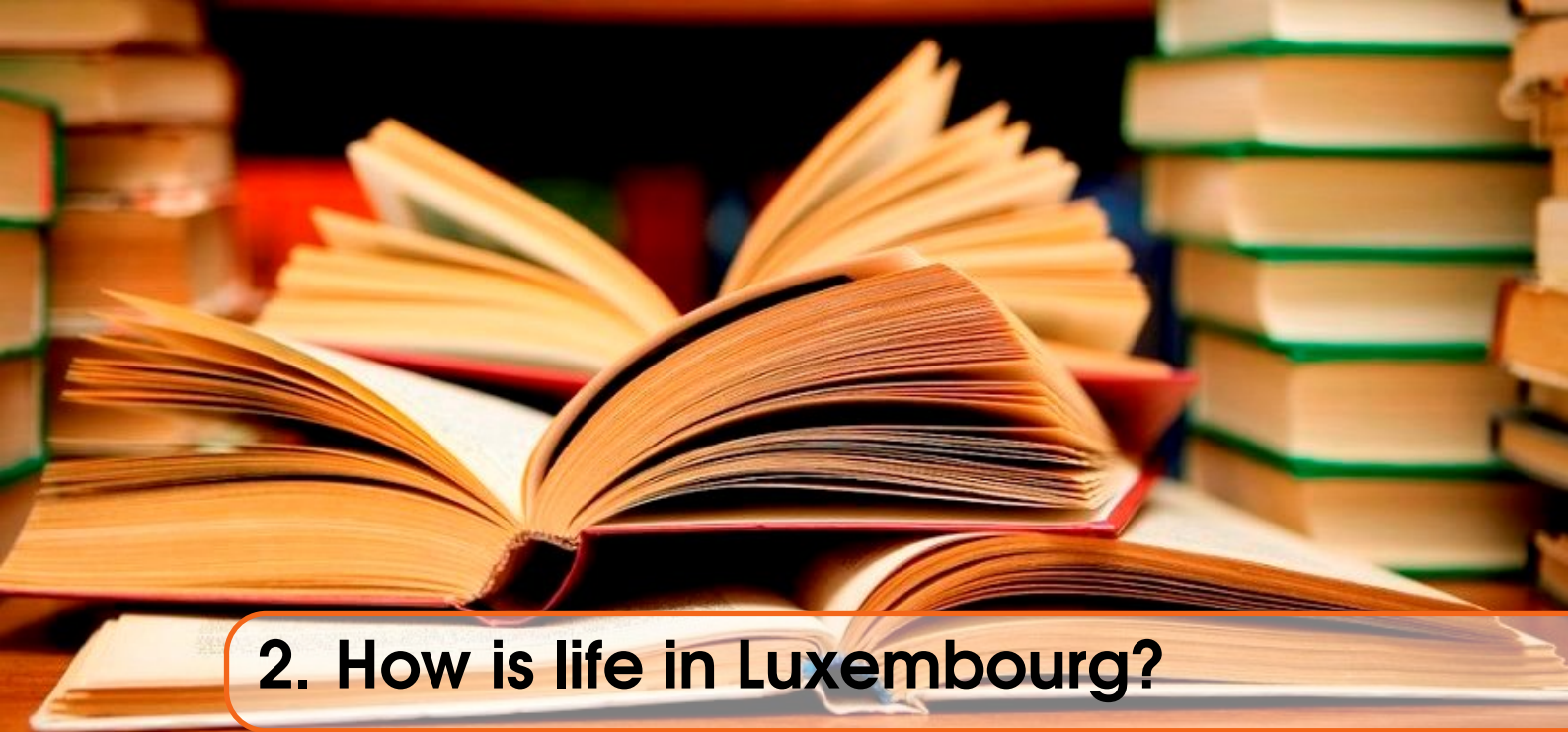
**The added value of the PIBien-être is the ability to statistically follow a complex and multifaceted concept such as quality of life, and to identify the policy areas that require investigation and action.** The LIW is a tool for navigating this vast amount of information, and it can be directly compared with prominent indicators of welfare such as Gross Domestic Product (GDP).

Among European countries, **Luxembourg has been at the forefront of the efforts to develop systematic measures of national quality of life.** In 2009, the government of Luxembourg asked social and economic consulting bodies to develop a framework to monitor the quality of life of the country's residents. A two-year research effort led by STATEC's research division resulted in an accurate description of the quality of life of Luxembourg residents from 2009 to 2015. This is achieved through a wide range of indicators and areas, covering the dimensions of 1) Income and Wealth; 2) Occupation; 3) Housing; 4) Health; 5) Private and working life balance; 6) Education and skills; 7) social relationships; 8) Governance; 9) Environment; 10) safety and physical integrity; 11) Subjective well-being. In turn, these areas are composed of individual, household, and national level indicators (63 in total), both subjective and objective, coming from national and international surveys, and registry data.

A problem with statistical sources is the timeliness: how to minimize the delay between data collection and dissemination of results? To overcome this impasse, STATEC developed a model to predict well-being using statistical techniques, and business and consumer survey data. Our forecasts indicate that, between 2015 and 2016, the proportion of people satisfied with their lives is expected to decrease by 1.5 percentage points, from 42% of the respondents to 40.5%.

| Domain                          | Above average                                                                                                                   | change | Average                                                                                      | change | Below average                                      | change |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------|--------|----------------------------------------------------------------------------------------------|--------|----------------------------------------------------|--------|
|                                 | GNI per capita                                                                                                                  | ↗      | Gini index                                                                                   | ↔      | Risk of poverty before social transfers            | ↔      |
| Income and wealth               | Total household wealth                                                                                                          | ↗      | Inter-quintile ratio                                                                         | ↔      |                                                    |        |
|                                 | Net adjusted available household income                                                                                         | ↘      | Inter-decile ratio                                                                           | ↔      |                                                    |        |
|                                 | The yearly growth rate of the gross household income                                                                            | ↗      | Men-women wage gap                                                                           | ↘      |                                                    |        |
|                                 | The yearly growth rate of the net available household income, before social transfers, but with old-age and survivor's benefits | ↗      | Risk of poverty after social transfers                                                       | ↗      |                                                    |        |
|                                 | The yearly growth rate of the net available household income, before all social transfers                                       | ↗      | People in situation of severe material deprivation                                           | ↗      |                                                    |        |
|                                 | The yearly growth rate of the net adjusted available household income                                                           | ↗      | People unable to make ends meet                                                              | ↗      |                                                    |        |
| Occupation                      | long-term unemployment rate (Eurostat definition)                                                                               | ↗      | employment rate                                                                              | ↗      | Non-fatal accidents at work                        | ↔      |
|                                 | People living in household with low working intensity                                                                           | ↔      | unemployment rate                                                                            | ↗      | Fatal accidents at work                            | ↗      |
|                                 |                                                                                                                                 |        | long-term unemployment rate (CES-CSDD definition)                                            | ↗      | Feeling of job insecurity                          | ↔      |
|                                 |                                                                                                                                 |        | temporary job rate                                                                           | ↗      |                                                    |        |
|                                 |                                                                                                                                 |        | Forced part-time rate                                                                        | ↗      |                                                    |        |
| Housing                         | Number of rooms per person                                                                                                      | ↔      | People living in overcrowded dwelling                                                        | ↔      |                                                    |        |
|                                 | Total housing costs as share of household income                                                                                | ↔      |                                                                                              |        |                                                    |        |
| Health                          | Life expectancy at birth                                                                                                        | ↔      | Life expectancy in good conditions, men                                                      | ↘      | Share of adults declaring to have chronic diseases | ↗      |
|                                 | Life expectancy at age 1                                                                                                        | ↔      | Life expectancy in good conditions, women                                                    | ↘      |                                                    |        |
|                                 | Life expectancy at age 15                                                                                                       | ↔      | Prevalence of mental problems                                                                | ↗      |                                                    |        |
|                                 | Life expectancy at age 45                                                                                                       | ↔      | Share of adults declaring to be in good or very good health                                  | ↘      |                                                    |        |
|                                 | Life expectancy at age 65                                                                                                       | ↔      | Share of adults declaring to be limited in their everyday activity because of health reasons | ↗      |                                                    |        |
|                                 | Suicide rate                                                                                                                    | ↘      |                                                                                              |        |                                                    |        |
|                                 | Death by cause                                                                                                                  | ↔      |                                                                                              |        |                                                    |        |
| Work-life balance               |                                                                                                                                 |        | Employment rate of women with children in mandatory schooling age                            | ↗      | Long hours rate out of employee population         | ↗      |
|                                 |                                                                                                                                 |        | satisfaction with work-life balance, employed and non-employed                               | NA     |                                                    |        |
|                                 |                                                                                                                                 |        | satisfaction with work-life balance, only employed                                           | NA     |                                                    |        |
|                                 |                                                                                                                                 |        | satisfaction with work-life balance, only non-employed                                       | NA     |                                                    |        |
| Education and skills            |                                                                                                                                 |        | Educational attainment                                                                       | ↗      | Young people having left education early           | ↗      |
|                                 |                                                                                                                                 |        |                                                                                              |        | Reading skills (at 15 years of age)                | ↗      |
|                                 |                                                                                                                                 |        |                                                                                              |        | Civic skills of students (at 14 years of age)      | NA     |
| Social relations                | Frequency of social contacts                                                                                                    | ↗      | Having anyone to discuss with personal matters                                               | NA     | Possibility to ask for help                        | NA     |
|                                 |                                                                                                                                 |        | Trust in others                                                                              | NA     |                                                    |        |
|                                 |                                                                                                                                 |        | Membership in social, cultural, sport associations                                           | NA     |                                                    |        |
| Governance and civic engagement | Confidence in institutions                                                                                                      | ↘      | Consultation on rule making                                                                  | ↔      |                                                    |        |
|                                 |                                                                                                                                 |        | Membership in political and civic associations                                               | NA     |                                                    |        |
| Environment                     |                                                                                                                                 |        | Air pollution                                                                                | ↗      | Noise                                              | ↔      |
|                                 |                                                                                                                                 |        | Recycling rate                                                                               | ↗      | Usage of renewable energies                        | ↗      |
|                                 |                                                                                                                                 |        | Car use                                                                                      | ↔      | Organic farming                                    | ↔      |
|                                 |                                                                                                                                 |        | Environmental disease burden                                                                 | NA     |                                                    |        |
| Personal security               |                                                                                                                                 |        |                                                                                              |        | Feeling of safety: walking alone at night          | NA     |
| Subjective well-being           |                                                                                                                                 |        | Life satisfaction                                                                            | ↘      |                                                    |        |
| Note:                           | The table includes only the indicators that are internationally comparable. Chapter 3 details the results summarised here.      |        |                                                                                              |        |                                                    |        |
| Legend:                         |                                                                                                                                 |        |                                                                                              |        |                                                    |        |
| ↗                               | Indicates an increase over time.                                                                                                |        |                                                                                              |        |                                                    |        |
| ↔                               | Indicates that the indicator did not change.                                                                                    |        |                                                                                              |        |                                                    |        |
| ↘                               | Indicates a decrease over time.                                                                                                 |        |                                                                                              |        |                                                    |        |
| NA                              | Time series is not available.                                                                                                   |        |                                                                                              |        |                                                    |        |





## 2. How is life in Luxembourg?

How is life in Luxembourg? The answer to this question depends on the tools we use to measure quality of life. According to the World Bank, in 2015 Luxembourg had the largest Gross National Income per capita evaluated at purchasing power parity among the Organisation for Economic Cooperation and Development (OECD) countries (The World Bank, 2016). Rankings based on GDP data or other measures of national income confirm this figure. Hence, according to income-based measures, Luxembourg features the highest quality of life among the OECD countries. Is this conclusion confirmed by alternative measures of welfare? Previous studies of quality of life conducted at the international level provide a different, more nuanced answer. For example, the OECD Better Life Index ranks Luxembourg in the 9th position out of 27 European countries.

Section 2.1 gives an account of studies on quality of life conducted by international policy institutions and organisations. Along these initiatives – which are essentially comparative– several European and non-European countries have undertaken significant efforts to monitor the quality of life of their citizens. Section 2.2 offers a selected review of those efforts that are close to the analysis of this report.

### 2.1 International projects on quality of life

The intense effort to overcome the limitations of traditional income-based measures of welfare dates back to the early 2000s, when European Institutions started developing an agenda for the evaluation of people's quality of life. For instance, in 2007 the European Commission and other organizations hosted a conference titled “Beyond GDP” to debate about how to complement the traditional measures of well-being. This event resulted – two years later – in the commitment of the Commission to improve Europeans' quality of life (European Commission, 2009). The French Economic Commission directed by Stiglitz, Sen and Fitoussi (2009) went in the same direction proposing to develop indices of well-being to integrate the more common income-based measures. Both the OECD

and EUROSTAT developed programs to collect internationally comparable measures of well-being and to inform about how well people are doing in modern societies.

### 2.1.1 Subjective evaluation of life quality in Europe

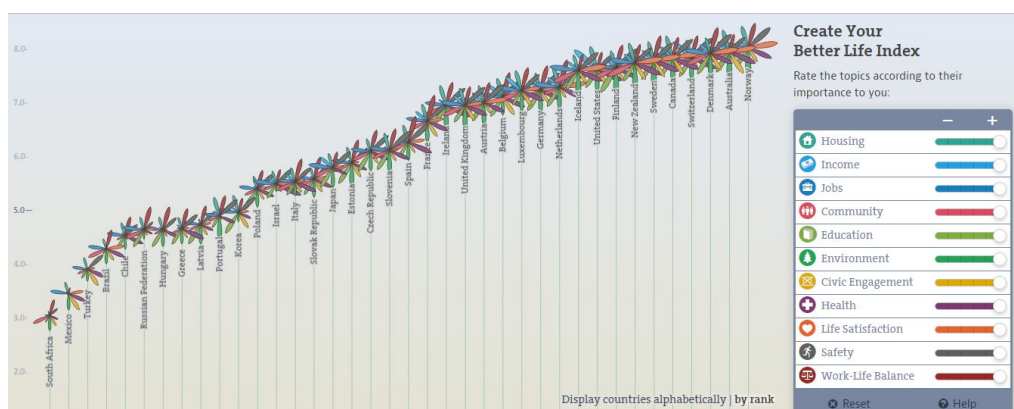
The Eurobarometer survey, run by the European Commission, provides subjective figures about people's satisfaction about a set of life domains. Delhey (2013) analysed the quality of life in European countries using data from the Eurobarometer. The author considered nine domains including satisfaction with health care system, personal safety, financial situation, social life, employment situation, health, family life, home and neighborhood. According to these indicators of quality of life, residents in Luxembourg belong to the group of most satisfied people in Europe, after Danish, Austrian, and Dutch residents. In particular, Eurobarometer data document that Luxembourg's residents are mostly satisfied with their homes (93% of satisfied respondents), family lives (94% of satisfied respondents), neighbourhoods (91% of satisfied respondents) and social lives (92% of satisfied respondents), whereas they are less satisfied with the health care system (77% of satisfied respondents), income (85% of satisfied respondents), and personal safety (85% of satisfied respondents). It is worth to emphasize, however, that this study refers to 2004.

In 2013, Eurofound (2013) reported that Luxembourg's residents are the most satisfied with their life after Danish, Finnish and Swedish people. This is the result from the analysis of life satisfaction trends in Europe, which uses data from the European Quality of Life Surveys conducted in 2003, 2007 and 2012.

In summary, the analysis of life satisfaction data seems to confirm Luxembourg's placement among the countries with the highest quality of life. However, alternative measures of life quality combining objective and subjective indicators – such as the Human Development Index of the United Nations, or the Happy Planet Index of the New Economic Foundation – challenge the result based on income indicators and subjective evaluations.

### 2.1.2 The OECD's Better Life Index

**Figure 2.1:** Better Life Index: ranking of OECD countries.



Source: authors' elaboration on OECD data; data retrieved on 29/09/2016 from:  
<http://www.oecdbetterlifeindex.org>.

The Better Life Index, a multidimensional index of quality of life developed by the OECD, assesses quality of life accounting for eleven domains which include, housing

conditions, job quality and availability, community involvement, education, environment, health along with measures of material well-being such as income (Durand, 2015). Figure 2.1 shows that, according to the Better Life Index, in 2016 Luxembourg ranked 13<sup>th</sup> among OECD countries and 9<sup>th</sup> among European countries.

The ranking of Luxembourg derives from a good performance in many material and work-related conditions OECD (2016). However, the gains in such domains seem to be offset by poor environmental and educational performance, and – to a minor extent – by low civic engagement.

A previous report by STATEC using Luxembourgish data provided in depth insights about the quality of life of residents (STATEC, 2013). In particular, Frising (2013) documented that a third of the residents in Luxembourg was very much satisfied with life, and about 16% of people were completely satisfied with their lives. Only 10% of respondents reported low levels of life satisfaction. Among the residents, people aged between 15 and 24, and elderly people, aged 65 years old or more, were the most satisfied with their working and housing conditions, as well as with their lives in general. Two thirds of young people were fully satisfied with their health status, while this share amounted to 25% for people aged 65 or more.

### 2.1.3 The UN's Human Development Index

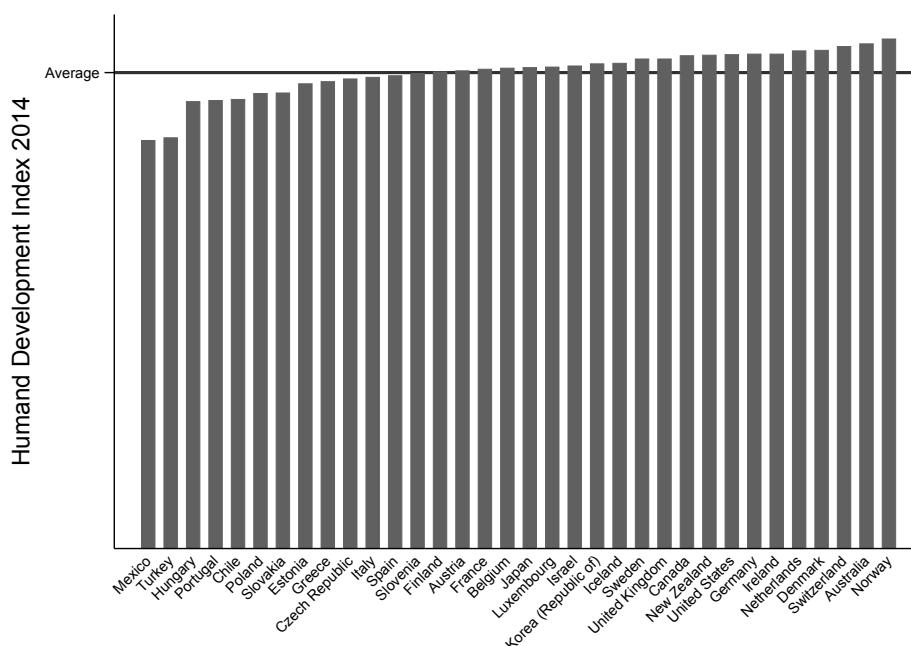
The Human Development Index, inspired by Amartya Sen's studies, is produced by the United Nations Development Programme. The index reflects the idea that countries' development should be assessed by people's ability to satisfy their needs — labelled by Sen as “capabilities” — rather than by their economies' growth rates. Accordingly, the Human Development Index considers three key dimensions of human development: health, as measured by life expectancy at birth; education, as measured by years of schooling; standard of living, as measured by Gross National Income per capita.

Figure 2.2 illustrates a country ranking based on the latest available, internationally comparable figures from the Human Development Index, which dates from 2014. This shows that Luxembourg ranks 15 out of 34 countries, very close to the average of the OECD countries: the geometric mean of the indices of human development for Luxembourg amounts to 0.89, whereas the average score for OECD countries is 0.88. The leading countries are Norway, Australia, Switzerland and Denmark whose scores range between 0.92 for Denmark and 0.94 for Norway.

### 2.1.4 The Happy Planet Index

The New Economic Foundation of London offers an alternative perspective to previous measures of quality of life by proposing the Happy Planet Index. This tool summarises the information about life expectancy, well-being, inequality of outcomes, and ecological footprint while it leaves out measures of national wealth, such as the Gross National Income. Figure 2.3 shows the ranking of OECD countries for 2016 according to the Happy Planet Index. One striking feature of this data is that Luxembourg scores the worst. This is because of the country's poor performance in terms of ecological footprint, which is probably linked to the small geographic dimensions of the country. The ecological footprint measures a population's demand for an ecosystem's supply of resources and services. Given the small dimension of the country, Luxembourg's biocapacity – i.e. its biologically productive area – is limited and insufficient to produce resources and services

**Figure 2.2:** Human Development Index (2014): ranking of OECD countries. The straight lines represents the average value.



Source: author's elaboration of United Nations Development Programme; data retrieved on 29/09/2016 from: <http://hdr.undp.org/en/data-explorer>.

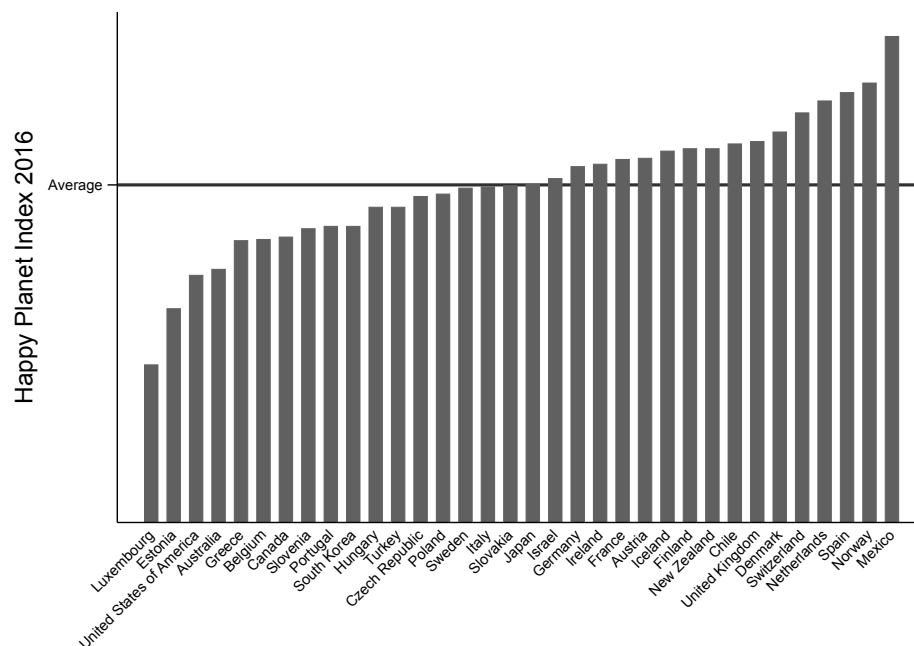
to meet the needs of its residents. The ecological footprint of Luxembourg is 15.8 global hectares per capita, i.e. more than 9 times the world's biocapacity, which amounts to 1.73 global hectares per capita.

In contrast, Luxembourg performs well in terms of life expectancy, well-being and inequality of outcomes. The Happy Planet Index shows that life expectancy in Luxembourg is 81.1 years, life satisfaction is 7 (on a scale from 1 to 10), and inequality of outcomes is 7%. To make sense of the last figure, one notes that, among the countries with the lowest inequality of outcomes, the index is 4% in Netherlands, 6% in Switzerland, Sweden and Finland, 8% in Germany, 9% in France and Belgium, 12% in Italy and 14% in Latvia and Chile.

### 2.1.5 Eurostat's report on quality of life

The Quality of Life report (Eurostat, 2015), released by Eurostat, presents a dashboard of 24 indicators grouped in 9 domains: material living conditions, employment, education, health, leisure and social interactions, economic and physical safety, governance and basic rights, natural and living environment, and overall life satisfaction.

Figure 2.4 shows that Luxembourg ranks 7<sup>th</sup> in terms of overall life satisfaction among the 28 EU countries. Luxembourg follows Finland, Denmark, Sweden, Austria, Netherlands and Belgium. According to Eurostat's figures, the countries with the lowest quality of life in Europe are Bulgaria, Portugal, Hungary, Greece and Cyprus. The position of Luxembourg in the international ranking does not change substantially if one considers single life domains. However, there are a few exceptions: Luxembourg ranks 10<sup>th</sup> in

**Figure 2.3:** Happy Planet Index (2016): ranking of OECD countries.

Source: author's elaboration of New Economic Foundation data retrieved on 29/09/2016 from: <http://happyplanetindex.org>.

satisfaction with accommodation, and 12<sup>th</sup> in satisfaction with personal relationships. In contrast, Luxembourg ranks 2<sup>th</sup> in the dimension 'overall experience with life', which refers to the personal perception of quality of life, i.e. life satisfaction, affects, and meaning of life.

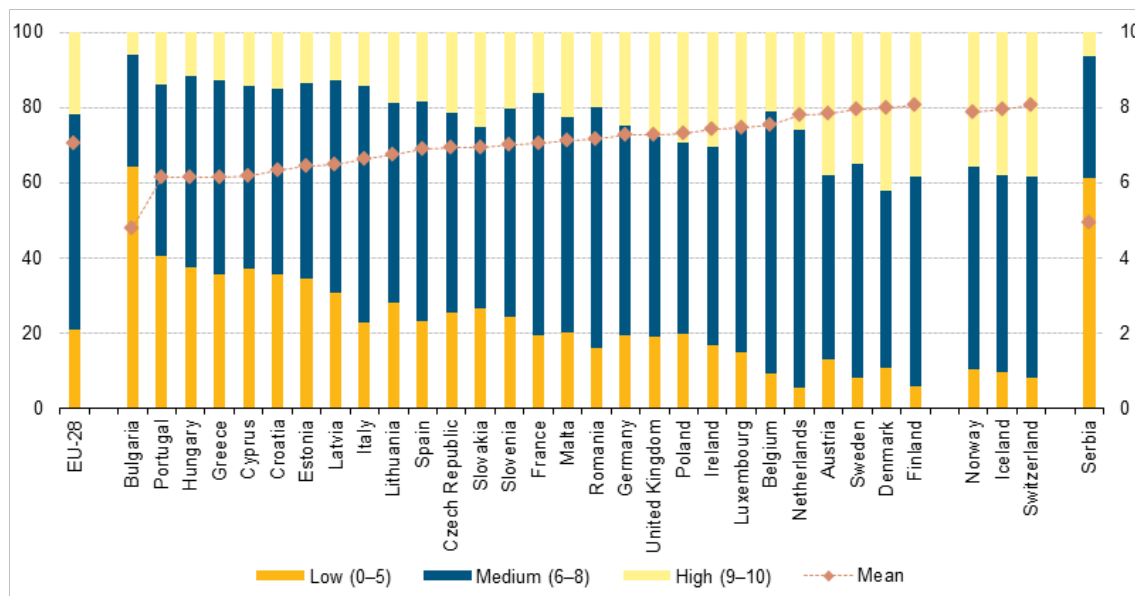
With respect to the PIBien-être project, Eurostat's report shares several common features. For instance, both studies rely on multiple data sources. Eurostat used administrative data combined with EU-SILC and EU-LFS data, PIAAC data (on adults education), information and communication technologies (ICT) household survey, European Health Interview Survey (EHIS), International Institute for Democracy and Electoral Assistance (IDEA), and Household Budget Survey (HBS). Another point in common between the PIBien-être and the report by Eurostat is the analysis of a set of indicators over time, on an yearly basis. Finally, depending on the considered indicator, and thus on the frequency at which the data are available, Eurostat's report on quality of life analyses its indicators by various breakdowns: either by standard demographic breakdowns (e.g. age and gender) or by breakdowns based on EU-SILC variables (e.g. percentage of people feeling unsafe).

### 2.1.6 World Happiness Report

In 2012 the "Sustainable Development Solutions Network" launched the first World Happiness Report to support the United Nations High Level meeting on happiness and well-being. Since then, each year the Network has published a report on world happiness to contribute to put people's well-being at the center of governments' efforts.

The World Happiness Report ranks countries based on a synthetic index that keeps into account various domains of people's life: caring, freedom, generosity, honesty, health,

**Figure 2.4:** Life satisfaction among EU and EFTA countries, plus Serbia, based on EU-SILC data, 2013.



Source: Eurostat, online data codes: ilc\_pw01 and ilc\_pw05, retrieved on 08/02/2017 from: <http://ec.europa.eu>.

income and good governance. Individual level data are drawn from the Gallup World Poll, a yearly survey administered world-wide, whereas macro variables such as economic growth or healthy life years are drawn from international institutions such as the World Bank and the World Health Organization.

In 2017 Luxembourg scored 18<sup>th</sup> out of the 155 considered countries world-wide, thus marking a slight improvement compared to 2016 when the country ranked 20<sup>th</sup>. However, the improvement in the ranking reflects mainly the changing in the position of other countries. This is confirmed by the score for Luxembourg which in 2016 was 6.87 and in 2017 it amounted to 6.86. In fact, the values of the components of a happy life in Luxembourg have not changed significantly between 2016 and 2017 (Helliwell et al., 2017b).

The best performers according to the World Happiness Report in 2017 are Norway, followed by Denmark, Iceland, and Switzerland. These countries rank consistently on top of the ranking thanks to their high values in all the key variables used to explain happiness differences among countries and through time, namely income, healthy life expectancy, having someone to count on in times of trouble, generosity, freedom and trust.

### 2.1.7 Social Progress Index

The Social Progress Index (Porter et al., 2015) proposes another interesting approach to measuring quality of life. Although the Index does not report on Luxembourg — which is not included because of the unavailability of some aggregated indicators (e.g., Global Peace Index data) — it is briefly mentioned here because it is compiled according to criteria similar to those adopted by the PIBien-être project.

The construction of this index is based on data from 52 indicators, divided into 12 domains (each domain includes 3 to 5 indicators), that measure the capacity of a society to meet basic human needs, and to enhance and sustain the quality of life. These domains can in turn be divided into 3 dimensions of social progress: basic human needs (i.e., nutrition and basic medical care, water and sanitation, shelter, personal safety); foundation of well-being (i.e., access to basic knowledge, access to information and communications, health and wellness, ecosystem sustainability); opportunity (i.e., personal rights, personal freedom and choice, tolerance and inclusion, access to advanced education). These indicators are measured consistently across all countries in the database.

## 2.2 A national perspective

In the wake of the international initiatives for an encompassing evaluation of quality of life, many countries world-wide established statistical systems to measure how their inhabitants fare: for instance, Canada adopted the Canadian Index of Wellbeing, Italy proposed the “Benessere equo e solidale”, Great Britain started a program called “Measuring National Wellbeing”.

Mirroring international efforts, the projects conducted at national level adopt various approaches and data sources: some propose dashboard of indicators, while others summarise the information provided by various indicators through a composite index. This section provides an overview of the national initiatives in which the PIBien-être is located.

### 2.2.1 The Canadian Index of Wellbeing

The Canadian Index of Well-being (Canadian index of well-being (CIW)) (Michalos et al., 2011) is a composite indicator designed to monitor Canadian residents’ quality of life, and it is carried out by researchers at the University of Waterloo. The index is based on data covering eight different domains, respectively living standards, healthy populations, community vitality, democratic engagement, leisure and culture, time use, education, and environment. In turn, each of these domains is composed by 8 indicators. In total, the CIW comprises 64 indicators. The availability of synthetic index allows researchers to compare the changes in quality of life over time with traditional measures such as GDP per capita growth.

The CIW is based on several sources and covers a long period ranging from 1994 to 2008.<sup>1</sup> The length of the period analysed comes at the price of missing information for some indicators or years. The CIW team tackled this problem using linear interpolation techniques.<sup>2</sup>

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<sup>1</sup> Surveys conducted by Statistics Canada are the main sources of data. The most frequently used surveys are: the General Social Survey; the Canadian Community Health Survey; the Labour Force Survey; the Canadian Survey of Giving; Volunteering, and Participating; and the Canadian Election Surveys. Additionally, researchers use data from indicators built by the institute Environment and Climate Change Canada, which produces environmental indicators. These figures are integrated with information from other bodies when Statistics Canada does not have sufficient sources. For instance, the domain Environment is integrated with data from the World Wildlife Fund’s Living Planet Index. Similarly, the report uses data from the Canadian Centre for Economic Analysis, which produces the highly regarded Shelter Consumption Affordability Ratio (SCAR Index).

<sup>2</sup> Linear interpolation is an imputation technique that “replaces” missing values by recorded/imputed values in the following manner. If missing values are positioned at the beginning/end of the period, they are

### 2.2.2 The Italian experience: the BES

The “Benessere equo e solidale” (Benessere equo e solidale (BES)) (ISTAT, 2015b) reports on well-being trends in Italy from 2004 onward. The project is administered by the Italian Statistical Office (Istituto nazionale di statistica (ISTAT)), and reports are released on a yearly basis. The last published report, the third in the series, covers the period 2004-2014.

The BES identifies 12 domains as relevant to quality of life. The report presents composite indices computed for each domain, which results in a dashboard of indices. In total, the report discusses 130 variables. The domains are grouped into two categories: 1) domains that directly affect human well-being and environment: this comprises health, education, work-life balance, economic well-being, social relationships, safety, natural and cultural heritage, and environment; 2) domains that represent instruments to improve the domains in the first dimension, namely public institutions and politics, research and innovation, and quality of public services. Additionally, there is a separate domain on subjective well-being, which comprises three variables, namely future expectations, time use, and overall life satisfaction. The Italian Statistical Office puts special emphasis on life satisfaction and its trend.

The BES indicators are also available at several levels of disaggregation, at macro-regional (Northern, Center and Southern Italy) and regional level, and by population sub-groups based on demographic characteristics.<sup>3</sup> Whenever possible, the indicators are compared to other EU countries. The BES has been produced also at two smaller geographical levels: urban BES (ISTAT, 2015c) and province BES (ISTAT, 2015a).

Data are collected from multiple sources. The main ones are the Italian Census or surveys, such as the European Union Survey on Income and Living Conditions (European Union Statistics on Income and Living Conditions (EU-SILC)) and the Community Innovation Survey which are run by ISTAT. Other sources of information are administrative records from several Italian authorities, such as the National Agency for School Evaluation, the National Institute for Insurance against Accidents at Work, the Bank of Italy, the National Commission for Societies and Stock Markets, and the Institute for the Environmental Protection and Research.

### 2.2.3 Measuring National Well-being in United Kingdom

The “Measuring National Well-being” (Evans et al., 2015) is a regular report released by the Office of National Statistics (Office of National Statistics of Great Britain (ONS)) of the United Kingdom. The document reports on UK residents’ well-being using subjective and objective measures of well-being. The reports presents disaggregated data and figures by region, gender and age groups. Depending on data availability, the report analyses changes in well-being over time, considering short-term (1 year) and long-term changes (3 years). The feasibility of this inter-temporal comparison depends on data availability, which also determines the time span of the analysis. For instance, some indicators are investigated for the period 2011-2014, while others cover the period 2000-2013.

The ONS analyses 41 indicators organized in 10 domains: relationships, health, “what we do” (interpreted in a large sense; e.g., employment status, job satisfaction, volunteer-

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assigned the value recorded for the following/previous year; if missing values are in between two recorded values, they are computed as an average of the two closest values.

<sup>3</sup>The disaggregated indices are computed on data for the last available year; time series are not shown for this data.

ing), characteristics of the living area, personal finance, economy, education and skills, governance, natural environment and personal well-being. The database is updated twice per year. Data are sourced from both surveys and administrative records.

The ONS releases a companion report that is focused on international comparisons made with reference to the OECD countries (Beardsmore and Randall, 2015). When internationally comparable data are not available, comparisons are restricted to EU countries. The companion's report data are Charity Commission, Eurobarometer, European Quality of Life Survey, Eurostat, Gallup World Poll, International Social Survey Programme, OECD, Programme for International Students Assessment (Programme for International Student Assessment (PISA)) and the World Health Organisation (World Health Organization (WHO)).

#### 2.2.4 Measures of Australia's Progress 2013

The Measures of Australia's Progress 2013 (Australian Bureau of Statistics, 2014), also known as Measures of Australia's Progress (MAP), is composed of four domains: society, economy, the environment, and governance; in total, these domains include 26 indicators. The choice of domains and indicators is the outcome of an extensive national consultation, in which Australians were asked to express their opinion about what is most important for national progress (Australian Bureau of Statistics, 2012).

The MAP proposes an original way to summarise the trend of its indicators. It provides a "headline progress indicator" with different colours and symbols depending on the trend: in progress, in regress, not changed. These changes are evaluated on the overall population as the report does not consider any breakdowns. Moreover, differently from the experience of the Canadian Index of Wellbeing, the assessment of quality of life in Australia does not make use of any synthetic index. In each indicator section, a paragraph explains the reason why the indicator is important (Australian Bureau of Statistics, 2012).

The indicators included in the report are followed over various periods of time. For instance, the indicator of life expectancy is observed yearly from 2001 to 2011. On the other hand, the indicator about the availability of a close relationship is observed only in 2006 and 2010. When complete time trends are not available, the specific indicator is flagged as being characterized by a data gap. The report describes four types of data gaps: 1) the indicator is based on a concept that is not yet developed enough to be measured; 2) although the concept on which the indicator is based is an important determinant of progress, it may not be meaningfully measured; 3) there is no good quality data to sufficiently measure the indicator; 4) only one data point is available, so that the progress of that indicator cannot be assessed.

These aspects are relevant for Luxembourg because the PIBien-être project faces similar difficulties. In the following chapter we will discuss the distribution and the trends of the indicators for Luxembourg, as well as data availability. The presence of regularly monitored indicators is a pre-condition for a consistent evaluation of quality of life, and it affects the periodicity of the report on PIBien-être .

### 2.3 The literature on the determinants of well-being

The attention shift towards a multidimensional assessment of quality of life followed an academic debate that developed in social sciences over the last thirty years. Ignited by

social psychologists, who moved the focus from treating bad-being to analysing people's well-being, part of the research in economics and sociology turned to subjective measures to study the correlates of well-being. There is no need of sophisticated research to tell that individual income is an imperfect measure of how well people fare and that many other issues, such as health and social relations, matter for people's well-being. The innovative aspect in this literature is the ability to reliably measure people's well-being and, therefore, to run sophisticated individual-level analysis on what matters for people's well-being. In this section we briefly introduce the concept of subjective well-being and we summarise the evidence on its reliability. Subsequently, we summarise the evidence on the correlates of well-being and we report some results based on data collected in Luxembourg in 2013.

Subjective well-being is an individual-based measurement of people's quality of life (OECD, 2013a), and it is usually observed through answers to survey questions such as: "Taking all things together, how happy would you say you are?" or "All things considered, how satisfied are you with your life as a whole these days?" (Van Praag et al., 2003). This is why researchers often refer to subjective well-being, "happiness" or "life satisfaction" interchangeably, although the concepts are clearly distinct.

People's evaluations of their well-being are relatively easy to collect, they are widely available and they proved to be reliable sources of information about actual well-being. Their reliability has been confirmed in many studies from several disciplines: subjective well-being correlates with objective measures of well-being such as the heart rate, blood pressure, frequency of Duchenne smiles and neurological tests of brain activity (Blanchflower and Oswald, 2004; Van Reekum et al., 2007); measures of subjective well-being are strongly correlated with other proxies of subjective well-being (Schwarz and Strack, 1999; Wanous and Hudy, 2001; Schimmack et al., 2010) and with the judgements about the respondent's happiness provided by friends, relatives or clinical experts (Schneider and Schimmack, 2009; Layard, 2005).

The possibility to reliably and directly measure people's well-being prompted an enormous amount of research in various domains: in economics to analyze the impact of issues such as poverty, inequality, unemployment and inflation on people's welfare (Di Tella and MacCulloch, 2008; Alesina et al., 2004; Diener et al., 2009; Clark et al., 2012, 2013); in sociology and politics to study aging, gender issues, marital and employment status, as well as the quality of political institutions (Frey and Stutzer, 2000; Powdthavee, 2007; Stutzer and Frey, 2012).

The results from this body of research show that it is possible to reliably monitor well-being and its correlates. This is the key element that allowed the debate about measuring quality of life beyond GDP.

In the World Happiness Report 2017, Helliwell et al. (2017a) present the results of a model explaining average life evaluations, across country and year, in terms of six key variables: GDP per capita, social support, healthy life expectancy, freedom to make life choices, generosity, and freedom from corruption. Their estimates explain nearly 75% of the variation in national annual average ladder scores among countries, using data from the years 2005 to 2016.

Results indicate that life satisfaction correlates positively with economic growth, the availability of social support, health, people's freedom to make their life choices, generosity, and negatively with the perception of corruption, i.e. the higher is the perception of corruption in a country, the lower is the average life satisfaction of its residents (see table

2.1).

**Table 2.1:** Pooled OLS regression to explain happiness across countries.

| Independent variable             | Happiness | standard errors |
|----------------------------------|-----------|-----------------|
| Log GDP per capita               | 0.341***  | 0.06            |
| Social support                   | 2.332***  | 0.407           |
| Healthy life expectancy at birth | 0.029***  | 0.008           |
| Freedom to make life choices     | 1.098***  | 0.31            |
| Generosity                       | 0.842***  | 0.273           |
| Perceptions of corruption        | -0.533*   | 0.287           |
| Year fixed effects               | Included  |                 |
| Number of countries              | 155       |                 |
| Number of observations           | 1249      |                 |
| Adjusted R-squared               | 0.746     |                 |

Notes: Coefficients are reported with robust standard errors clustered by country in parentheses. \*\*\*, \*\*, \* indicate significance at the 1, 5 and 10 percent levels respectively.

Source: World Happiness Report, 2017, p. 16.

Clark et al. (2017) analyse various panel datasets from various countries to study the correlates of life satisfaction at individual level. They identified five major surveys suitable for their analysis covering the United States, Australia, Britain and Indonesia. Their results confirm and extend previous evidence: in all three Western countries, the authors found that having a mental disease is more important than income, employment or physical illness for life satisfaction. In Indonesia mental health remains important but less than income. Also they found that in every country physical health is important, but in no country it is more important than mental health.

As a robustness check, Clark et al. (2017) test the association of their explanatory variable with a measure of “misery”, i.e. the lack of happiness. They found that correlates of misery and life satisfaction are very similar thus suggesting that there is no evidence that income, mental health, or any other variable is any more important lower down the well-being scale than it is higher up.

Besides the role of income and health, the team of researchers documented that having a partner is a crucial factor for well-being in Western countries. Education as well as income have, on average, a positive effect. However, income – measured as household income per head, explained less than 2% of the variance of happiness. Moreover, large part of the positive effect of a raise in income on well-being is offset by the increase of relative income, i.e. the increase of the income of relevant others, which is harmful to well-being. Finally, being unemployed correlates negatively with life satisfaction.

The results presented above are the outcome of some recent research on the correlates of well-being and they derive either from an extensive macro-level analysis, or from an in-depth micro-level analysis. In either case, they are consistent with an extensive body of results indicating that, on average, poor health, separation, unemployment, relative concerns, raising inequality and lack of social contacts are all strongly negatively associated with subjective well-being. On the contrary, previous studies documented a positive association between increasing income, religiosity, freedom of choice and control over

own life, trust in institutions, and volunteering for well-being (Powdthavee, 2010; Dolan et al., 2008).

What features of every day life matter for the life satisfaction of the residents on Luxembourg? Figures from STATEC (2015) seem consistent with the evidence from other countries. For instance, richer, more educated, and younger people report a higher life satisfaction than others. Having a partner, children or being employed are features that, on average, significantly contribute to the well-being and meaning of life of a person. Yet, this evidence leaves some questions unanswered: are richer people more satisfied with their lives because they are healthier, more educated, living in a proper environment, have a safe job, or because they are – just – rich? To address such issues, we applied regression analysis to Luxembourgian data issued from the European Union Survey on Income and Living Conditions (EU-SILC) of 2013.

Results show that, *ceteris paribus*, richer people, home owners, retired, house workers, and married people have a higher probability to be very satisfied with their lives (a score of life satisfaction equal to 8) (see Table 2.2). It is worth emphasizing that these results are net of each other: for instance, the positive statistical association (correlation) between household income and life satisfaction does not depend on the fact that richer people can also be home owners, retired or married. On the other hand, unemployed people, elderly, disabled and people with chronic illnesses have lower probabilities to be very satisfied with their lives than their counterparts.

The regression analysis uncovered two further aspects: the first one is the positive impact of a lively social life on well-being. People who meet often with friends, who can count on the help from others, who have someone to discuss with have, on average, a higher probability to be very satisfied with their lives than others. The same holds true for people who trust others and national institutions, namely the legal system, and the police. On the contrary, trusting the political system is not significantly associated with the probability of being very satisfied with life. The coefficients indicate that meeting friends at least once a month increases the probability of being very satisfied by 3.16 percentage points. In case of people regularly participating in leisure activities or having anyone to discuss personal matters, the same probability increases by about 1.50 percentage points. Confidence in institutions and trust in others seem to exert a smaller, although positive and significant, effect: people who trust others have a probability of 0.89 percentage points higher than others of being very satisfied, while in case of confidence in institutions the same probability increases by 0.5 percentage points. These numbers indicate that the probability of being very satisfied with own life for people who trust others or Luxembourgian institutions increases from 33.6% to nearly 34.5%.

The second aspect concerns the well-being of people with a migratory background: immigrants – either from within or outside Europe – are, on average, less satisfied with their lives than nationals: the probability of being very satisfied with life is 0.48 percentage points lower for immigrants than nationals. Although the difference is small, it is worth to emphasise that this number refers to a fairly high level of satisfaction with life. If we consider a lower level of satisfaction – such as the one of the first quartile, which is equal to 5 – the probability that an immigrant's well-being belongs to that level is 1.2 percentage points higher than for nationals: i.e. the probability increases from 8.8% to 10%.

Understanding the reasons for the difference in well-being between nationals and immigrants requires a deeper analysis and goes beyond the scope of this box. However,

**Table 2.2:** Marginal effects of each independent variable on life satisfaction. Marginal effects have been computed for a score of life satisfaction equal to 8, the median value of the life satisfaction distribution.

| Variables                                    | dy/dx      | z-stat  |
|----------------------------------------------|------------|---------|
| Male                                         | -0.00250*  | (-2.03) |
| Age                                          | -0.000345  | (-1.36) |
| Age squared / 100                            | 0.000214   | (0.82)  |
| Married                                      | 0.00745**  | (2.78)  |
| Separated                                    | -0.00101   | (-0.09) |
| Widowed                                      | -0.0157    | (-1.67) |
| Divorced                                     | -0.00127   | (-0.29) |
| Household size: 2 people                     | -0.00053   | (-0.52) |
| Household size: 3 people                     | -0.00624** | (-2.86) |
| Household size: 4 people                     | -0.00106   | (-0.74) |
| Household size: 5 and more                   | -0.00109   | (-0.60) |
| Lower secondary education                    | -0.000848  | (-0.31) |
| Upper secondary education                    | 0.00188    | (0.94)  |
| Post-secondary education                     | 0.00293    | (1.16)  |
| Tertiary education                           | 0.00215    | (1.00)  |
| Employee part-time                           | -0.000759  | (-0.29) |
| Self-employed                                | 0.00237    | (1.07)  |
| Unemployed                                   | -0.0630*** | (-3.81) |
| Student                                      | 0.00026    | (0.05)  |
| Retired                                      | 0.00299    | (1.63)  |
| Disabled                                     | -0.0218*   | (-2.01) |
| Housework                                    | 0.00360**  | (2.66)  |
| House owner                                  | 0.00301*   | (2.51)  |
| Immigrant                                    | -0.00483** | (-2.81) |
| Trust in the political system                | -0.000388  | (-0.31) |
| Trust in the legal system                    | 0.00506**  | (2.90)  |
| Trust in the police                          | 0.00575**  | (2.91)  |
| Trust in others                              | 0.00891*** | (4.77)  |
| Has anyone to discuss personal matters       | 0.0178*    | (2.11)  |
| Help from others if needed                   | 0.0048     | (1.59)  |
| Log of household income                      | 0.00698*** | (4.59)  |
| Regularly participates in a leisure activity | 0.0150***  | (4.42)  |
| Suffers from a chronic illness               | -0.0152*** | (-4.57) |
| Meeting friends at least once a month        | 0.0316***  | (3.71)  |
| Observations                                 | 4511       |         |

Note:  $z$  statistics in parentheses. Marginal effects after ordered probit regression with robust standard errors. Dependent variable: Life satisfaction (0-10). dy/dx for factor levels is the discrete change from the base level. \*, \*\*, \*\*\* indicate significance at the 10, 5 and 1 percent levels respectively.

Source: EU-SILC for Luxembourg, 2013 (STATEC, 2015).

previous studies – both within and across countries – confirm that the life satisfaction gap between immigrants and nationals exists, and they explain it in terms of different endowments of what matters for people's well-being (see, for instance, Valentova and Berzosa, 2012; Callens et al., 2014). Descriptive statistics for Luxembourg point to the differences between immigrants and nationals in terms of income, home ownership, and social relations as possible explanatory factors of the gap. Unemployed immigrants are nearly two times more numerous than nationals and, on average, less rich: 57% of nationals have a household income higher than the national average, while this percentage amounts to 42% in case of immigrants; the latter group reports slightly less social contacts (for instance, 48% of immigrants and 52.7% of nationals declared to trust others), but higher confidence in national institutions, such as police, and the political and legal system. Finally, while 37% of nationals own the dwelling they live in, only 18.5% of immigrants own the dwelling they live in.

In sum, the correlates of life satisfaction in Luxembourg are similar to those identified by the international literature on quality of life (Dolan et al., 2008; Boarini et al., 2012; OECD, 2013a). Far from being conclusive, this evidence calls for a more in-depth analysis of the possible mechanisms behind these results. Future analyses require more sophisticated methods, such as instrumental variables, to assess the causality between explanatory variables and life satisfaction. This step is necessary to reach some conclusive result that could inform policy-makers about the policies to improve life satisfaction in Luxembourg.

## 2.4 Summary

The limitations of GDP as a measure of countries' social and economic development are widely recognised. In the last decades, international policy institutions, governments and statistical offices have put in place several initiatives aimed at providing a more comprehensive accounts of countries' welfare. This chapter presented a selected review of initiatives run by international institutions, which focus on the comparison of life conditions across countries, and national initiatives, which focus on monitoring quality of life within countries. The last section summarised the evidence about the correlates of subjective well-being and it focused on the results from data on Luxembourg.

The literature offers mainly three sets of measures to account for quality of life (Delhey and Kroll, 2013). The first one includes measures aimed at correcting GDP to account for public bads or negative externalities. Some examples are the Measure of Economic Welfare, the Index of Sustainable Well-Being, Genuine Progress Indicator, and the Index of Economic well-being. These initiatives try to overcome the existing weaknesses of GDP without departing from its basic logic, i.e. a measure that seeks to sum up goods and services in a comparable, monetary manner. In contrast to GDP, the new measures are enriched with mainly social and environmental factors to fill some of the blind spots of GDP (Cobb and Cobb, 1994; Cobb et al., 1999). The second set includes measures that propose to replace GDP as a measure of quality of life to focus on indicators of what makes life worth living. Implicitly, this approach assumes that GDP is solely a measure of economic production and as such it remains a mean to an end rather than the end itself. Therefore, indicators such as the Happy Planet Index (Abdallah et al., 2012), the Gross National Happiness (Veenhoven, 2007) or the Happy Life Expectancy (Veenhoven,

1996, 2005) aim at replacing GDP with composite indicators including life expectancy, ecological footprint, and/or life satisfaction. The third set includes measures aimed at complementing GDP with other indicators to derive a dashboard of indicators of quality of life. These indicators are usually standardized and merged with GDP to create a synthetic index of quality of life. The Human Development Index, the Index of Social Progress, the Better Life Index are some notable examples of such group of measures, and – to date – they represent the most widely accepted indicators of quality of life, in particular after the famous contribution by Sen, Stiglitz and Fitoussi (Stiglitz et al., 2009), among international institutions.

The initiatives reviewed in this chapter have several features in common (see Table 2.3). First, and foremost, they all recognize the multidimensionality of the concept of quality of life and, accordingly, they try to account for it by considering several aspects. The projects, for instance, share the focus on income-related measures, education, health as well as the the quality of the social and natural environment. Moreover, the various initiatives recognize the value of public goods and they try to include dimensions or indicators to account for negative externalities, and the quality of public services for quality of life.

**Table 2.3:** Country projects on quality of life: comparisons of main features

| Domain                | CIW                                                                                                                                  | BES                 | ONS                    | MAP                    |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------------|------------------------|
| Income and wealth     | yes                                                                                                                                  | yes                 | yes                    | yes                    |
| Health                | yes                                                                                                                                  | yes                 | yes                    |                        |
| Education             | yes                                                                                                                                  | yes                 | yes                    |                        |
| Environment           | yes                                                                                                                                  | yes                 | yes                    | yes                    |
| Social relations      | yes <sup>1</sup>                                                                                                                     | yes                 | yes                    | yes                    |
| Work-life balance     | yes                                                                                                                                  | yes                 |                        |                        |
| Civil engagement      | yes                                                                                                                                  |                     |                        |                        |
| Leisure               | yes                                                                                                                                  | yes                 |                        |                        |
| Public institutions   |                                                                                                                                      | yes                 | yes                    | yes                    |
| R&D                   |                                                                                                                                      | yes                 |                        |                        |
| Safety                |                                                                                                                                      | yes                 | yes                    |                        |
| Quality of services   |                                                                                                                                      | yes                 |                        |                        |
| Subjective well-being |                                                                                                                                      | yes                 | yes                    |                        |
| Indicator type        | D + CI                                                                                                                               | D + CI <sup>2</sup> | D                      | D                      |
| Time series           | 1994–2008                                                                                                                            | 2004–2014           | 2000–2013 <sup>3</sup> | 2001–2012 <sup>3</sup> |
| Disaggregation        | no                                                                                                                                   | yes                 | yes                    | no                     |
| Number of indicators  | 64                                                                                                                                   | 130                 | 41                     | 26                     |
| Note:                 | <sup>1</sup> Community vitality. <sup>2</sup> Composite index per domain.<br><sup>3</sup> Years range varies with data availability. |                     |                        |                        |
| Legend:               |                                                                                                                                      |                     |                        |                        |
| D                     | Dashboard of indicators.                                                                                                             |                     |                        |                        |
| CI                    | Composite index.                                                                                                                     |                     |                        |                        |

The attempt to summarise the information in composite indicators or dashboards of indicators is another element in common among the various initiatives. In some cases, this information is summarised by means of graphic interfaces, while in others the projects adopted synthetic indeces of quality of life. Moreover, international projects, by their nature, adopt cross-country perspectives by focusing on a set of indicators at a point in

time. National initiatives, on the contrary, focus mainly on what happened to quality of life within the country. This amounts to study a set of indicators over time. The availability of comparative data, both across countries and time, is a common constraint of the initiatives to monitor quality of life. Additionally, every project relies, at least in part, on survey data and therefore it suffers from some lag in releasing the result. Finally, all the project we reviewed tend to neglect distributional issues, i.e. they focus on the average of the indicators of quality of life, but they pay little or no attention to their distribution across the population.

The PIBien-être project fits in the group of initiatives that tries to complement GDP with other measures to compose a dashboard of indicators of quality of life. The project identified 11 domains as relevant for quality of life including income and economic situation, working conditions, health, familiar relationships, quality of institutions, environment, social involvement, and well-being. As other national initiatives, the PIBien-être project adopts a time-series analysis, therefore evaluating quality of life of its residents in comparison to their previous achievements and not to the achievements of residents of other countries. The value-added of the PIBien-être compared to the other initiatives is a keen focus on distributional issues: all the indicators are considered not only with regard to their average across the population, but also for specific sub-groups of residents. The indicators are analysed by various breakdowns, such as age group, gender, income group, familiar status, and education. Just like the other national projects, the PIBien-être relies largely on survey data which impose two limitations: first, the figures for the analysis are available with some delay; second, not all the indicators are available at the same time and with the same frequency. To address the first issue, we have introduced a forecasting method to predict subjective well-being figures. As we will illustrate in more detail in chapter 6, this technique allows us to bridge the data gap and to inform about the expected trends in life satisfaction. The second issue, related to data availability, is more difficult to overcome and in chapter 4 we will discuss possible solutions to circumvent it.



### 3. Indicators

How do we measure quality of life in Luxembourg?

The 2013 *Avis Commun Conseil économique et social* (CES) - Conseil supérieur pour un développement durable (CSDD) (CES-CSDD, 2013) defines the structure and the content of a system of indicators for measuring quality of life in Luxembourg. This system aims to monitor economic, social, and environmental aspects that are regarded as relevant to people's quality of life. This information is organised in a wide dashboard of indicator. The objective is to achieve a comprehensive assessment of living conditions in Luxembourg, beyond that performed on traditional economic measure such as GDP, with the view of informing and shaping social and economic policies.

The CES-CSDD (2013) avis commun is consistent with other international initiatives to measure countries' progress and their populations' well-being. The work of the CES-CSDD commission, established in 2009, built on the experience of the OECD (2011) and of the Stiglitz commission (Stiglitz et al., 2009) to integrate the prevailing international methods with indicators of economic development, equality of opportunities between men and women, land use, social cohesion and, more in general, all aspects that matter to a comprehensive assessment of quality of life. Moreover, the joint commission recognised the importance of people's perceptions about their living conditions, so it recommended to include subjective as well as objective indicators in the dashboard. The joint commission also warned that the study of population averages can be misleading, as averages can mask substantial differences between population groups. Hence, to account for possible social and/or economic inequalities, it recommended to study the distribution of each indicator by a number of socio-demographic breakdowns including age, employment contract, domain of activity, education, household type, nationality, socio-professional status, income, gender and place of residence.<sup>1</sup>

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<sup>1</sup>For more details, please, refer to the "Avis commun CES-CSDD" available here: <http://www.ces-public.lu/fr/actualites/2013/11/pibienetre/avis-commun-ces-csdd-pibien-etre.pdf>.

The PIBien-être project, as defined by the 2013 document, is a dashboard of 63 indicators grouped in 11 domains. Indicators and domains are listed in table 3.1. For each indicator, the table reports the source of the data, the breakdowns considered to analyse the distribution across the population, and the years for which data is available. For each item the table also informs about the source of the data, the breakdowns considered to analyse the distribution across the population, and the years when the data are available. For instance, the first indicator of the domain “Income and wealth” is *Gross National Income per capita*. The dash in the Breakdown column indicates that this indicator is not analysed by sub-groups. This is because distributional aspects of GNI are considered in more detail by other indicators. The fourth column informs that the data are retrieved from STATEC, while the fifth column shows that, for the sake of the PIBien-être project, this figure is available every year since 2009. As a further example, let us consider the second indicator, *Total household wealth*. The third column of table 3.1 shows that this indicator considers the average on the overall population, and by income groups. In other words, the PIBien-être project studies the distribution of total household wealth for households belonging to different income groups. This allows to unveil possible differences, both in levels and trends, within the population. This figure is retrieved from the Household Finance and Consumption Survey administered by the European Central Bank (column 4) in 2012 and 2014 (column 5).

Table 3.2 provides a general overview of the results discussed in this chapter. This table reports the following information: the name of each domain and of the indicators that compose it; the time trend of each indicator as illustrated by an arrow – when data on multiple years are available; and how Luxembourg fares compared to other European countries for each indicator – when data for such comparisons are possible<sup>2</sup>.

The remaining of this chapter provides a description of each indicator and domain. The chapter is organised as follows. Each section is devoted to illustrate the data for a specific domain. The introductions to the sections give a general overview of the domains and the main trends found in the data, and discuss the relevance of the indicators to quality of life. A summary table lists the indicators in each domain and summarises the result from the analysis. The last two columns give, respectively, the international comparison of Luxembourg, with the aid of colour-codes, and the change of the indicator in the last year of observation compared to the base year. The colours used in table are red, yellow and green. These indicate, respectively, the position of Luxembourg compared to other Western European countries – when comparable data are available. Green indicates that the level of a specific indicator in Luxembourg is higher than the Western European average; yellow indicates that the level of an indicator is in line with the European average; red indicates that Luxembourg scores worst than the European average for a specific indicator. Within each section, various subsections present the indicators in details, analysing time trends and distributions whenever possible.

<sup>2</sup>Please, refer to table 8.1 on page 221 for the detailed list of countries used for international comparison.

**Table 3.1:** The dashboard of indicators by breakdowns, data sources and time-series availability.

| Domain               | Indicator                                                             | Breakdown                                                                               | Data source                              | Year        |
|----------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------------------------------|-------------|
| I. Income and Wealth | 1. Gross National Income per capita                                   | –                                                                                       | Eurostat (National accounts)             | 2009-2015   |
|                      | 2. Total household wealth                                             | income groups                                                                           | Household Finance and Consumption Survey | 2012, 2014  |
|                      | 3. Net adjusted available household income                            | income groups                                                                           | Survey of Income and Living Conditions   | 2010 - 2015 |
|                      | 4. Real yearly growth rate of various measures of household income    | income groups                                                                           | Survey of Income and Living Conditions   | 2010 - 2015 |
|                      | 5. Household total consumption including non-market services          | income groups                                                                           | Time Use Survey                          | 2014        |
|                      | 6. Gini index                                                         | –                                                                                       | Survey of Income and Living Conditions   | 2010 - 2015 |
|                      | 7. Inter-quintile ratio and inter-decile ration                       | –                                                                                       | Survey of Income and Living Conditions   | 2010 - 2015 |
|                      | 8. Men-women wage gap                                                 | –                                                                                       | Survey of Income and Living Conditions   | 2010 - 2015 |
|                      | 9. Risk of poverty before social transfers and after social transfers | sex, age groups, family situation, socio-professional status, nationality               | Survey of Income and Living Conditions   | 2010 - 2015 |
|                      | 10. People in situation of severe material deprivation                | –                                                                                       | Survey of Income and Living Conditions   | 2010 - 2015 |
|                      | 11. People unable to make ends meet                                   | income groups                                                                           | Survey of Income and Living Conditions   | 2010 - 2015 |
| II. Occupation       | 12. Employment rate                                                   | sex, age groups                                                                         | Labor Force Survey                       | 2009 - 2015 |
|                      | 13. Unemployment rate and long-term unemployment rate                 | sex, age groups, nationality, socio-professional status, education level, income groups | Labor Force Survey                       | 2009 - 2015 |
|                      | 14. Wage earners with temporary contracts                             | sex, age groups, education level, socio-professional status, income groups              | Labor Force Survey                       | 2009 - 2015 |
|                      | 15. Frequency of forced part-time work                                | sex, family situation, nationality, socio-professional status, income groups            | Labor Force Survey                       | 2009 - 2015 |
|                      | 16. People living in households with a very weak work intensity       | –                                                                                       | Survey of Income and Living Conditions   | 2009 - 2015 |
|                      | 17. Accidents at work                                                 | sex, age groups                                                                         | European Statistics on Accidents at Work | 2009 - 2015 |
|                      | 18. Feelings of job insecurity                                        | –                                                                                       | Survey of Income and Living Conditions   | 2009 - 2015 |
| III. Housing         | 19. Number of rooms per person                                        | –                                                                                       | Survey of Income and Living Conditions   | 2009 - 2015 |
|                      | 20. People living in overcrowded dwelling                             | –                                                                                       | Survey of Income and Living Conditions   | 2009 - 2015 |
|                      | 21. Relative part of dwelling costs                                   | tenure status, income groups                                                            | Survey of Income and Living Conditions   | 2009 - 2015 |
|                      | 22. Number of new dwellings per year                                  | tenure status, income groups                                                            | Statec (Enquête bâtiments achevés)       | 2009-2013   |
|                      | 23. Dwellings in “Wohnvorrangemeinden”                                | –                                                                                       | Statec (Enquête bâtiments achevés)       | 2009-2013   |
| IV. Health           | 24. Life expectation at various ages and in good health               | sex, age groups, socio-professional status, income groups, education level              | European Health for All Database         | 2009-2013   |
|                      | 25. Prevalence and intensity of mental problems                       | sex, age groups                                                                         | European Health for All Database         | 2009-2013   |
|                      | 26. Suicide rate                                                      | sex, age groups                                                                         | European Health for All Database         | 2009 -2013  |
|                      | 27. Death by cause                                                    | age groups, sex, socio-professional status                                              | European Health for All Database         | 2009-2013   |
|                      | 28. Drug consumption (antidepressants)                                | -                                                                                       | IGSS (administrative data)               | 2009 - 2015 |

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| Continued                             |                                                                                                  |                                                                             |                                                                   |               |
|---------------------------------------|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------|---------------|
| Domain                                | Indicator                                                                                        | Breakdown                                                                   | Data source                                                       | Year          |
| IV. Health                            | 29. Share of adults declaring to be in good or very good health                                  | sex, age groups, socio-professional status, income groups, education level  | Survey of Income and Living Conditions                            | 2010 - 2015   |
|                                       | 30. Share of adults declaring to have chronic disease                                            | sex, age groups, socio-professional status, income groups, education level  | Survey of Income and Living Conditions                            | 2010 - 2015   |
|                                       | 31. Share of adults declaring to be limited in their everyday activity because of health reasons | sex, age groups, socio-professional status, income groups, education level  | Survey of Income and Living Conditions                            | 2010 - 2015   |
| V. Work-life balance                  | 32. Share of employees working very long hours                                                   | –                                                                           | Labor Force Survey                                                | 2009 - 2015   |
|                                       | 33. Leisure and occupation time                                                                  | –                                                                           | Time use survey                                                   | 2014          |
|                                       | 34. Employment rate of women with children in mandatory schooling age                            | age groups, education level                                                 | Labor Force Survey                                                | 2009 - 2015   |
|                                       | 35. Time spent commuting                                                                         | age groups, sex, nationality, education, family situation, income groups    | Time use survey                                                   | 2014          |
|                                       | 36. Share of parental living (woman/man)                                                         | –                                                                           | Caisse nationale des Prestations familiales (administrative data) | 2009 - 2013   |
|                                       | 37. Satisfaction with work-life balance                                                          | sex, age groups, income groups, nationality, education level                | Survey of Income and Living Conditions                            | 2013          |
| VI. Education and skills              | 38. Educational attainment                                                                       | sex, age groups                                                             | Labor Force Survey                                                | 2009 - 2015   |
|                                       | 39. Young people having left education and training early                                        | –                                                                           | Labor Force Survey                                                | 2009 - 2015   |
|                                       | 40. Reading skills at 15                                                                         | –                                                                           | Program for International Student Assessment                      | 2009 and 2012 |
|                                       | 41. Civic skills of students                                                                     | –                                                                           | International Civic and Citizenship Education Study               | 2009          |
| VII. Social relationships             | 42. Social network support                                                                       | age groups, income groups, education level                                  | Survey of Income and Living Conditions                            | 2013          |
|                                       | 43. Membership in social, cultural and sport associations                                        | age groups, sex, education level, income groups                             | European Values Study                                             | 2008          |
|                                       | 44. Time spent volunteering                                                                      | age groups, sex, nationality, education level, family status, income groups | Time use survey                                                   | 2014          |
|                                       | 45. Frequency of social contacts                                                                 | income groups, education level, family status                               | Survey of Income and Living Conditions                            | 2013          |
| VIII. Governance and civic engagement | 46. Voter turnout                                                                                | –                                                                           | Institute for Democracy and Electoral Assistance                  | 2009 and 2013 |
|                                       | 47. Consultation on rule making                                                                  | –                                                                           | The Organisation for Economic Co-operation and Development        | 2013          |
|                                       | 48. Membership in political and civic associations                                               | sex, age groups, income groups, education level                             | European Values Study                                             | 2010 - 2015   |
|                                       | 49. Knowledge and use of Luxembourgian, French, German, and/or English                           | nationality                                                                 | Statec (census)                                                   | 2011          |
| To be continued over next page        |                                                                                                  |                                                                             |                                                                   |               |

| Continued                             |                                                                    |                                                              |                                                                               |                     |
|---------------------------------------|--------------------------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------|
| Domain                                | Indicator                                                          | Breakdown                                                    | Data source                                                                   | Year                |
| VIII. Governance and civic engagement | 50. Confidence in institutions                                     | –                                                            | Eurobarometer                                                                 | 2010 - 2015         |
|                                       | 51. Feeling of discrimination                                      | –                                                            | Centre pour l'égalité de traitement                                           | 2009, 2011 and 2014 |
| IX. Environment                       | 52. Air quality and satisfaction with quality                      | –                                                            | European Environment Agency                                                   | 2009 - 2015         |
|                                       | 53. Water quality                                                  | –                                                            | Administration de la Gestion de l'Eau                                         | 2009 - 2015         |
|                                       | 54. Noise                                                          | income groups                                                | Eurostat                                                                      | 2009-2015           |
|                                       | 55. Recycling rate                                                 | –                                                            | Eurostat (National Statistical Institutes and Ministries for the Environment) | 2009 - 2015         |
|                                       | 56. Share of renewable energies on the final consumption of energy | –                                                            | Eurostat (National Authorities)                                               | 2009 - 2015         |
|                                       | 57. Transport mode (car/shared transport)                          | –                                                            | Eurostat (Statec)                                                             | 2009 - 2015         |
|                                       | 58. Land use                                                       | –                                                            | Statec (Administration du Cadastre et de la Topographie)                      | 2009 - 2015         |
|                                       | 59. Bio agriculture (hectars)                                      | –                                                            | Eurostat (National Certification and Inspection bodies)                       | 2009 - 2015         |
|                                       | 60. Environmental disease burden                                   | –                                                            | World Health Organization                                                     | 2012                |
|                                       | 61. Offence rate                                                   | –                                                            | Police (administrative data)                                                  | 2009 - 2013         |
| X. Personal security                  | 62. Feeling of safety (walking alone at night)                     | social-professional status, income groups, nationality       | Survey of Income and Living Conditions                                        | 2013                |
| XI. Subjective well-being             | 63. Life satisfaction                                              | sex, income groups, nationality, age groups, education level | Eurobarometer                                                                 | 2013                |

**Table 3.2:** The dashboard of indicators: results at a glance.

| Domain                                       | Indicator                                                             | Change | Tier | Indicator                                                                                        | Change | Tier |
|----------------------------------------------|-----------------------------------------------------------------------|--------|------|--------------------------------------------------------------------------------------------------|--------|------|
| <b>I. Income and Wealth</b>                  | 1. Gross National Income per capita                                   | ↗      | ●    | 7. Inter-quintile and inter-decile ratio                                                         | ↔      | ●    |
|                                              | 2. Total household wealth                                             | ↗      | ●    | 8. Men-women wage gap                                                                            | ↘      | ●    |
|                                              | 3. Net adjusted available household income                            | ↘      | ●    | 9. Risk of poverty after social transfers                                                        | ↗      | ●    |
|                                              | 4. Real yearly growth rate of various measures of household income    | ↗      | ●    | 10. People in situation of severe material deprivation                                           | ↗      | ●    |
|                                              | 5. Household total consumption (marketed goods and services)          | ↘      | NA   | 11. People unable to make ends meet                                                              | ↗      | ●    |
|                                              | 6. Gini index                                                         | ↔      | ●    |                                                                                                  |        |      |
| <b>II. Occupation</b>                        | 12. Employment rate                                                   | ↔      | ●    | 16. People living in households with a very weak work intensity                                  | ↔      | ●    |
|                                              | 13. Unemployment rate and long-term unemployment rate                 | ↗      | ●    | 17. Accidents at work                                                                            | ↗      | ●    |
|                                              | 14. Wage earners with temporary contracts                             | ↗      | ●    | 18. Feelings of job insecurity                                                                   | ↔      | ●    |
|                                              | 15. Frequency of forced part-time work                                | ↗      | ●    |                                                                                                  |        |      |
| <b>III. Housing</b>                          | 19. Number of rooms per person                                        | ↔      | ●    | 22. Number of new dwellings per year                                                             | ↘      | NA   |
|                                              | 20. People living in overcrowded dwelling                             | ↔      | ●    | 23. Dwellings in “Wohnvorranggemeinden”                                                          | ↘      | NA   |
|                                              | 21. Relative part of dwelling costs                                   | ↔      | ●    |                                                                                                  |        |      |
| <b>IV. Health</b>                            | 24. Life expectation at various ages and in good health               | ↘      | ●    | 28. Drug consumption                                                                             | ↔      | NA   |
|                                              | 25. Prevalence of mental problems                                     | ↗      | ●    | 29. Share of adults declaring to be in good or very good health                                  | ↘      | ●    |
|                                              | 26. Suicide rate                                                      | ↘      | ●    | 30. Share of adults declaring to have chronic disease                                            | ↗      | ●    |
|                                              | 27. Death by cause                                                    | ↘      | ●    | 31. Share of adults declaring to be limited in their everyday activity because of health reasons | ↗      | ●    |
|                                              |                                                                       |        |      |                                                                                                  |        |      |
| <b>V. Work-life balance</b>                  | 32. Share of employees working very long hours                        | ↗      | ●    | 35. Time spent commuting                                                                         | NA     | NA   |
|                                              | 33. Leisure and occupation time                                       | NA     | NA   | 36. Share of parental living (woman/man)                                                         | ↗      | NA   |
|                                              | 34. Employment rate of women with children in mandatory schooling age | ↗      | ●    | 37. Satisfaction with work-life balance                                                          | NA     | ●    |
| <b>VI. Education and skills</b>              | 38. Educational attainment                                            | ↗      | ●    | 40. Reading skills at 15                                                                         | ↗      | ●    |
|                                              | 39. Young people having left education and training early             | ↗      | ●    | 41. Civic skills of students                                                                     | NA     | ●    |
| <b>VII. Social relationships</b>             | 42. Social network support                                            | NA     | ●    | 44. Time spent volunteering                                                                      | NA     | NA   |
|                                              | 43. Membership in social, cultural and sport associations             | NA     | ●    | 45. Frequency of social contacts                                                                 | ↗      | ●    |
| <b>VIII. Governance and civic engagement</b> | 46. Voter turnout                                                     | ↔      | NA   | 49. Knowledge and use of Luxembourgian, French, German, and/or English                           | NA     | NA   |
|                                              | 47. Consultation on rule making                                       | ↔      | ●    | 50. Confidence in institutions                                                                   | ↘      | ●    |
|                                              | 48. Membership in political and civic associations                    | NA     | ●    | 51. Feeling of discrimination                                                                    | ↔      | NA   |
| <b>IX. Environment</b>                       | 52. Air quality                                                       | ↗      | ●    | 56. Share of renewable energies on the final consumption of energy                               | ↗      | ●    |
|                                              | 53. Water quality                                                     | ↘      | NA   | 57. Car use                                                                                      | ↔      | ●    |
|                                              | 54. Noise                                                             | ↔      | ●    | 58. Land use                                                                                     | ↔      | NA   |
|                                              | 55. Recycling rate                                                    | ↗      | ●    | 59. Organic farming                                                                              | ↔      | ●    |
|                                              | 60. Environmental disease burden                                      | NA     | ●    |                                                                                                  |        |      |
| <b>X. Personal security</b>                  | 61. Offence rate                                                      | ↗      | NA   | 62. Feeling of safety (walking alone at night)                                                   | NA     | ●    |
| <b>XI. Subjective well-being</b>             | 63. Life satisfaction                                                 | ↘      | ●    |                                                                                                  |        |      |

### 3.1 Domain I: Income and wealth

This section illustrates the eleven indicators that compose the domain on income and wealth. Table 3.3 lists all the indicators included in this domain, and summarises the results using a system of colours and arrows. The colours (red, green, and yellow) indicate how Luxembourg scores compared to other European countries in a given year for a given indicator. The comparison uses data for the most recent year on which data are available. The signs ( $\nearrow$ ,  $\searrow$ , and  $\rightsquigarrow$ ) indicate how the given indicator changed over time in Luxembourg (see the legend for details on how to interpret the colours and signs). If the available data does not allow an international comparison and/or a time-series analysis, we used the acronym *NA* which stands for ‘not available’. (Note that some indicators are in fact composed by sub-indicators, so that the total number of rows in the table is seventeen.)

Table 3.3 informs that for twelve indicators Luxembourg ranks in the top quartile of the indicators scores compared to other Western European countries. These are mainly measures of income and wealth per capita. As for Gini and gender wage gap, Luxembourg data is in line with other European countries. In one case, namely risk of poverty after transfers, Luxembourg ranks in the bottom quartile of the distribution. Overall, measures of income and wealth have an increasing trend during the period, while the risk of poverty has increased and income inequality has stayed the same.

*Why does this domain matter?* Income and wealth are essential components of individuals’ well-being: income is a tool to satisfy basic needs, it also enables people to make life choices; wealth provides security and buffering from economic shocks such as recessions; and income distribution measures inform on income inequality.

*Why do these indicators matter?* The Gross National Income (GNI) per capita reflects people’s ability to satisfy their basic and material needs, while the total household wealth proxies the households’ ability to satisfy their needs and to cope with economic vulnerability. The net adjusted available household income is the best measure of personal economic resources, since it includes marketed and non-marketed resources. The yearly growth rate of different measures of income allow us to observe the evolution of the households’ income from different perspectives. Household total consumption of marketed and non-marketed goods contributes to households’ material well-being, and accounts for consumption measures that are often neglected. The Gini index, the inter-quantile ratios, the men-women wage gap and different measures of risk of poverty provide different perspectives on how income distributes in the population. Increasing income inequality signals that some groups may be left behind; this, it turns, may threaten social cohesion, may reduce the possibility to prosper for a share of the population, and may lead to social cleavages and unrest. Severe material deprivation and the inability to make ends meet are subjective indicators on people’s perceptions on their ability to afford satisfactory living conditions.

#### 3.1.1 (1.) GNI per capita

The gross national income (GNI) per capita is an aggregate-level indicator computed as the ratio of the GNI at current market prices to the population. GNI is the gross domestic product, and it accounts for net wages, salaries and property income from abroad, as well as net taxes and subsidies from abroad. Data are sourced from Eurostat and STATEC. The

**Table 3.3:** Domain 1, income and wealth.

| N   | Indicators                                                                                                                      | Description                                                                                                                                                                                                                                               | International comparison | Change |
|-----|---------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------|
| 1   | GNI per capita                                                                                                                  | This indicator increases from €58,697.47 to €59,297.8 in 2015; note the initial jump in 2010 owed to a definition change.                                                                                                                                 | ● 2014                   | ↗      |
| 2   | Total household wealth                                                                                                          | In 2010 the median total household wealth amounted to about €398,000, while four years later the same statistic amounted to about €438,000.                                                                                                               | ● 2014                   | ↗      |
| 3   | Net adjusted available household income                                                                                         | In 2015 the net adjusted available household income amounted to €64,352, i.e. about €3,600 less than in 2009.                                                                                                                                             | ● 2015                   | ↘      |
| 4.a | The yearly growth rate of the gross household income                                                                            | The total gross household income is more volatile for the bottom 3 quintiles of the income distribution.                                                                                                                                                  | ● 2015                   | ↗      |
| 4.b | The yearly growth rate of the net available household income, before social transfers, but with old-age and survivor's benefits | The net available household income is more volatile for the bottom two quintiles of the income distribution.                                                                                                                                              | ● 2015                   | ↗      |
| 4.c | The yearly growth rate of the net available household income, before all social transfers                                       | The net available household income, before all social transfers, is even more volatile for low-income households than sub-indicator (4.b).                                                                                                                | ● 2015                   | ↗      |
| 4.d | The yearly growth rate of the net adjusted available household income                                                           | The net adjusted available household income shows that, after taxation, social transfers reduce income volatility on a year-to-year basis.                                                                                                                | ● 2015                   | ↗      |
| 5.a | Household total consumption of marketed goods                                                                                   | Household consumption of marketed goods has decreased by €1,721 since 2009.                                                                                                                                                                               | NA*                      | ↘      |
| 5.b | Household total consumption of non marketed goods                                                                               | This indicator is observed only in year 2014 and it shows an average daily consumption, in terms of replacement costs, of non-marketed goods of €18.80, and an average daily consumption, in terms of opportunity costs, of non-marketed goods of €28.12. | NA*                      | NA'    |
| 6   | Gini index                                                                                                                      | Income inequality reduced from 29.1% in 2009 to 26.9% in 2011, it peaked at 30% in 2013, and it subsequently remained stable at 28.2% in 2015.                                                                                                            | ● 2015                   | ↔      |

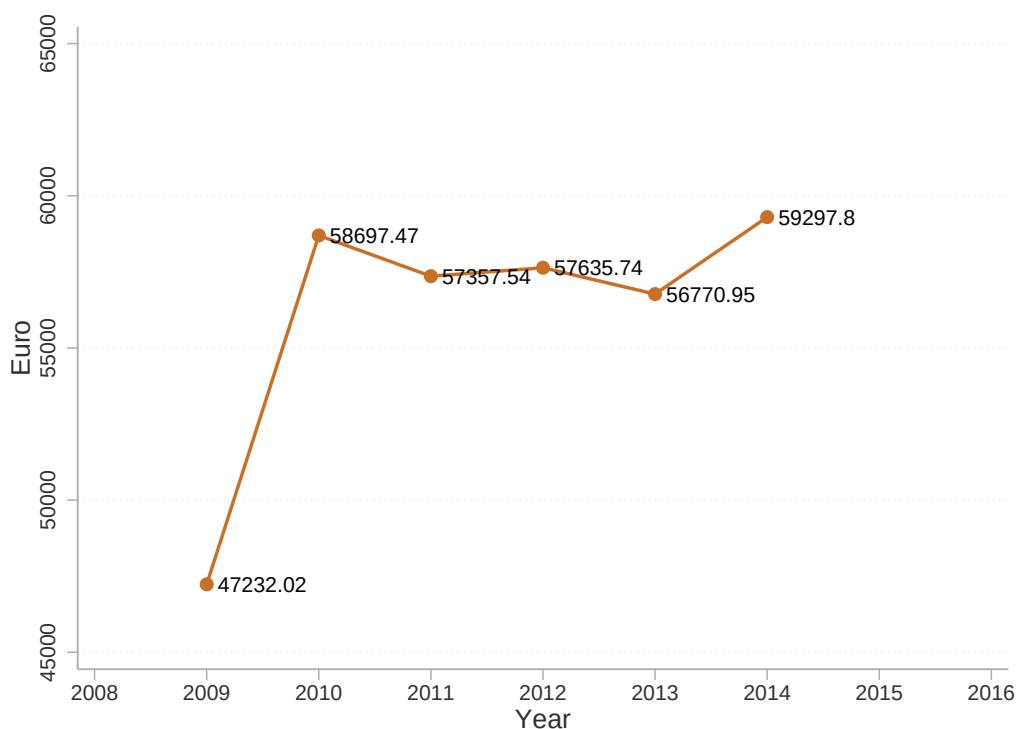
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|        |                                                                              |                                                                                                                                                                                                                          |                          | Continued |
|--------|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-----------|
| N      | Indicators                                                                   | Description                                                                                                                                                                                                              | International comparison | Change    |
| 7.a    | Inter-quintile ratio                                                         | The inter-quintile ratio follows a trend similar to the Gini index; it is stable around 4.2 percentage points.                                                                                                           | ● 2015                   | ↔         |
| 7.b    | Inter-decile ratio                                                           | The inter-decile ratio follows a trend similar to the Gini index; it is stable around 6.5 percentage points.                                                                                                             | ● 2015                   | ↔         |
| 8      | Men-women wage gap                                                           | The gender wage gap nearly halved between 2009 (13.17%) and 2014 (6.91%). However, this indicator follows a reverse U trend: it increased above 16 percentage points in 2010 and 2011 before starting declining in 2012. | ● 2015                   | ↘         |
| 9.a    | Risk of poverty before social transfers                                      | On average 28% of households in Luxembourg are at risk of poverty before social transfers.                                                                                                                               | ● 2015                   | ↔         |
| 9.b    | Risk of poverty after social transfers                                       | On average 15% of households in Luxembourg are at risk of poverty after social transfers. The share increases from 14.9% in 2009 to 16.4% in 2014, and finally reduces to 15.3% in 2015.                                 | ● 2015                   | ↗         |
| 10     | People in situation of severe material deprivation                           | The share of people living in severely deprived households was 1.11% in 2009 and 1.96% in 2015.                                                                                                                          | ● 2015                   | ↗         |
| 11     | People unable to make ends meet                                              | The share of people declaring to have difficulties in making ends meet increased by 3.1% between 2009 (24.7%) and 2015 (27.3%).                                                                                          | ● 2015                   | ↗         |
| Legend |                                                                              |                                                                                                                                                                                                                          |                          |           |
| ●      | Luxembourg score is in the top 25% among Western European countries.         |                                                                                                                                                                                                                          |                          |           |
| ●      | Luxembourg score is in line with the Western Europe average.                 |                                                                                                                                                                                                                          |                          |           |
| ●      | Luxembourg score belongs to the bottom 25% among Western European countries. |                                                                                                                                                                                                                          |                          |           |
| ↗      | Indicates an increase over time.                                             |                                                                                                                                                                                                                          |                          |           |
| ↔      | Indicates that the indicator did not change.                                 |                                                                                                                                                                                                                          |                          |           |
| ↘      | Indicates a decrease over time.                                              |                                                                                                                                                                                                                          |                          |           |
| NA'    | Time series is not available.                                                |                                                                                                                                                                                                                          |                          |           |
| NA*    | Data sourced from data producer, and thus not internationally comparable.    |                                                                                                                                                                                                                          |                          |           |
| NA**   | Data sourced from administrative records.                                    |                                                                                                                                                                                                                          |                          |           |

GNI is computed according to the accounting rule set by the new “European System of National and Regional Accounts (European System of National and Regional Accounts (ESA))” published in 2010.<sup>3</sup>

Figure 3.1 shows the trend of Gross National Income per capita (GNIpc) in Luxembourg.

**Figure 3.1:** GNI per capita.



**Source:** Eurostat data, own elaboration.

In 2014 the level of GNIpc was about €600 larger than in 2010, despite a setback that took place between 2011 and 2013.

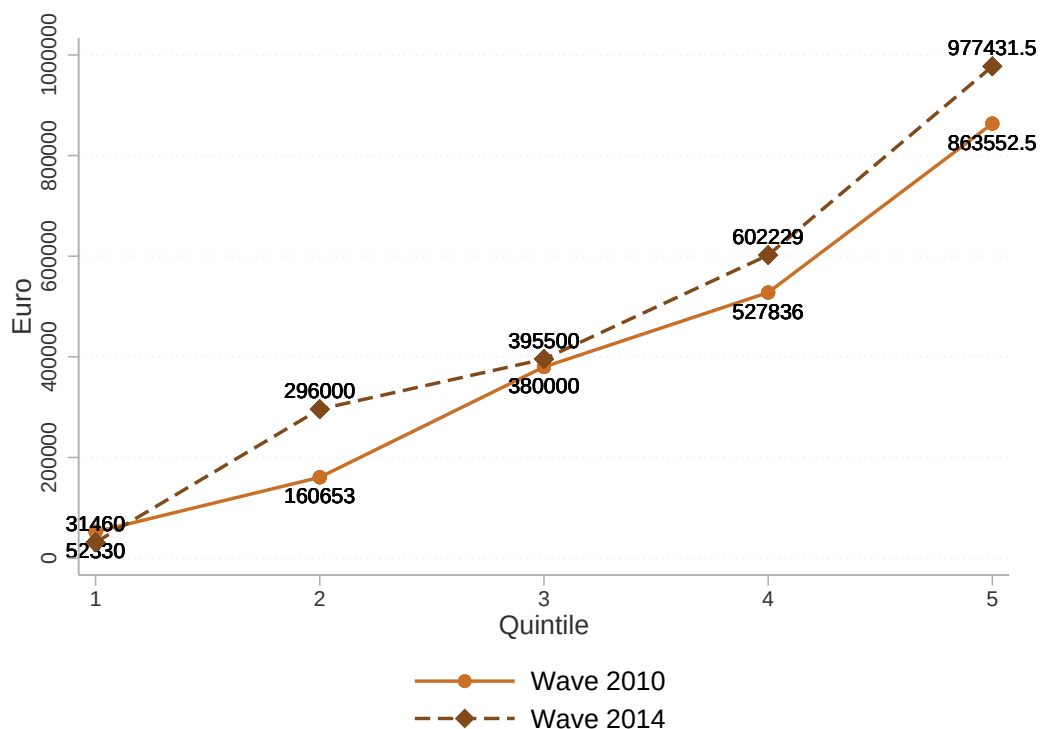
We emphasise that these figures are not directly comparable to the 2009 level, because of the break in the series in 2009. Until then, the GNI was computed excluding “Financial Intermediation Services Indirectly Measured (Financial Intermediation Services Indirectly Measured (FISIM))”. Starting from 2010, these services have been included in the computation of the GNI, which explains the jump in the levels between 2009 and 2010.

<sup>3</sup>The accounting rules based on the ESA2010 standard are illustrated on online material: <http://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/KS-GQ-14-010>. Note that this indicator differs from the GNI compiled according to the accounting rule set in the ESA95 (The accounting rules based on the ESA95 standard are illustrated on online material: <http://ec.europa.eu/eurostat/en/web/products-manuals-and-guidelines/-/KS-42-02-585>). The data are obtained directly from the Eurostat website ([http://ec.europa.eu/eurostat/statistics-explained/index.php/Monitoring\\_GNI\\_for\\_own\\_resource\\_purposes](http://ec.europa.eu/eurostat/statistics-explained/index.php/Monitoring_GNI_for_own_resource_purposes), then click on “GNI data collection 2015.”), and they are produced on an annual basis by the GNI Committee. Data on Luxembourg population are produced by STATEC, and are available at [http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=12856&IF\\_Language=eng&MainTheme=2&FldrName=1](http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=12856&IF_Language=eng&MainTheme=2&FldrName=1).

### 3.1.2 (2.) Total household wealth

The wealth of residents is measured by the total household wealth (i.e., the difference between total assets and total liabilities). Total assets include real assets (for instance, value of real estate property, of vehicles, valuables, etc.) and financial assets (i.e. deposits, investments, bonds, etc.), whereas total liabilities include mortgages, and outstanding amount of debts and loans. This indicator is sourced from the “Household Finance and Consumption Survey (Household Finance and Consumption Survey (HFCS))”, a survey run every four years by the “European Central Bank (European Central Bank (ECB))” and administered in Luxembourg by the Central Bank of Luxembourg.<sup>4</sup>

**Figure 3.2:** Median total household wealth, by income quintile, 2010 and 2014.



**Source:** HFCS survey data, own elaboration.

Two waves of the survey are available for Luxembourg, namely 2010 and 2014. The median total household wealth was €39,7840.8 in 2010 and €43,7510.4 in 2014.<sup>5</sup> Figure 3.2 presents the median total household wealth by income quintile, which tells us how wealth varies across the population’s income distribution.

We observe that the difference in total household wealth between the first and fifth quintile of the income distribution has increased between 2010 and 2014 by about €100,000.

<sup>4</sup>“Total household net wealth” is the variable dn3001 from HFCS. Data have been obtained from the European Central Bank, following an application by this report’s authors. Please, see reports ECB (2018) and ECB (2013) for results on wave 2014 and wave 2010 respectively; both reports are freely available online.

<sup>5</sup>The wealth in € is not deflated.

### 3.1.3 (3.) Net adjusted available household income

The definition of this indicator is provided by STATEC. It is the “adjusted disposable income, which is obtained from the disposable income of an institutional unit or sector by adding the value of the social transfers in kind receivable by that unit or sector and by subtracting the value of the social transfers in kind payable by that unit or sector.”<sup>6</sup> In other terms, this is the net adjusted disposable household income *after social transfer*.

This indicator corresponds to a variable from the “European Union Statistics on Income and Living Conditions (EU-SILC):” “Total disposable household income” after tax and after social transfers, that is, HY020.

In this report, we consider data for the waves 2009-2015.

The income variable is inflated at 2015 prices. The inflation proceeds based on the consumer price index (Base 100 = 1.1.1948), over the period 1948 - 2015, produced by STATEC.<sup>7</sup>

EU-SILC data are produced every year by STATEC and harmonized by Eurostat. The final data are obtained from Eurostat after application; yearly updates are automatically delivered by Eurostat.

**Table 3.4:** Net adjusted available household income.

|                        | Year      |           |           |           |           |           |           | Mean   |
|------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|--------|
|                        | 2009<br>€ | 2010<br>€ | 2011<br>€ | 2012<br>€ | 2013<br>€ | 2014<br>€ | 2015<br>€ |        |
| <b>Income quintile</b> |           |           |           |           |           |           |           |        |
| 1                      | 25303     | 24162     | 23224     | 22813     | 22435     | 21954     | 22071     | 23097  |
| 2                      | 42307     | 42201     | 41242     | 40059     | 40135     | 40549     | 39236     | 40777  |
| 3                      | 57258     | 57314     | 56676     | 54641     | 54584     | 55308     | 54489     | 55709  |
| 4                      | 78216     | 78739     | 77222     | 74758     | 74777     | 75929     | 75740     | 76433  |
| 5                      | 137030    | 132413    | 126780    | 124631    | 133511    | 125054    | 130281    | 129843 |
| <b>Mean</b>            | 67985     | 66948     | 65017     | 63360     | 65069     | 63754     | 64352     | 65155  |

**Source:** EU-SILC survey data, own elaboration.

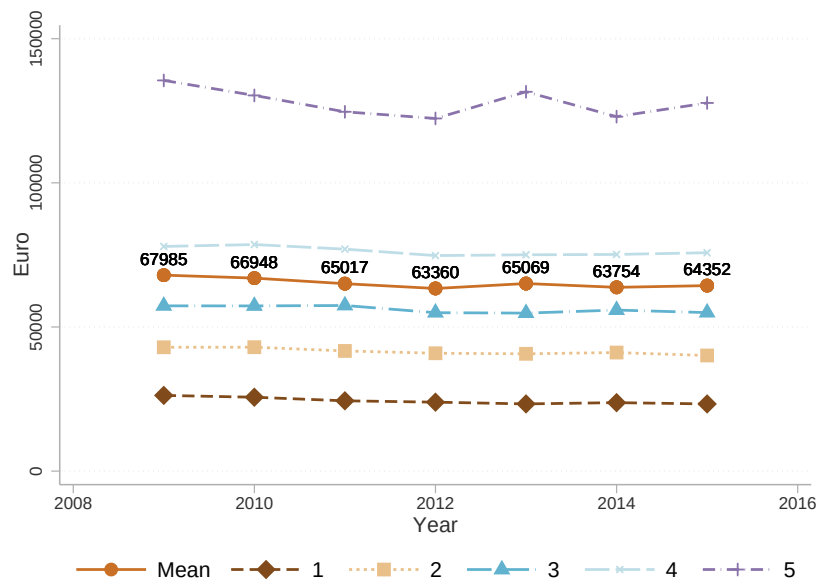
Table 3.4 shows the average net adjusted available household income in each year (row “Mean”), the average net adjusted available household income in each year and by income quintile (rows 1 to 5), and the average net adjusted available household income across years (column “Mean”).

Figure 3.3 illustrates these figures, except for those from the last column.

The average net adjusted available household income has reduced over the period 2009-2015 by about €3,000; this figure suggests that the decrease in the net adjusted available household income might be due to a slight reduction in the fifth quintile of the income distribution.

<sup>6</sup><http://www.statistiques.public.lu/en/methodology/definitions/A/revenudisponibleajuste/index.html>

<sup>7</sup>[http://www.statistiques.public.lu/stat/ReportFolders/ReportFolder.aspx?IF\\_Language=eng&MainTheme=5&FldrName=5&RFPath=109](http://www.statistiques.public.lu/stat/ReportFolders/ReportFolder.aspx?IF_Language=eng&MainTheme=5&FldrName=5&RFPath=109)

**Figure 3.3:** Net adjusted available household income, by income quintile.

Source: EU-SILC survey data, own elaboration.

### 3.1.4 (4.) Real yearly growth rate of various measures of household income

The document “Avis commun CES-CSDD: PIBien-être”<sup>8</sup> recommends to compute the real yearly growth rate of the following three measures of household income:<sup>9</sup>

- 1 The gross household income (i.e., income before taxation);
- 2 The net available household income (i.e., income after taxation, without social transfers);
- 3 The net adjusted available household income (i.e., income after taxation, with social transfers).

In this section, we compute the real yearly growth rate of these three measures of household income. Additionally, the second measure is computed in two different ways:

- 2.a The net available household income, before social transfers, but with old-age and survivor’s benefits;
- 2.b The net available household income, before all social transfers.

All these indicators are based on EU-SILC data: 1 uses variable HY010, 2.a uses variable HY022, 2.b uses variable HY023, 3 uses variable HY020; these indicators cover the period 2009-2015.

Income variables are converted in constant Euro of 2015 to account for differences in the levels of price over time. The consumer price index (Base 100 = 1.1.1948), over the period 1948 - 2015, is produced by STATEC. Figures are publicly available here: <http://www.>

<sup>8</sup><http://www.statistiques.public.lu/fr/actualites/economie-finances/comptes-finances/2013/11/20131122/AvisCES-CSDD-PIBbienetre.pdf>

<sup>9</sup>A detailed illustration of the component of these measures of household income and the measure of household income in indicator 3. can be found in the pdf document “DOC-SILC065 operation 2014 version reconciliated and early transmission October 2014,” which can be downloaded from [https://circabc.europa.eu/webdav/CircaBC/ESTAT/eusilc/Library/guidelines\\_questionnaire/2014%20operation%20Guidelines](https://circabc.europa.eu/webdav/CircaBC/ESTAT/eusilc/Library/guidelines_questionnaire/2014%20operation%20Guidelines)

[statistiques.public.lu/stat/ReportFolders/ReportFolder.aspx?IF\\_Language=eng&MainTheme=5&FldrName=5&RFPPath=109](http://statistiques.public.lu/stat/ReportFolders/ReportFolder.aspx?IF_Language=eng&MainTheme=5&FldrName=5&RFPPath=109).

EU-SILC data are produced every year by STATEC and harmonized by Eurostat. The final data are obtained from Eurostat after application; yearly updates are automatically delivered by Eurostat.

Tables 3.5, 3.6, 3.7, and 3.8, illustrate the growth rates of these four indicators (for the entire population and by income quintile), while Figures 3.6, 3.4, 3.5, and 3.7 provide a graphic illustration of these statistics. Note that 2009 is not the reference year for the computation of the growth rate; the growth rate in each year is computed with respect to the level of a given type of income level in the previous year.<sup>10</sup>

**Table 3.5:** Yearly growth rate of total gross household income (1), for the entire population and by income quintile.

| Year | Whole pop.<br>% | Quint. 1<br>% | Income quintile |               |               | Quint. 5<br>% |
|------|-----------------|---------------|-----------------|---------------|---------------|---------------|
|      |                 |               | Quint. 2<br>%   | Quint. 3<br>% | Quint. 4<br>% |               |
| 2009 | 100             | 100           | 100             | 100           | 100           | 100           |
| 2010 | 99              | 96            | 98              | 99            | 100           | 96            |
| 2011 | 97              | 99            | 98              | 99            | 99            | 95            |
| 2012 | 100             | 98            | 99              | 98            | 98            | 101           |
| 2013 | 102             | 100           | 100             | 100           | 100           | 106           |
| 2014 | 99              | 100           | 101             | 103           | 102           | 95            |
| 2015 | 103             | 99            | 98              | 99            | 101           | 104           |

**Source:** EU-SILC survey data, own elaboration.

The total gross household income for the entire population has not been much volatile from 2009 to 2015. However, different quintiles have experienced different situations. On one hand, there has been volatility for the bottom three quintiles of the income distribution, which faced frequent income decreases. On the other hand, the top quintiles of the income distribution have shown the largest changes of income on a year-to-year basis.

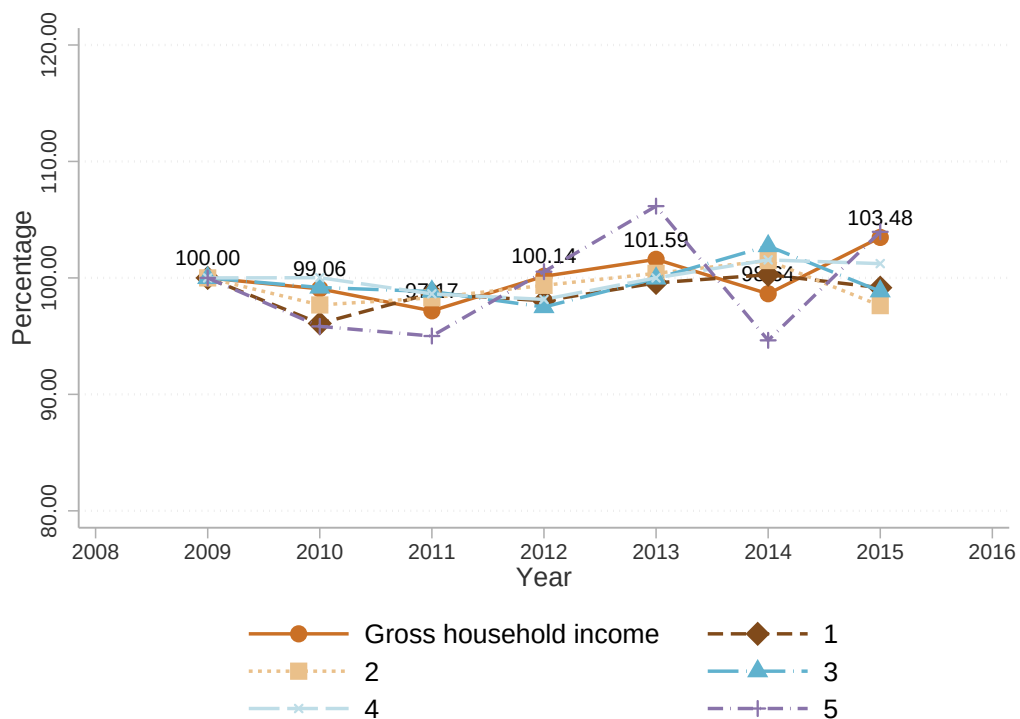
**Table 3.6:** Yearly growth rate of net disposable household income (2.a), for the entire population and by income quintile.

| Year | Whole pop.<br>% | Quint. 1<br>% | Income quintile |               |               | Quint. 5<br>% |
|------|-----------------|---------------|-----------------|---------------|---------------|---------------|
|      |                 |               | Quint. 2<br>%   | Quint. 3<br>% | Quint. 4<br>% |               |
| 2009 | 100             | 100           | 100             | 100           | 100           | 100           |
| 2010 | 99              | 92            | 97              | 100           | 100           | 96            |
| 2011 | 97              | 94            | 97              | 101           | 99            | 95            |
| 2012 | 98              | 98            | 99              | 95            | 97            | 98            |
| 2013 | 102             | 92            | 96              | 100           | 100           | 109           |
| 2014 | 98              | 104           | 106             | 102           | 100           | 93            |
| 2015 | 104             | 102           | 96              | 99            | 101           | 104           |

**Source:** EU-SILC survey data, own elaboration.

<sup>10</sup>Let us consider 3.5. The total gross household income in 2011 is 97% of the total gross household income in 2010.

**Figure 3.4:** Yearly growth rate of total gross household income (1), for the entire population and by income quintile.



**Source:** EU-SILC survey data, own elaboration.

Figures in Table 3.6 reconcile with those from Table 3.5: we more observe frequent negative changes for bottom quintiles, but largest for the top quintile.

**Table 3.7:** Yearly growth rate of net disposable household income (2.b), for the entire population and by income quintile.

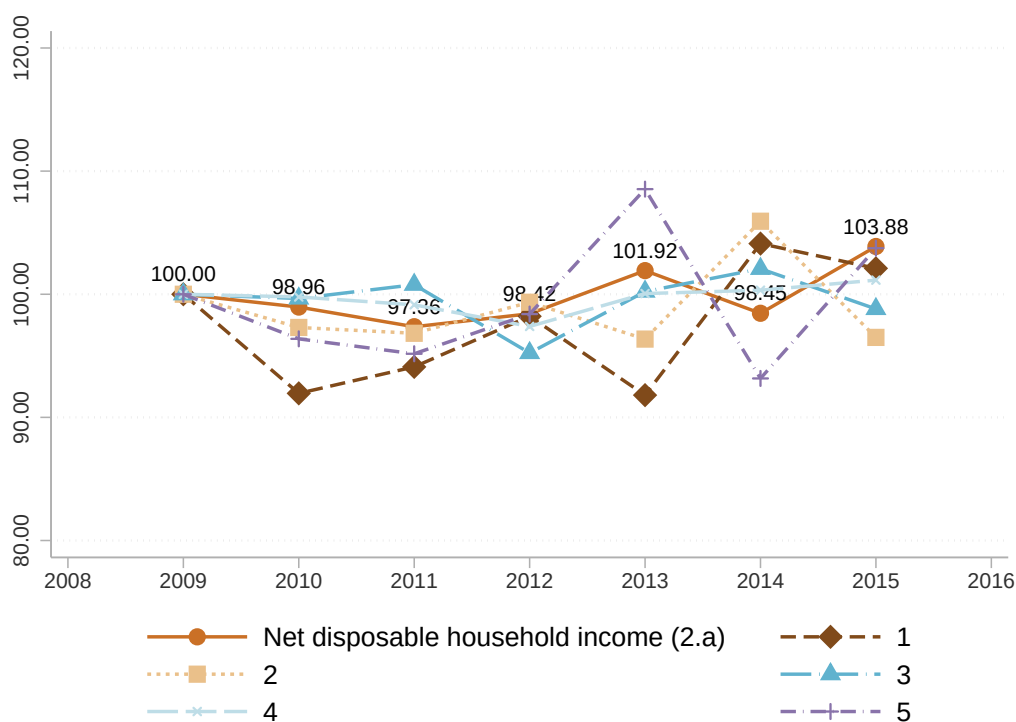
| Year | Income quintile |               |               |               |               |               |
|------|-----------------|---------------|---------------|---------------|---------------|---------------|
|      | Whole pop.<br>% | Quint. 1<br>% | Quint. 2<br>% | Quint. 3<br>% | Quint. 4<br>% | Quint. 5<br>% |
| 2009 | 100             | 100           | 100           | 100           | 100           | 100           |
| 2010 | 99              | 101           | 95            | 95            | 100           | 96            |
| 2011 | 96              | 96            | 100           | 101           | 99            | 92            |
| 2012 | 98              | 95            | 99            | 93            | 94            | 98            |
| 2013 | 103             | 88            | 94            | 100           | 99            | 110           |
| 2014 | 97              | 114           | 105           | 104           | 97            | 91            |
| 2015 | 103             | 101           | 91            | 99            | 98            | 105           |

**Source:** EU-SILC survey data, own elaboration.

Figures from Table 3.7 show that, without any social transfer, the bottom quintiles of the income distribution would have faced a greater income volatility (e.g., a 12% reduction in net disposable household income without social transfers in 2013, with respect to 2012).

Finally, Table 3.8 suggests that, after taxation, social transfers reduce income volatility

**Figure 3.5:** Yearly growth rate of net disposable household income (2.a), for the entire population and by income quintile.



**Source:** EU-SILC survey data, own elaboration.

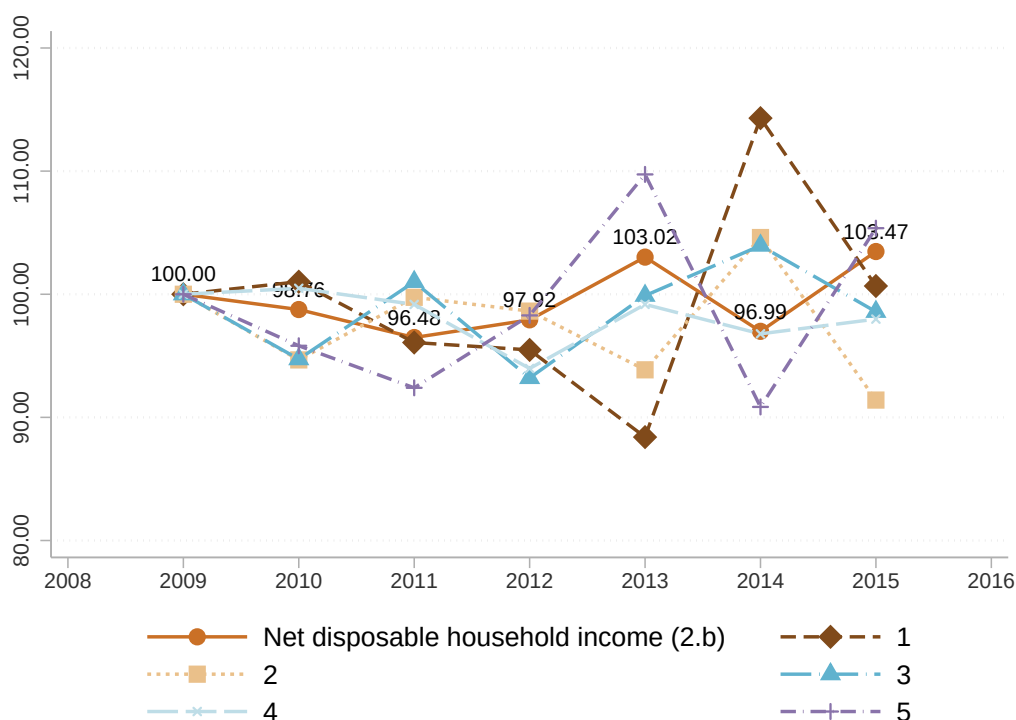
**Table 3.8:** Yearly growth rate of net adjusted disposable household income (3), for the entire population and by income quintile.

| Year | Income quintile |               |               |               |               |               |
|------|-----------------|---------------|---------------|---------------|---------------|---------------|
|      | Whole pop.<br>% | Quint. 1<br>% | Quint. 2<br>% | Quint. 3<br>% | Quint. 4<br>% | Quint. 5<br>% |
| 2009 | 100             | 100           | 100           | 100           | 100           | 100           |
| 2010 | 100             | 98            | 100           | 100           | 101           | 96            |
| 2011 | 97              | 95            | 97            | 100           | 98            | 96            |
| 2012 | 99              | 98            | 98            | 96            | 97            | 98            |
| 2013 | 102             | 97            | 100           | 100           | 100           | 108           |
| 2014 | 98              | 102           | 101           | 102           | 100           | 93            |
| 2015 | 103             | 98            | 98            | 98            | 101           | 104           |

**Source:** EU-SILC survey data, own elaboration.

on a year-to-year basis.

**Figure 3.6:** Yearly growth rate of net disposable household income (2.b), for the entire population and by income quintile.



Source: EU-SILC survey data, own elaboration.

### 3.1.5 (5.) Household total consumption

The document “Avis commun CES-CSDD: PIBien-être” recommends to account for the consumption of both marketed and non-marketed goods (e.g. meals preparation, elderly care, etc...), since both of them contribute to people’s wellbeing. Because of data availability, these two sub-indicators are computed at the individual level, in lieu of household level. For the same reason, these two sub-indicators are not aggregated in a single indicator.

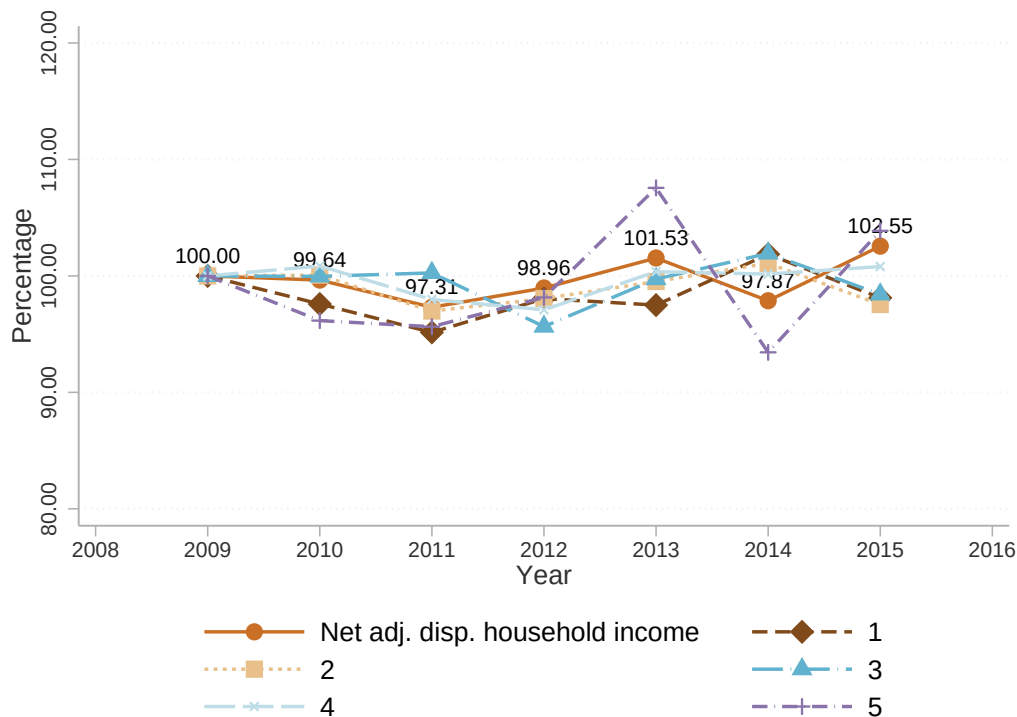
#### (5.a) Consumption of marketed goods

Consumption of marketed goods is computed based on data from the “Household Budget Survey (Household Budget Survey (HBS)).” This survey is produced yearly by STATEC and the data can be obtained internally, without application to external institutes. The analyses are conducted on available waves within our period of interest (2009-2015); when the analyses were conducted, only wave 2015 was not yet available.

We computed three different indicators of equivalized marketed consumption: <sup>11</sup>

<sup>11</sup>“To compare the living standards of households having different sizes and compositions, we usually adjust the disposable income of a household by the number of adult-equivalents. This number is calculated by using the so-called *OECD-modified scale*, according to which the reference person of the household counts for 1 adult-equivalent, every other member aged 14 or over count to 0.5 and each member aged 13 or less to 0.3.” Source: <http://www.statistiques.public.lu/en/methodology/definitions/D/revenudisponibleequivalentadulte/index.html>

**Figure 3.7:** Yearly growth rate of net adjusted disposable household income (3), for the entire population and by income quintile.



**Source:** EU-SILC survey data, own elaboration.

- 1 Total equivalized consumption;
- 2 Total equivalized consumption minus equivalized imputed rent;
- 3 Equivalized imputed rent.

The levels of these three indicators are illustrated in Figure 3.8.

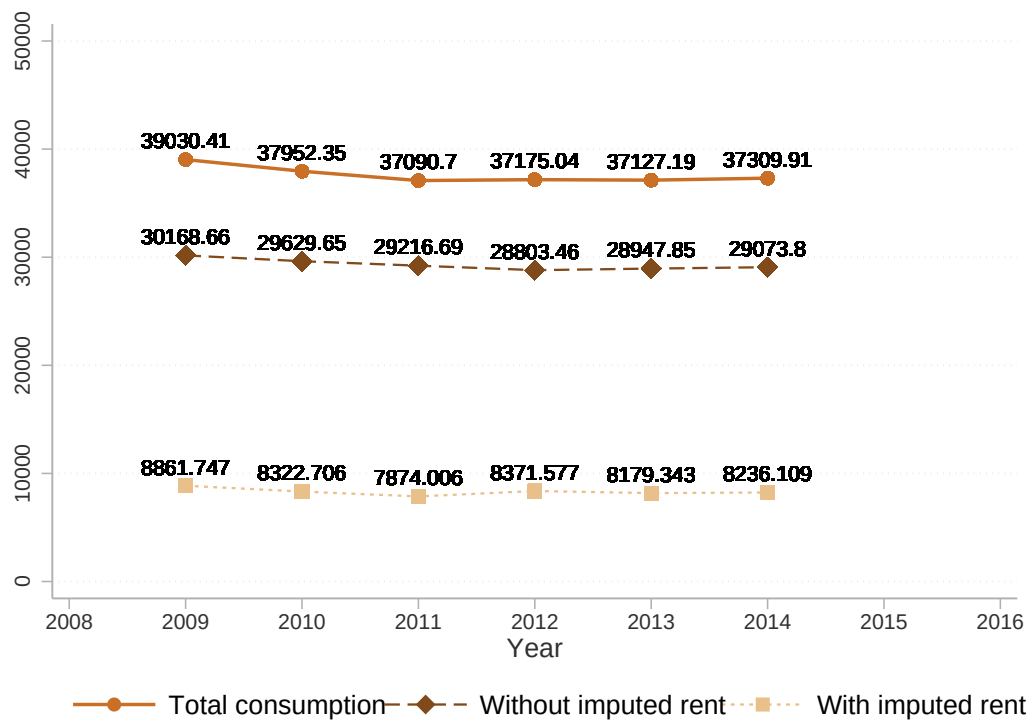
Over the period 2009-2015, we observe a slight reduction in the equivalised consumption without imputed rent. Does that vary by income level?

We can answer this question by disaggregating these measures. Note that the disaggregation by income quintile cannot be carried out, because for waves 2009 and 2010 there is no information on household income level. For these two waves, there are eight monthly income groups in which households are divided. The eight categories are built based on the following income brackets: 1 = <1250€, 2 = 1250-1850€, 3 = 1850-2500€, 4 = 2500-3100€, 5 = 3100-3700€, 6 = 3700-5000€, 7 = 5000-6200€, 8 = >6200€. Assuming that these categories were established in 2009, we use that year as a baseline to inflate these categories to be applied to waves 2011-2014. Based on exact monthly income level for waves 2011-2014, it is possible to reconstruct these same eight categories for these most recent waves, and then disaggregate these three indicators by monthly income group over the period 2009 to 2014.

The levels of these three indicators are presented in Figures 3.9 to 3.16 by income category.

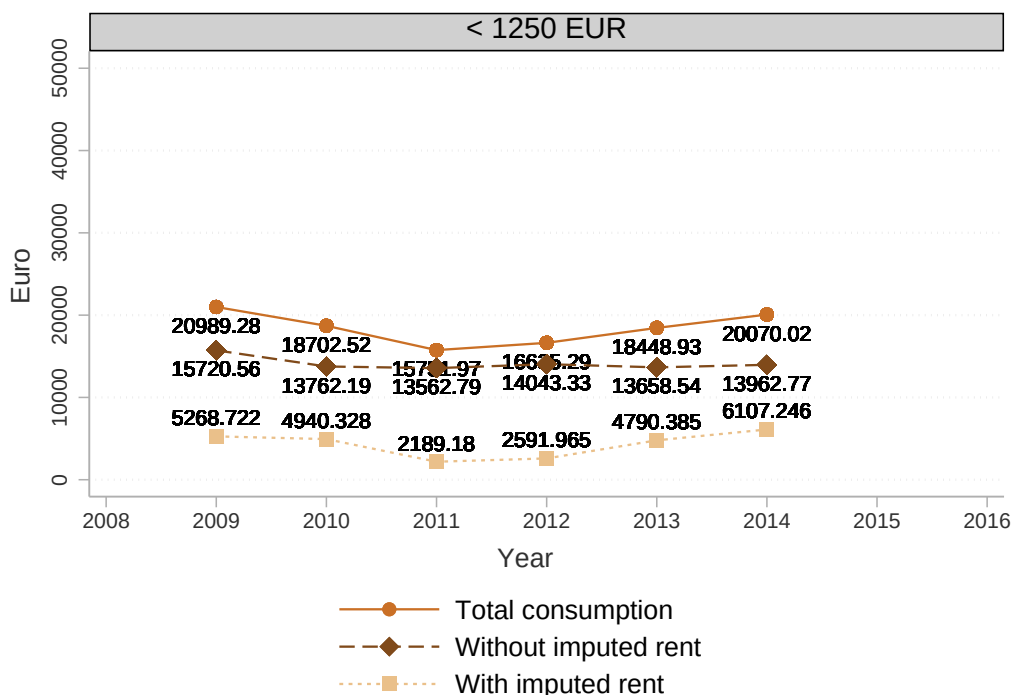
Over the period 2009-2014, we observe that the slight reduction in the equivalised

**Figure 3.8:** Total consumption marketed goods (total, without imputed rent, and only imputed rent).



**Source:** HBS survey data, own elaboration.

consumption without imputed rent seems to concern most income categories, except for that with the lowest income ( $\leq 1250\text{€}$ ). This income category presents a more volatile consumption level, which is characterized by a U-shaped trend, with the minimum being reached in 2011.

**Figure 3.9:** Total consumption marketed goods, by income category 1.

Source: HBS survey data, own elaboration.

### (5.b) Consumption of non-marketed goods

The document “Avis commun CES-CSDD: PIBien-être” recommends to compute two different indicators for non-marketed goods:

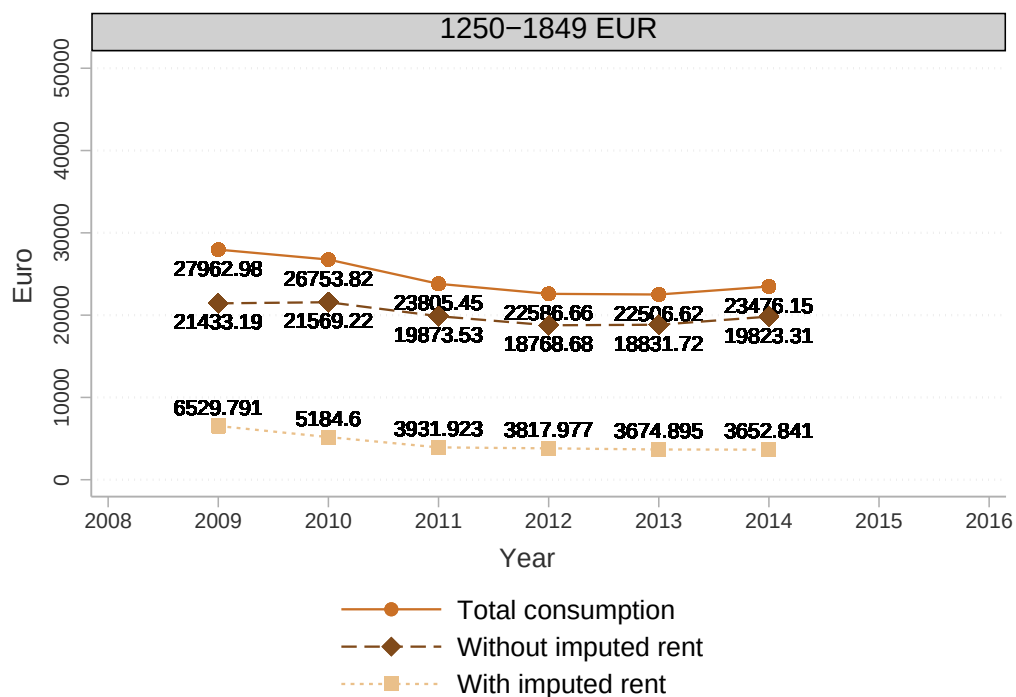
- 1 Replacements costs, that is, the wage that one person would have to pay to someone else to produce the same service;
- 2 Opportunity costs, that is, the wage that a person would receive, if that person spent the equivalent amount of time at work, instead of self-producing a non-marketed good.

To compute these two indicators first we compute the hours spent per day in a certain activity and then we multiply it by a monetary value.

The information on hours spent per day in doing a given activity is extracted from the “Time Use Survey (Time Use Survey (TUS));” the first and only available wave when we conducted these analyses refers to year 2014. These data can be obtained internally, without application to external institutes. The hours spent in a given day in producing non-marketed goods is given by the sum of all of the unpaid domestic work activities and unpaid family care (activities 311 to 399 in TUS).

The information on the monetary value for a given self-produced service is obtained from the Eurostat website.<sup>12</sup> The monetary value assigned to replacement costs for one hour of work is represented by the median hourly gross wage for low wage workers, in

<sup>12</sup>[http://ec.europa.eu/eurostat/statistics-explained/index.php/Earnings\\_statistics#Median\\_gross\\_hourly\\_earnings](http://ec.europa.eu/eurostat/statistics-explained/index.php/Earnings_statistics#Median_gross_hourly_earnings)

**Figure 3.10:** Total consumption marketed goods, by income category 2.

**Source:** HBS survey data, own elaboration.

Luxembourg, in 2010, that is, €11.9. The monetary value assigned to opportunity costs for one hour of work is represented by the median hourly gross wage, in Luxembourg, in 2010, that is, €17.8. These figures are computed from Eurostat with data from the Structure of Earnings Survey.

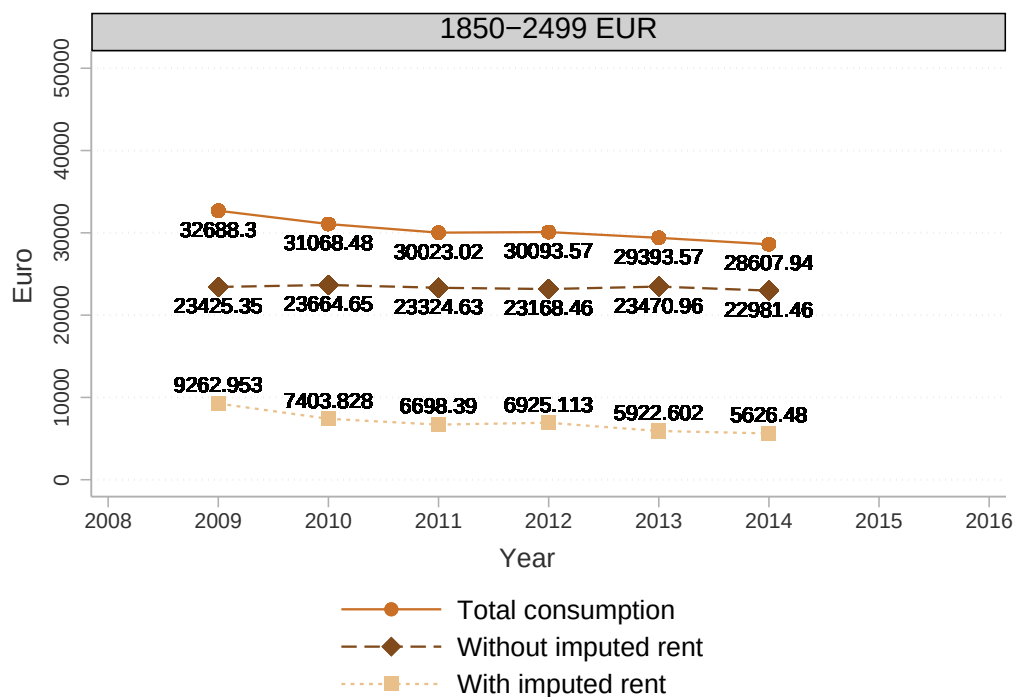
Once we have multiplied the time spent in a given activity by the monetary value, we divided the result by the equivalised amount of household members, to obtain the monetary value generated per equivalised household member.

Because of their nature, opportunity costs should not be computed for people younger than 16 years of age, since they are out of the labour force; for consistency sake, not even replacement costs are computed for this age group.

Table 3.9 shows the average replacements costs during weekdays, weekend days and the entire week (last row). This table shows average replacement costs disaggregated by age category, gender, nationality in sensu lato (i.e., Luxembourg, European Union (EU), and non-EU), education level (i.e., lower secondary, upper secondary, and tertiary education), marital status (i.e., single, married and civil unions, and no longer married), and income quintile.

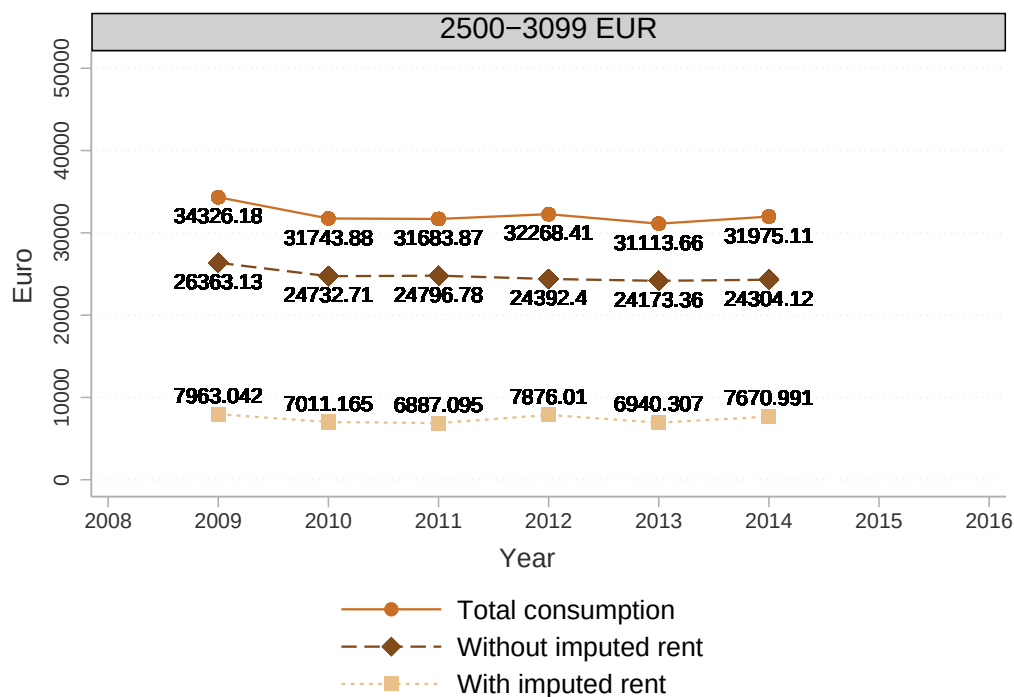
Table 3.10 reports similar figures for the opportunity costs.

We observe similar patterns for both replacement and opportunity costs. The amount of time put in self-produced services increases with age, it is greater for women and for people who are no longer married (probably single people produce less because tend to be younger and to live with their parents). Moreover, the amount of time put in self-produced

**Figure 3.11:** Total consumption marketed goods, by income category 3.

**Source:** HBS survey data, own elaboration.

services reduces with income and increases in the weekends across most categories.

**Figure 3.12:** Total consumption marketed goods, by income category 4.

Source: HBS survey data, own elaboration.

### 3.1.6 (6.-7.) Income inequality: Gini index & Inter-quintile and inter-decile ratio

As explained by Eurostat, the Gini coefficient “measures the extent to which the distribution of income within a country deviates from a perfectly equal distribution. A coefficient of 0 expresses perfect equality where everyone has the same income, while a coefficient of 100 expresses full inequality where only one person has all the income.”<sup>13</sup>

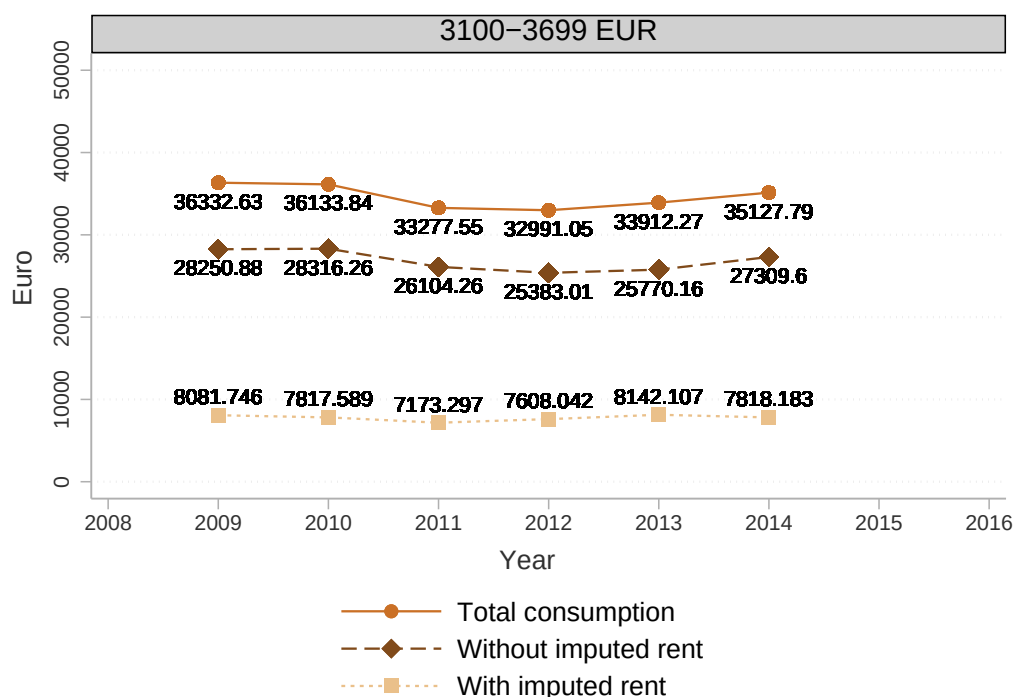
The Inter-quintile ratio, that is, S80/S20 ratio (and the inter-decile ratio, S90/S10 ratio) is “calculated as the ratio of the mean income received by the 20% (10%) of the population with the highest income to that received by the 20% (10%) of the population with the lowest income.”<sup>14</sup>

These two indicators have been computed with EU-SILC data for the period 2009-2015; both of them are based on the variable HX090, that is, “Equivalized disposable income.”

Overall, the statistics illustrated in this subsection show a U-shaped trend (decrease in inequality until 2011 and then an increase until 2013), with a new reduction in 2014-2015.

<sup>13</sup>[http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Gini\\_coefficient](http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Gini_coefficient)

<sup>14</sup><http://www.statistiques.public.lu/en/methodology/definitions/S/rappinterquint/index.html>

**Figure 3.13:** Total consumption marketed goods, by income category 5.

Source: HBS survey data, own elaboration.

### 3.1.7 (8.) Men-women wage gap

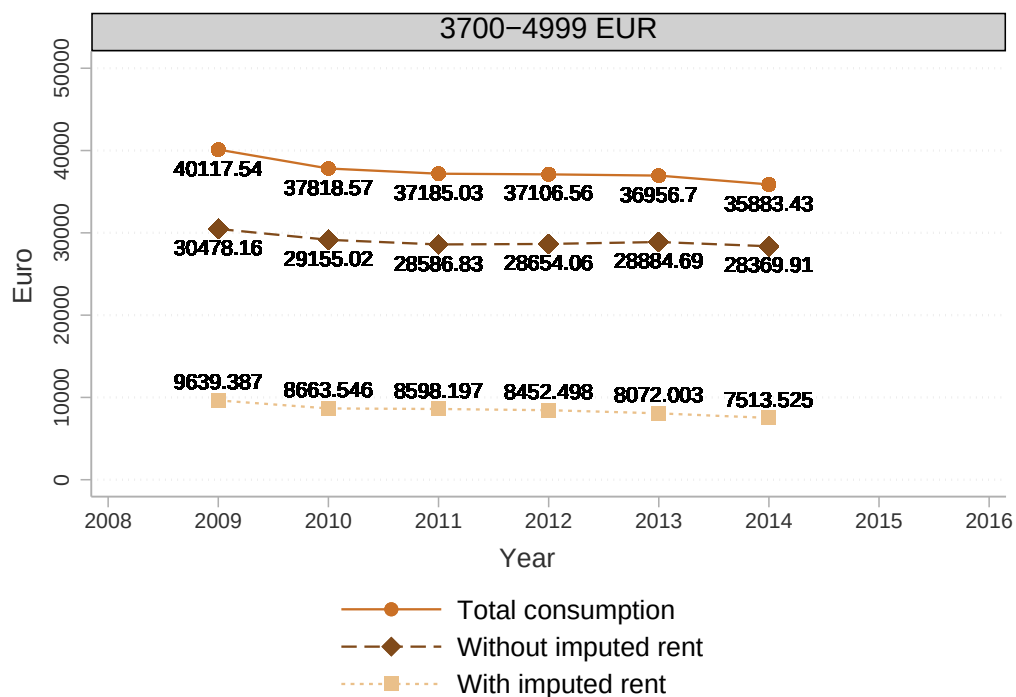
According to the definition provided by Eurostat, the “gender pay gap...refers to the difference in average wages between men and women. The unadjusted gender pay gap is calculated as the difference between the average gross hourly earnings of male and female paid employees as a percentage of average gross hourly earnings of male paid employees.” Here “Unadjusted,” implies that there is no correction for national differences in individual characteristics of employed men and women - the main reason is that, at this stage, there is neither consensus nor scientific evidence on which adjustment method should be used.<sup>15</sup>

This indicator has been computed with EU-SILC data for the period 2009-2015. It is based on several variables combined together to create the hourly wage per person.<sup>16</sup> Then, the average hourly wage for men and for women, and the percentage difference between the two of them are also computed.

We can observe that the gender wage gap has been decreasing since 2011. This decrease in the gender wage gap appears to be mostly driven by an increase in women’s wages.

<sup>15</sup>[http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Gender\\_pay\\_gap\\_%28GPG%29](http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Gender_pay_gap_%28GPG%29)

<sup>16</sup> $((PY010G)/(PL073+PL074+PL075+PL076))/(4*PL060)$ . Where PY010G is the employee cash or near cash gross income, which is divided by the sum of the number of months spent working (full-time or part-time, as an employee or as a self-employed). This ratio is divided by the number of hours usually worked per week in main job, that is, PL060, in the main job, which is multiplied by 4 to obtain the amount of hours worked per month.

**Figure 3.14:** Total consumption marketed goods, by income category 6.

Source: HBS survey data, own elaboration.

### 3.1.8 (9.) Risk of poverty

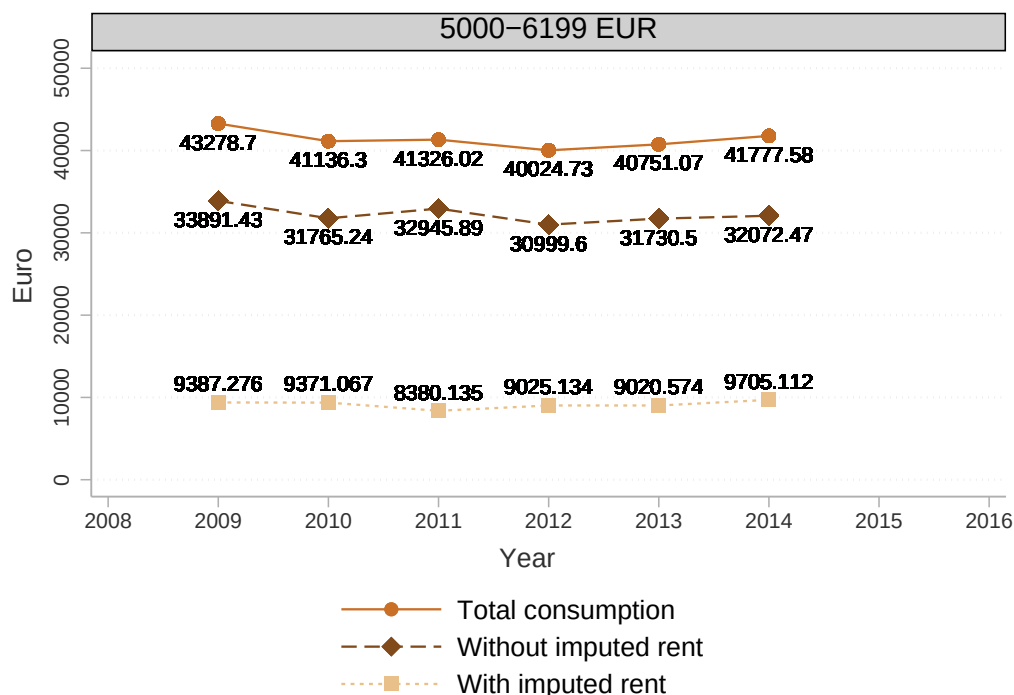
In general, depending on the definition of income we are following, we can compute two different risk-of-poverty rates. When we consider the household total disposable income per adult-equivalent, we refer to the “at-risk-of-poverty rate after social transfers.” When we consider the household disposable income per adult-equivalent without social transfers (e.g. family allowances, housing-related allowances), we refer to the “at-risk-of-poverty rate before social transfers.”<sup>17</sup> These two definitions reflect the monetary poverty. Other definitions of poverty could be considered, such as: the poverty of people who work (full- or part-time) for at least half year and the poverty of people living in households where adults have worked for less than 20% of the time in the past year. In this subsection, we present the figures for the two sub-indicators on monetary poverty; for lack of necessary data, the other two sub-indicators cannot be computed.

#### (9.a) Risk of poverty before social transfers

STATEC defines the rate of people at risk of poverty before social transfers as the share of people having an equivalised disposable income<sup>18</sup> below 60% of the median national income, which represents the poverty threshold. This indicator focuses on the hypothetical

<sup>17</sup><http://www.statistiques.public.lu/en/methodology/definitions/A/tauxrisquepauvrete/index.html>

<sup>18</sup>Pensions, such as old-age and survivors' (widows and widowers) benefits, are counted as income and not as social transfers

**Figure 3.15:** Total consumption marketed goods, by income category 7.

**Source:** HBS survey data, own elaboration.

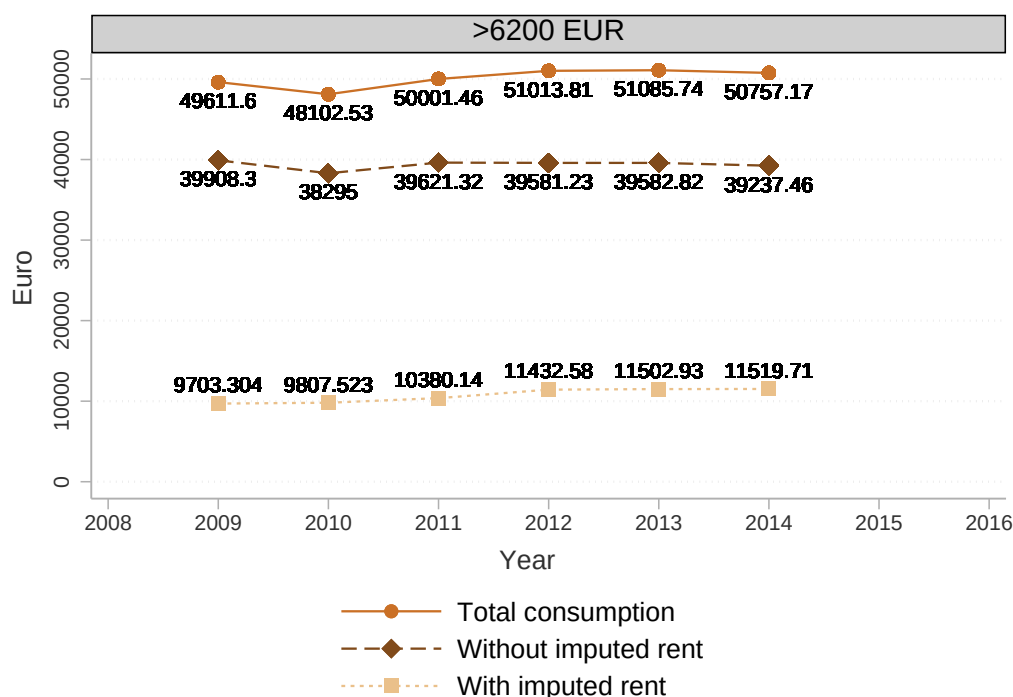
non-existence of social transfers.<sup>19</sup>

This indicator has been computed with EU-SILC data for the period 2009-2015. It gives the ratio of people for whom  $HY022/HX050 < 0.6 * \text{mean}(HX090)$ ; where  $HX090$  is the “Equivalized disposable income.”

Table 3.13 provides the averages for the entire population, by years, and disaggregated by gender, age group, household type (1 adult, 1 adult with a child, 2 adults with 1 child, 2 adults with 2 children, 2 adults with more than 2 children, other adults combinations without children, other adults combinations with children), occupation (managers, professionals, technicians and associate professions; clerical support workers, servants and sales workers, skilled agriculture, forestry and fishery workers; craft and related trades workers, plant and machinery operators and assemblers, elementary occupations), nationality in sensu lato.

The share of people at risk of poverty – before social transfers, has been quite stable, around 28% over the entire period. It is worth nothing that women and single parents are more exposed to the risk of poverty, though; this risk decreases by age, and it is higher for foreigners and unskilled workers.

<sup>19</sup>[http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:At-risk-of-poverty\\_rate](http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:At-risk-of-poverty_rate)

**Figure 3.16:** Total consumption marketed goods, by income category 8.

Source: HBS survey data, own elaboration.

### (9.b) Risk of poverty after social transfers

This rate of people at risk of poverty accounts for social transfers.<sup>20</sup> This indicator does not measure wealth or poverty, but low income in comparison to other residents in a given country, which does not necessarily imply a low standard of living.<sup>21</sup>

This indicator has been computed with EU-SILC data for the period 2009-2015. Differently from the previous indicator, this one is based on one only variable HX080, that is, an individual “poverty indicator.”

Table 3.14 provides the averages for the entire population, by years, and disaggregated in different breakdowns, as for sub-indicator (9.a).

We have mentioned that this sub-indicator differs slightly from the previous measure of poverty, because it compares the own income to that of other residents in a given country (and thus it does not necessarily imply a low standard of living). From 2009 to 2015, it increased by about 0.4%; moreover, women and single parents appear to be more exposed to the risk of poverty, which decreases with age, and it is higher for foreigners and unskilled workers.

<sup>20</sup>Also in this case, pensions, such as old-age and survivors’ (widows and widowers) benefits, are counted as income and not as social transfers.

<sup>21</sup>[http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:At-risk-of-poverty\\_rate](http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:At-risk-of-poverty_rate)

**Table 3.9:** Replacement costs, by various breakdowns.

|                        | Day          |              |           |
|------------------------|--------------|--------------|-----------|
|                        | Weekday<br>€ | Weekend<br>€ | Week<br>€ |
| <b>Age category</b>    |              |              |           |
| 16-24                  | 5.78         | 7.28         | 6.21      |
| 25-34                  | 16.15        | 19.87        | 17.21     |
| 35-49                  | 15.70        | 23.56        | 17.93     |
| 50-64                  | 22.29        | 23.83        | 22.72     |
| 65-74                  | 32.88        | 27.09        | 31.22     |
| <b>Gender</b>          |              |              |           |
| Male                   | 11.22        | 16.62        | 12.76     |
| Female                 | 24.78        | 25.58        | 25.00     |
| <b>Nationality</b>     |              |              |           |
| resid. country         | 19.84        | 21.08        | 20.19     |
| euro. country          | 15.89        | 21.49        | 17.47     |
| other country          | 14.22        | 17.46        | 15.15     |
| <b>Education level</b> |              |              |           |
| Lower sec.             | 17.86        | 18.42        | 18.02     |
| Upper sec.             | 19.34        | 21.00        | 19.81     |
| Third lev.             | 16.45        | 24.16        | 18.64     |
| <b>Marital status</b>  |              |              |           |
| Single                 | 10.51        | 15.43        | 11.91     |
| Married - PACS         | 20.13        | 22.53        | 20.81     |
| No longer married      | 29.44        | 30.85        | 29.84     |
| <b>Income quintile</b> |              |              |           |
| 1                      | 23.28        | 24.22        | 23.55     |
| 2                      | 17.50        | 22.75        | 18.99     |
| 3                      | 18.82        | 21.05        | 19.44     |
| 4                      | 15.87        | 18.35        | 16.58     |
| 5                      | 13.85        | 18.68        | 15.23     |
| <b>Mean</b>            | 17.92        | 21.04        | 18.80     |

**Source:** TUS survey data, own elaboration.

### 3.1.9 (10.) People in situation of severe material deprivation

According to Eurostat, the share of people in situation of severe material deprivation refers to the share of people that “expresses the inability to afford some items considered by most people to be desirable or even necessary to lead an adequate life. The indicator distinguishes between individuals who cannot afford a certain good or service, and those who do not have this good or service for another reason, e.g. because they do not want or do not need it.” <sup>22</sup>

The indicator illustrated in this subsection is closely related to the above definition: it refers to the share of people living in severely deprived households and it has been computed with EU-SILC data for the period 2009-2015, with the variable RX060, that is, “severely materially deprived household.”

More precisely, deprivation is defined as the inability to pay for *at least four* of the following items:

<sup>22</sup>[http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Material\\_deprivation](http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Material_deprivation)

**Table 3.10:** Opportunity costs, by various breakdowns.

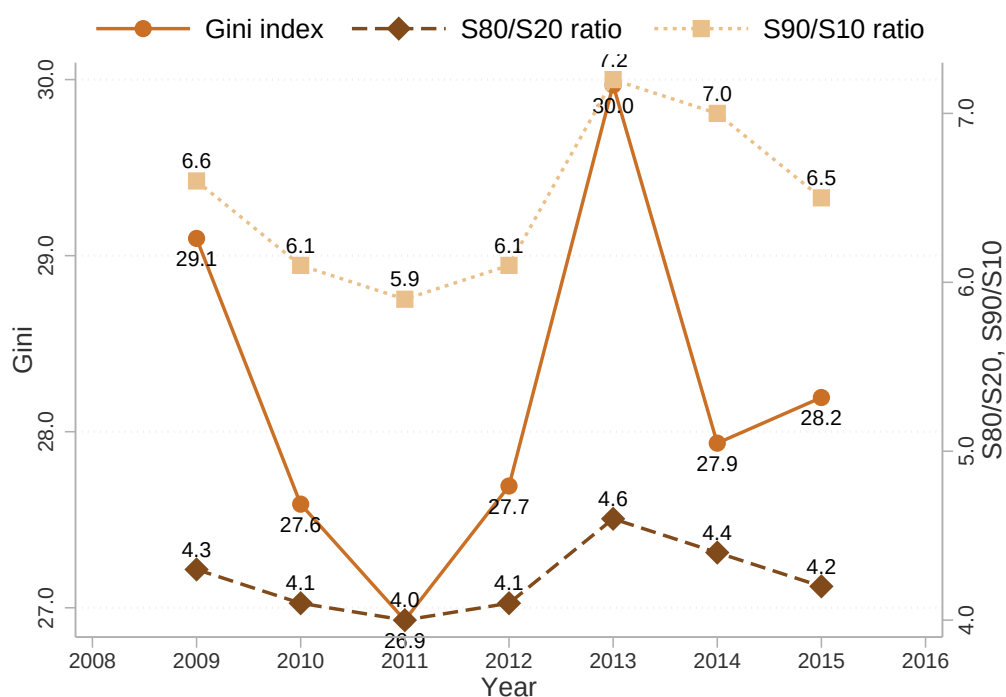
|                        | Day          |              |           |
|------------------------|--------------|--------------|-----------|
|                        | Weekday<br>€ | Weekend<br>€ | Week<br>€ |
| <b>Age category</b>    |              |              |           |
| 16-24                  | 8.65         | 10.89        | 9.29      |
| 25-34                  | 24.16        | 29.73        | 25.74     |
| 35-49                  | 23.48        | 35.24        | 26.82     |
| 50-64                  | 33.34        | 35.64        | 33.98     |
| 65-74                  | 49.18        | 40.52        | 46.71     |
| <b>Gender</b>          |              |              |           |
| Male                   | 16.78        | 24.87        | 19.08     |
| Female                 | 37.06        | 38.27        | 37.40     |
| <b>Nationality</b>     |              |              |           |
| resid. country         | 29.67        | 31.54        | 30.20     |
| euro. country          | 23.77        | 32.15        | 26.13     |
| other country          | 21.27        | 26.12        | 22.66     |
| <b>Education level</b> |              |              |           |
| Lower sec.             | 26.71        | 27.56        | 26.95     |
| Upper sec.             | 28.93        | 31.42        | 29.64     |
| Third lev.             | 24.61        | 36.14        | 27.88     |
| <b>Marital status</b>  |              |              |           |
| Single                 | 15.72        | 23.08        | 17.81     |
| Married - PACS         | 30.11        | 33.69        | 31.12     |
| No longer married      | 44.03        | 46.15        | 44.64     |
| <b>Income quintile</b> |              |              |           |
| 1                      | 34.83        | 36.23        | 35.23     |
| 2                      | 26.18        | 34.03        | 28.41     |
| 3                      | 28.15        | 31.48        | 29.08     |
| 4                      | 23.75        | 27.44        | 24.79     |
| 5                      | 20.72        | 27.94        | 22.78     |
| <b>Mean</b>            | 26.80        | 31.47        | 28.12     |

**Source:** TUS survey data, own elaboration.

**Table 3.11:** Gini index.

|             | Gini index | S80/S20 ratio | S90/S10 ratio |
|-------------|------------|---------------|---------------|
| <b>Year</b> |            |               |               |
| 2009        | 29.1       | 4.3           | 6.6           |
| 2010        | 27.6       | 4.1           | 6.1           |
| 2011        | 26.9       | 4.0           | 5.9           |
| 2012        | 27.7       | 4.1           | 6.1           |
| 2013        | 30.0       | 4.6           | 7.2           |
| 2014        | 27.9       | 4.4           | 7.0           |
| 2015        | 28.2       | 4.2           | 6.5           |

**Source:** EU-SILC survey data, own elaboration.

**Figure 3.17:** Income inequality.

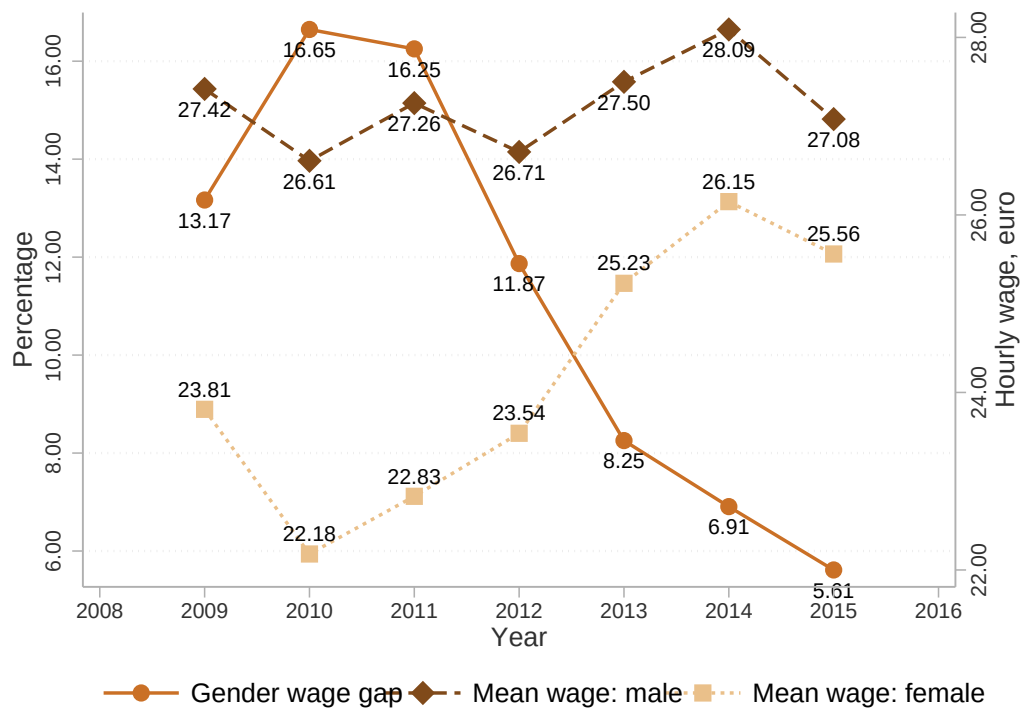
**Source:** EU-SILC survey data, own elaboration.

**Table 3.12:** Gender wage gap.

|             | Mean wage: male | Mean wage: female | Gender wage gap |
|-------------|-----------------|-------------------|-----------------|
| <b>Year</b> |                 |                   |                 |
| 2009        | 27.42           | 23.81             | 13.17           |
| 2010        | 26.61           | 22.18             | 16.65           |
| 2011        | 27.26           | 22.83             | 16.25           |
| 2012        | 26.71           | 23.54             | 11.87           |
| 2013        | 27.50           | 25.23             | 8.25            |
| 2014        | 28.09           | 26.15             | 6.91            |
| 2015        | 27.08           | 25.56             | 5.61            |

**Source:** EU-SILC survey data, own elaboration.

- to pay their rent, mortgage or utility bills;
- to keep their home adequately warm;
- to face unexpected expenses;
- to eat meat or proteins regularly;
- to go on holiday;
- a television set;

**Figure 3.18:** Gender wage gap.

**Source:** EU-SILC survey data, own elaboration.

- a washing machine;
- a car;
- a telephone.

We can observe that the share of people living in severely deprived households increased over time: it passed from 1% in 2009 to about 2% in 2015.

**Table 3.13:** At-risk-of-poverty before social transfers, by various breakdowns.

|                                      | Year |      |      |      |      |      |      | Mean |
|--------------------------------------|------|------|------|------|------|------|------|------|
|                                      | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |      |
|                                      | %    | %    | %    | %    | %    | %    | %    | %    |
| <b>Sex</b>                           |      |      |      |      |      |      |      |      |
| male                                 | 26.6 | 29.2 | 26.2 | 28.5 | 29.1 | 27.0 | 27.4 | 27.7 |
| female                               | 27.4 | 28.9 | 28.2 | 29.5 | 29.7 | 28.3 | 27.1 | 28.4 |
| <b>Age group</b>                     |      |      |      |      |      |      |      |      |
| below 16                             | 39.4 | 42.5 | 40.6 | 45.9 | 43.8 | 41.7 | 37.9 | 41.7 |
| 16-24                                | 36.9 | 39.3 | 35.5 | 37.0 | 37.5 | 36.6 | 35.5 | 36.9 |
| 25-34                                | 27.1 | 24.7 | 24.3 | 28.2 | 25.5 | 23.9 | 24.5 | 25.5 |
| 35-49                                | 25.9 | 30.7 | 28.3 | 28.2 | 29.8 | 28.2 | 27.6 | 28.4 |
| 50-64                                | 23.3 | 24.3 | 23.8 | 23.5 | 25.9 | 25.1 | 25.8 | 24.6 |
| 65-74                                | 10.9 | 11.0 | 7.6  | 9.3  | 9.3  | 9.2  | 12.7 | 10.0 |
| above 75                             | 6.5  | 9.6  | 8.4  | 8.5  | 9.8  | 8.7  | 10.5 | 8.9  |
| <b>Household type</b>                |      |      |      |      |      |      |      |      |
| 1 pers. hhd                          | 19.6 | 24.6 | 23.1 | 20.2 | 23.8 | 21.8 | 26.5 | 22.9 |
| 2 ads, 0 ch.                         | 10.6 | 12.0 | 11.2 | 11.6 | 11.4 | 11.5 | 14.3 | 11.8 |
| sing. par. hhd                       | 65.1 | 63.6 | 64.8 | 65.9 | 66.4 | 59.0 | 57.7 | 63.0 |
| 2 ads, 1+ ch.                        | 33.3 | 37.1 | 34.3 | 37.9 | 35.5 | 34.9 | 32.1 | 35.0 |
| oth. hhds, ch.                       | 26.6 | 25.4 | 23.9 | 28.4 | 29.1 | 26.0 | 24.2 | 26.3 |
| <b>Occupation (ISCO-08, 1 digit)</b> |      |      |      |      |      |      |      |      |
| man., prof., tech. (1,2,3)           | 8.3  | 10.0 | 7.9  | 9.4  | 8.9  | 7.6  | 9.0  | 8.7  |
| clerks, sales (4,5)                  | 24.9 | 25.9 | 26.4 | 25.5 | 23.6 | 25.0 | 24.5 | 25.1 |
| skill. agr., craft (6,7)             | 32.8 | 34.2 | 30.4 | 32.7 | 39.6 | 34.6 | 34.6 | 34.1 |
| mach. oper., elem. (8,9)             | 39.2 | 41.8 | 42.6 | 43.1 | 46.5 | 44.0 | 43.8 | 43.0 |
| <b>Country of birth</b>              |      |      |      |      |      |      |      |      |
| resid. country                       | 16.2 | 17.2 | 15.7 | 16.7 | 16.8 | 16.6 | 15.9 | 16.5 |
| euro. country                        | 31.0 | 31.1 | 29.0 | 29.5 | 33.0 | 29.6 | 28.9 | 30.2 |
| other country                        | 50.0 | 57.5 | 54.3 | 54.1 | 54.8 | 50.6 | 57.7 | 54.2 |
| <b>Mean</b>                          | 27.0 | 29.1 | 27.2 | 29.0 | 29.4 | 27.6 | 27.2 | 28.1 |

Source: EU-SILC survey data, own elaboration.

### 3.1.10 (11.) People unable to make ends meet

This indicator provides the share of people declaring great difficulty, difficulty, or some difficulty in making ends meet. It has been computed with EU-SILC data for the period 2009-2015, with the variable HS120, that is, “Ability to make ends meet.”

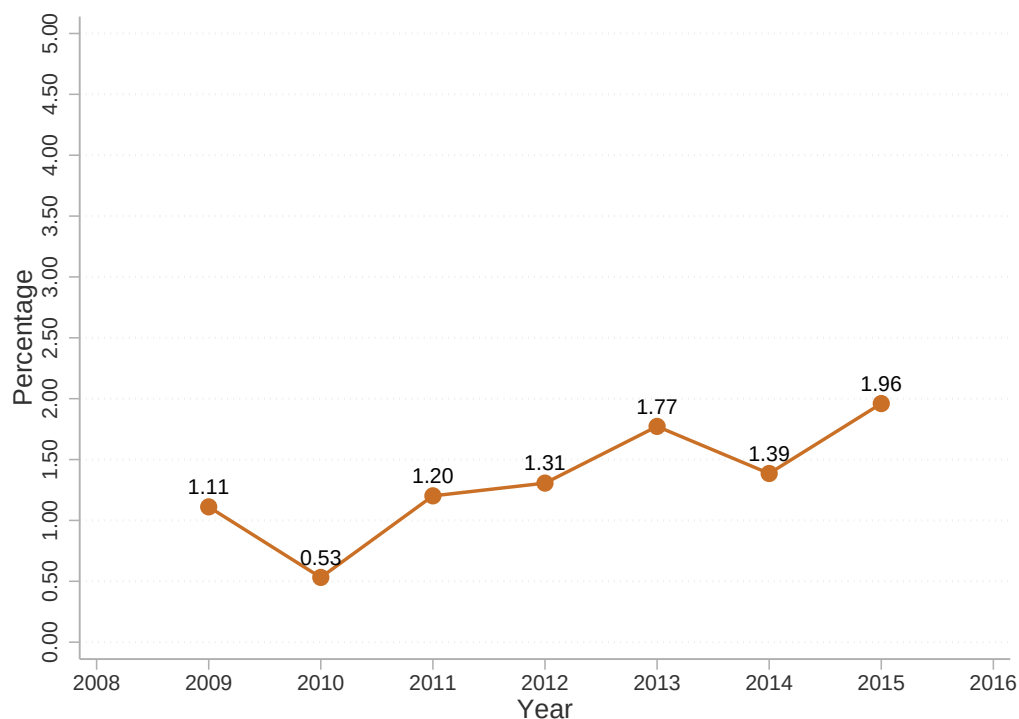
Table 3.15 shows share of people unable to make ends meet in each year (row “Mean”), the share of people unable to make ends meet in each year and by income quintile (rows 1 to 5), and the share of people unable to make ends meet across years (column “Mean”).

The table and the figure illustrate two things: i) the share of people declaring difficulties in making ends meet increased by almost 3 percentage points from 2009 to 2015 average; ii) most of this increase is due to greater difficulties faced by people in the bottom of the income distribution (i.e., in the first quintile).

**Table 3.14:** At-risk-of-poverty after social transfers, by various breakdowns.

|                                      | Year      |           |           |           |           |           |           | Mean |
|--------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------|
|                                      | 2009<br>% | 2010<br>% | 2011<br>% | 2012<br>% | 2013<br>% | 2014<br>% | 2015<br>% |      |
| <b>Sex</b>                           |           |           |           |           |           |           |           |      |
| male                                 | 13.8      | 14.6      | 12.7      | 14.7      | 15.7      | 16.3      | 15.0      | 14.7 |
| female                               | 16.0      | 14.4      | 14.5      | 15.6      | 16.0      | 16.6      | 15.7      | 15.5 |
| <b>Age group</b>                     |           |           |           |           |           |           |           |      |
| below 16                             | 21.6      | 21.4      | 19.9      | 22.1      | 23.3      | 24.8      | 20.8      | 22.0 |
| 16-24                                | 23.1      | 18.5      | 18.7      | 21.0      | 22.0      | 23.9      | 23.0      | 21.5 |
| 25-34                                | 14.0      | 13.6      | 12.1      | 14.1      | 14.1      | 14.1      | 13.9      | 13.7 |
| 35-49                                | 14.2      | 15.6      | 14.8      | 15.4      | 15.3      | 16.3      | 15.1      | 15.2 |
| 50-64                                | 11.6      | 10.9      | 10.3      | 11.7      | 13.1      | 13.6      | 12.7      | 12.0 |
| 65-74                                | 6.3       | 5.2       | 4.2       | 6.0       | 5.6       | 5.7       | 8.2       | 5.9  |
| above 75                             | 5.1       | 6.8       | 5.3       | 6.6       | 7.0       | 7.2       | 7.8       | 6.6  |
| <b>Household type</b>                |           |           |           |           |           |           |           |      |
| 1 pers. hhd                          | 16.1      | 16.4      | 15.4      | 14.9      | 15.7      | 15.3      | 18.7      | 16.1 |
| 2 ads, 0 ch.                         | 5.3       | 6.3       | 5.2       | 5.8       | 5.6       | 6.7       | 6.8       | 6.0  |
| sing. par. hhd                       | 52.3      | 46.4      | 45.5      | 46.9      | 46.1      | 44.6      | 44.6      | 46.5 |
| 2 ads, 1+ ch.                        | 16.1      | 16.9      | 15.8      | 17.1      | 17.4      | 19.8      | 16.0      | 17.0 |
| oth. hhds, ch.                       | 13.8      | 10.7      | 10.6      | 15.0      | 15.3      | 13.8      | 13.5      | 13.3 |
| <b>Occupation (ISCO-08, 1 digit)</b> |           |           |           |           |           |           |           |      |
| man., prof., tech. (1,2,3)           | 4.4       | 4.3       | 3.0       | 4.2       | 4.5       | 4.1       | 4.6       | 4.2  |
| clerks, sales (4,5)                  | 14.1      | 14.0      | 12.8      | 13.8      | 12.5      | 13.8      | 13.2      | 13.5 |
| skill. agr., craft (6,7)             | 15.9      | 16.6      | 14.3      | 17.3      | 21.0      | 20.1      | 19.4      | 17.8 |
| mach. oper., elem. (8,9)             | 20.7      | 20.9      | 22.7      | 23.1      | 25.2      | 26.8      | 24.8      | 23.4 |
| <b>Country of birth</b>              |           |           |           |           |           |           |           |      |
| resid. country                       | 8.5       | 8.1       | 7.0       | 7.4       | 8.9       | 9.3       | 8.1       | 8.2  |
| euro. country                        | 16.1      | 15.0      | 13.6      | 16.6      | 17.7      | 17.0      | 15.6      | 16.0 |
| other country                        | 34.4      | 33.6      | 36.2      | 35.3      | 31.6      | 35.4      | 39.4      | 35.2 |
| <b>Mean</b>                          | 14.9      | 14.5      | 13.6      | 15.1      | 15.9      | 16.4      | 15.3      | 15.1 |

**Source:** EU-SILC survey data, own elaboration.

**Figure 3.19:** Share of people living in severely deprived households.

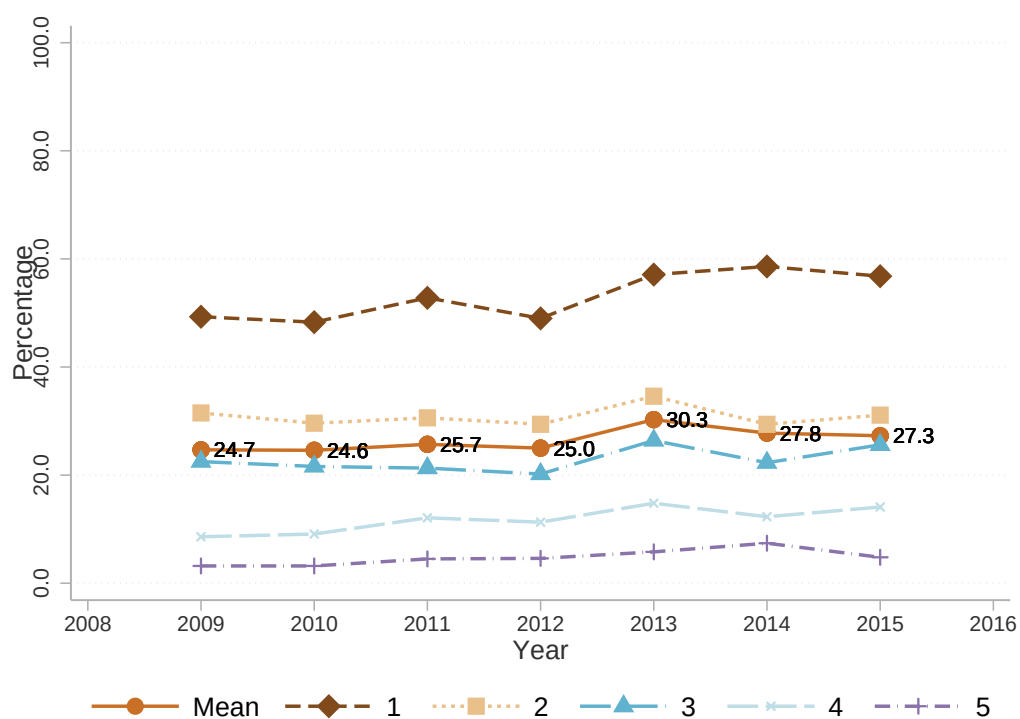
Source: EU-SILC survey data, own elaboration.

**Table 3.15:** Share of people declaring difficulties in making ends meet, by income quintile.

|                        | Year      |           |           |           |           |           |           | Mean |
|------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------|
|                        | 2009<br>% | 2010<br>% | 2011<br>% | 2012<br>% | 2013<br>% | 2014<br>% | 2015<br>% |      |
| <b>Income quintile</b> |           |           |           |           |           |           |           |      |
| 1                      | 49.3      | 48.3      | 52.8      | 49.0      | 57.1      | 58.6      | 56.8      | 53.2 |
| 2                      | 31.5      | 29.6      | 30.6      | 29.4      | 34.6      | 29.4      | 31.1      | 30.9 |
| 3                      | 22.5      | 21.6      | 21.3      | 20.2      | 26.4      | 22.3      | 25.6      | 22.9 |
| 4                      | 8.6       | 9.1       | 12.1      | 11.3      | 14.8      | 12.3      | 14.1      | 11.8 |
| 5                      | 3.2       | 3.2       | 4.5       | 4.6       | 5.8       | 7.4       | 4.8       | 4.8  |
| <b>Mean</b>            | 24.7      | 24.6      | 25.7      | 25.0      | 30.3      | 27.8      | 27.3      | 26.5 |

Source: EU-SILC survey data, own elaboration.

**Figure 3.20:** Share of people declaring difficulties in making ends meet, by income quintile.



**Source:** EU-SILC survey data, own elaboration.

## 3.2 Domain II: Occupation

This section illustrates the seven indicators that compose the domain on occupation. Table 3.16 lists the seven indicators that compose this domain and summarizes the results. Whenever possible, the table reports the overall time trend. The table provides also information on how individual indicators in Luxembourg fare with respect to the same indicators from other Western European countries. The comparison uses the most recent year for which data are available. We observe that for two indicators Luxembourg scores relatively high compared to other Western European countries and it ranks in the top quartile of the indicators score; for eight indicators, Luxembourg scores close to the average of Western European countries.

*Why does this domain matter?* A job that pays an adequate salary is a common aspiration around the world. Moreover, the working time takes up most of people's life; therefore, the conditions at which the work is carried out directly affect people's quality of life.

*Why do these indicators matter?* The employment rate matters because it illustrates the percentage of people in the labour force who hold a job, which allows them to perceive an income and thus directly support their life. Additionally, a job provides an identity, a social network, and a way to potentially fill one own life with enjoying and fulfilling activities. Conversely, the lack of an employment, as measured for the residents' population by the unemployment rate, prevents individuals to support themselves and may have negative psychological effects. This is particularly true for long-term unemployment spells. The temporary job rate provides a measure of the potential precariousness of the labour market. The forced part-time rate provides an idea of the percentage of people whose actual working time is lower than the ideal one, which both causes individual frustration and illustrates potential difficulties with assuring material well-being. Material well-being is lowered by living in a household with low working intensity, while mental well-being may deteriorate because job insecurity – either subjective or objective, in terms of possibility of losing the job. Differently from previous indicators, the two measures of accidents at work provide an objective measure of the material working conditions.

### 3.2.1 (12.) Employment rate

As defined by Eurostat, this is the percentage of employed persons in relation to the comparable total population. For the overall employment rate, the comparison is made with the working-age population.<sup>23</sup>

In this report, we consider data for the waves 2009-2015 from the European Union Labour Force Survey (European Union Labour Force Survey (EU-LFS)). These data are produced yearly by STATEC and harmonized by Eurostat. The final data are obtained from Eurostat after application; yearly updates are automatically delivered by Eurostat.

We compute the employment rate with the variable ILOSTAT, that is, "International Labour Organization (ILO) work status;" the computation is restricted only to the population between 16 and 64 years of age.

<sup>23</sup>[http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Employment\\_rate](http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Employment_rate)

**Table 3.16:** Domain 2, occupation.

| N    | Indicators                                                                                            | Description                                                                                                                                                      | Cross country | Change |
|------|-------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|
| 12   | Employment rate                                                                                       | The employment rate increased from 65.11% in 2009 to 66.49% in 2015.                                                                                             | ●2015         | ↗      |
| 13.a | Unemployment rate                                                                                     | The unemployment rate increased from 5.2% in 2009 to 6.8% in 2015.                                                                                               | ●2015         | ↗      |
| 13.b | Long-term unemployment rate (CES-CSDD: % workers in long-term unemployment out of the labour force)   | This long-term unemployment rate increased from 1.3% in 2009 to 1.9% in 2015.                                                                                    | ●2015         | ↗      |
| 13.c | Long-term unemployment rate (Eurostat: % workers in long-term unemployment out of unemployed workers) | This long-term unemployment rate increased from 24.4% in 2009 to 27.3% in 2015.                                                                                  | ●2015         | ↗      |
| 14   | Temporary job rate                                                                                    | The share of workers with a temporary job contract increased from 7.4% in 2009 to 9.8% in 2015.                                                                  | ●2015         | ↗      |
| 15   | Forced part-time rate                                                                                 | The percentage of employed people who works part-time and wishes to work more increased from 4.3% in 2009 to 5.3% in 2015.                                       | ●2015         | ↗      |
| 16   | People living in household with low working intensity                                                 | This indicator first decreased from 6.31% in 2009 to 5.52% in 2010, then it increased constantly up to 2013 at 6.57%, and decreases since then to 5.65% in 2015. | ●2015         | ↔      |

To be continued over next page

|      |                                               |                                                                                                                                                                                                                     |                 | Continued |
|------|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------|
| N    | Indicators                                    | Description                                                                                                                                                                                                         | Cross country   | Change    |
| 17.a | Non-fatal accidents at work                   | The number of accidents at work that caused the worker to lose more than three days of work is stable over the considered period, with about 2,300 accidents per year.                                              | ● 2014          | ↔         |
| 17.b | Fatal accidents at work                       | Although the fatalities increased from 1.77 in 2009 to 3.71 in 2014, it is important to consider the low amount of fatal accidents each year, which leads to increased volatility.                                  | ● 2014          | ↗         |
| 18.a | Feeling of job insecurity, subjective measure | The share of workers who declares to fear to lose their job within six months decreases from 3.1% in 2009 to 0.6% in 2015.                                                                                          | NA <sup>r</sup> | ↘         |
| 18.b | Feeling of job insecurity, objective measure  | This indicator shows a certain degree of volatility: it starts at 3% in 2009, deeps in 2010, and increases back to the initial value by 2013, then there is another deep to 2.3% and back again up to 2.8% in 2015. | ● 2015          | ↔         |

## Legend

|                  |                                                                              |
|------------------|------------------------------------------------------------------------------|
| ●                | Luxembourg score is in the top 25% among Western European countries.         |
| ●                | Luxembourg score is in line with the Western Europe average.                 |
| ●                | Luxembourg score belongs to the bottom 25% among Western European countries. |
| ↗                | Indicates an increase over time.                                             |
| ↔                | Indicates that the indicator did not change.                                 |
| ↘                | Indicates a decrease over time.                                              |
| NA <sup>r</sup>  | Time series is not available.                                                |
| NA <sup>*</sup>  | Data sourced from data producer, and thus not internationally comparable.    |
| NA <sup>**</sup> | Data sourced from administrative records.                                    |
| NA <sup>r</sup>  | Different repartition of working situations across countries and waves.      |

Table 3.17 provides the employment rate by age and by gender, across years, as well as the average employment rate by age and gender over the entire period.

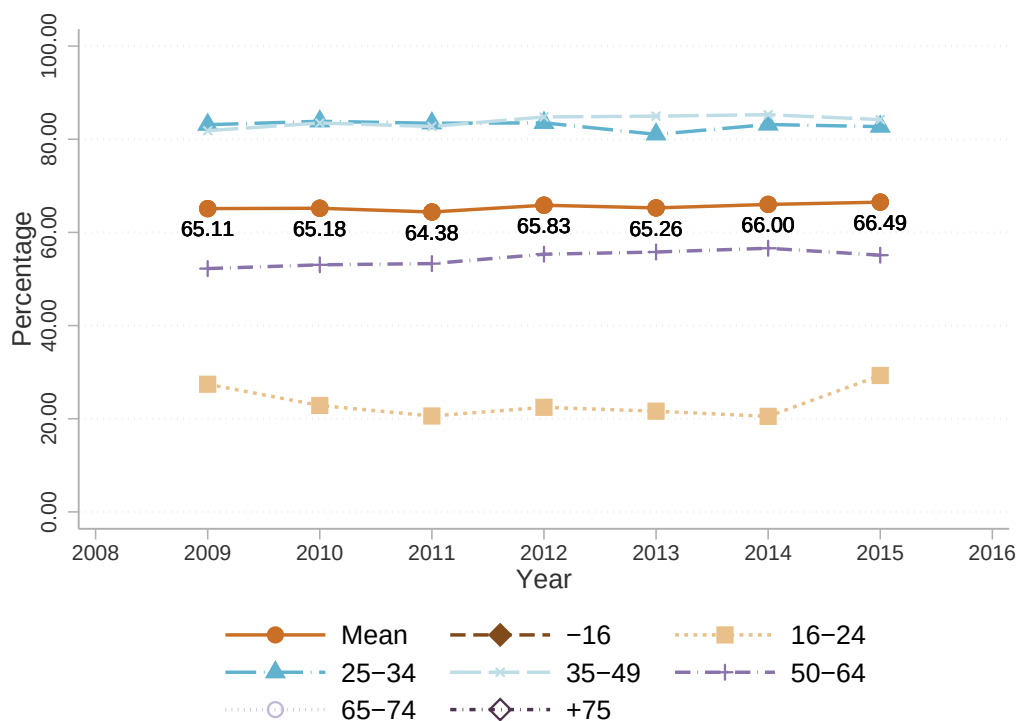
**Table 3.17:** Employment rate, by sex and age.

|                     | 2009 | 2010 | 2011 | Year | 2013 | 2014 | 2015 | Mean |
|---------------------|------|------|------|------|------|------|------|------|
|                     | %    | %    | %    | %    | %    | %    | %    | %    |
| <b>Age category</b> |      |      |      |      |      |      |      |      |
| 16-24               | 27.4 | 22.8 | 20.6 | 22.5 | 21.6 | 20.5 | 29.3 | 23.5 |
| 25-34               | 83.1 | 83.8 | 83.4 | 83.5 | 81.0 | 83.2 | 82.7 | 83.0 |
| 35-49               | 81.8 | 83.5 | 82.7 | 84.8 | 85.0 | 85.3 | 84.2 | 83.9 |
| 50-64               | 52.2 | 53.0 | 53.3 | 55.3 | 55.8 | 56.6 | 55.1 | 54.6 |
| <b>Gender</b>       |      |      |      |      |      |      |      |      |
| Male                | 73.2 | 73.1 | 71.7 | 72.3 | 71.5 | 72.0 | 71.2 | 72.1 |
| Female              | 56.8 | 57.0 | 56.8 | 59.1 | 58.8 | 59.9 | 61.6 | 58.7 |

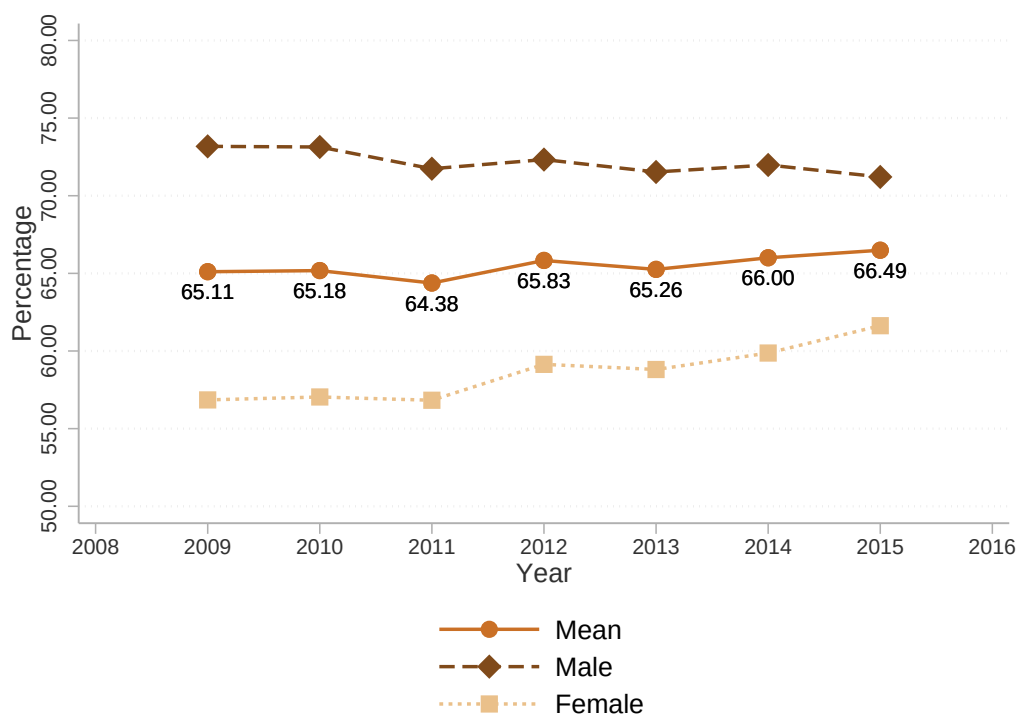
**Source:** EU-LFS survey data, own elaboration.

Figures 3.21 and 3.22 provide the employment rate by age and by gender, as well as the average employment rate in each year.

**Figure 3.21:** Employment rate, by age.



**Source:** EU-LFS survey data, own elaboration.

**Figure 3.22:** Employment rate, by sex.

**Source:** EU-LFS survey data, own elaboration.

Tables and figures suggest that the employment rate increased by 1.5 percentage points from 2009 to 2015. Moreover, we can see that this is mostly driven by the increase of about 5 percentage points in the women's employment rate over the same period.

### 3.2.2 (13.) Unemployment rate and long-term unemployment rate

As defined by Eurostat, and based on the International Labour Organization (ILO) guidelines, the unemployment rate <sup>24</sup> is the percentage of persons in the labour force, between 15 and 74 years of age, that:

- declares not to have worked in the reference week;
- is available to start a new work within two weeks or has obtained a new job to start in the next three months;
- has been looking for a job in the last four weeks.

It is possible to compute also the long-term unemployment rate. Based on ILO's guidelines, Eurostat defines the long-term unemployment rate as the percentage of unemployed people who have been unemployed for at least one year. <sup>25</sup>

In alternative, it is possible to compute the long-term unemployment rate as the percentage of people in long-term unemployment out of the labour force, as defined in the guidelines within the "Avis commun CES-CSDD: PIBien-être."

In this report, we illustrate the figures on all these three sub-indicators, for the period 2009-2015, based on EU-LFS data.

These sub-indicators are computed based on the variable ILOSTAT, that is, "ILO work status," and – for the long-term unemployment – also on the variable DURUNE, that is, "Duration of unemployment." Computations are restricted to the population between 16 and 74 years of age.

#### (13.a) Unemployment rate

Table 3.18 provides the unemployment rate by age, gender, nationality and education level, across years. Figures 3.23, 3.24, 3.25, and 3.26 illustrate those same figures.

Available figures suggest that the unemployment rate increased by about 1.5 percentage points from 2009 to 2015. Moreover, we can see that this is mostly due to the increase in the unemployment rate of workers with a lower secondary education by about 2.5 percentage points.

<sup>24</sup>[http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Unemployment\\_rate](http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Unemployment_rate)

<sup>25</sup>[http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Long-term\\_unemployment](http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Long-term_unemployment)

**Table 3.18:** Unemployment rate, by different breakdowns.

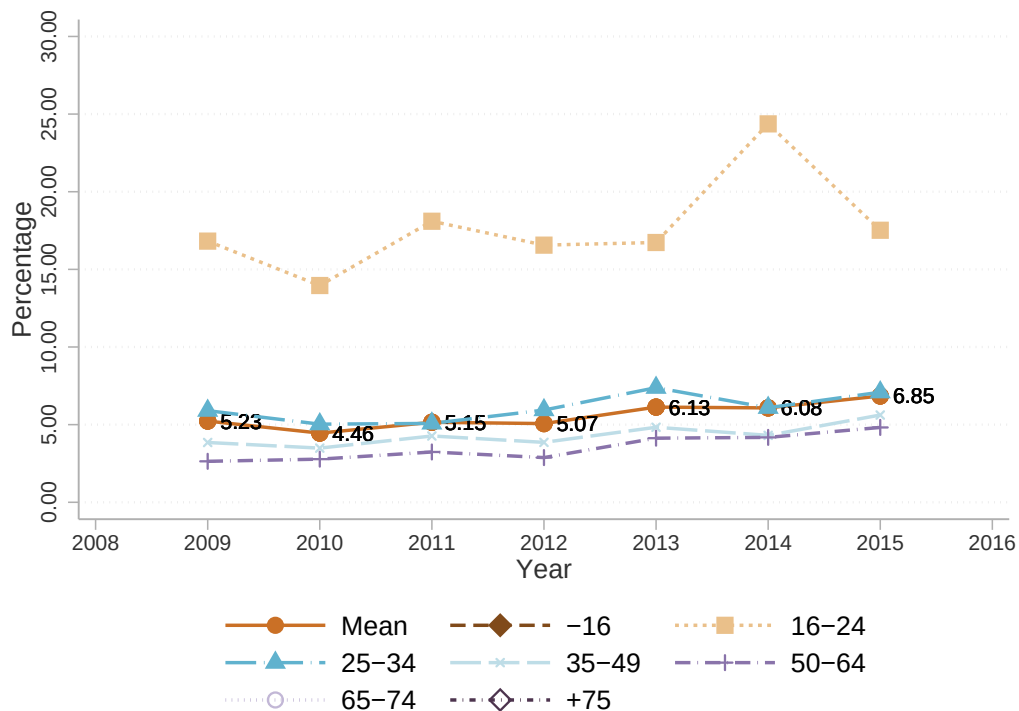
|                         | 2009 | 2010 | 2011 | Year |      | 2014 | 2015 | Mean |
|-------------------------|------|------|------|------|------|------|------|------|
|                         | %    | %    | %    | 2012 | 2013 | %    | %    | %    |
| <b>Age category</b>     |      |      |      |      |      |      |      |      |
| 16-24                   | 16.8 | 14.0 | 18.1 | 16.6 | 16.7 | 24.4 | 17.5 | 17.8 |
| 25-34                   | 5.9  | 5.0  | 5.1  | 5.9  | 7.4  | 6.1  | 7.1  | 6.1  |
| 35-49                   | 3.9  | 3.5  | 4.3  | 3.9  | 4.8  | 4.3  | 5.6  | 4.3  |
| 50-64                   | 2.6  | 2.8  | 3.2  | 2.9  | 4.1  | 4.2  | 4.8  | 3.6  |
| <b>Gender</b>           |      |      |      |      |      |      |      |      |
| Male                    | 4.4  | 3.9  | 4.1  | 4.5  | 5.7  | 5.9  | 6.5  | 5.1  |
| Female                  | 6.3  | 5.2  | 6.5  | 5.8  | 6.6  | 6.3  | 7.2  | 6.3  |
| <b>Country of birth</b> |      |      |      |      |      |      |      |      |
| resid. country          | 3.0  | 2.8  | 3.5  | 3.3  | 3.6  | 3.8  | 4.3  | 3.5  |
| euro. country           | 6.8  | 5.9  | 6.6  | 6.4  | 8.2  | 7.9  | 8.8  | 7.3  |
| other country           | 21.6 | 12.2 | 12.6 | 11.9 | 13.4 | 14.5 | 15.9 | 14.5 |
| <b>Education level</b>  |      |      |      |      |      |      |      |      |
| Lower sec.              | 8.4  | 6.2  | 8.4  | 8.4  | 10.4 | 11.1 | 10.7 | 9.2  |
| Upper sec.              | 4.5  | 4.2  | 4.7  | 5.1  | 6.1  | 6.3  | 6.3  | 5.3  |
| Third lev.              | 4.3  | 3.8  | 3.9  | 3.5  | 4.2  | 4.0  | 4.8  | 4.1  |
| <b>Mean</b>             | 5.2  | 4.5  | 5.2  | 5.1  | 6.1  | 6.1  | 6.8  | 5.6  |

**Source:** EU-LFS survey data, own elaboration.

### (13.b) Long-term unemployment rate; CES-CSDD definition

Table 3.19 provides the long-term unemployment rate by age, gender, nationality and education level, across years, following the CES-CSDD definition. Figures 3.27, 3.28, 3.29, and 3.30 illustrate those same figures.

Available figures suggest that the long-term unemployment rate, as defined by the guidelines to this report, increased by about 0.6 percentage points from 2009 to 2015. Moreover, similarly to what is found for the overall unemployment rate – see Table 3.18, we can observe that this is mostly driven by the increase in the unemployment rate of workers with a lower secondary education by about 1.2 percentage points.

**Figure 3.23:** Unemployment rate, by age.

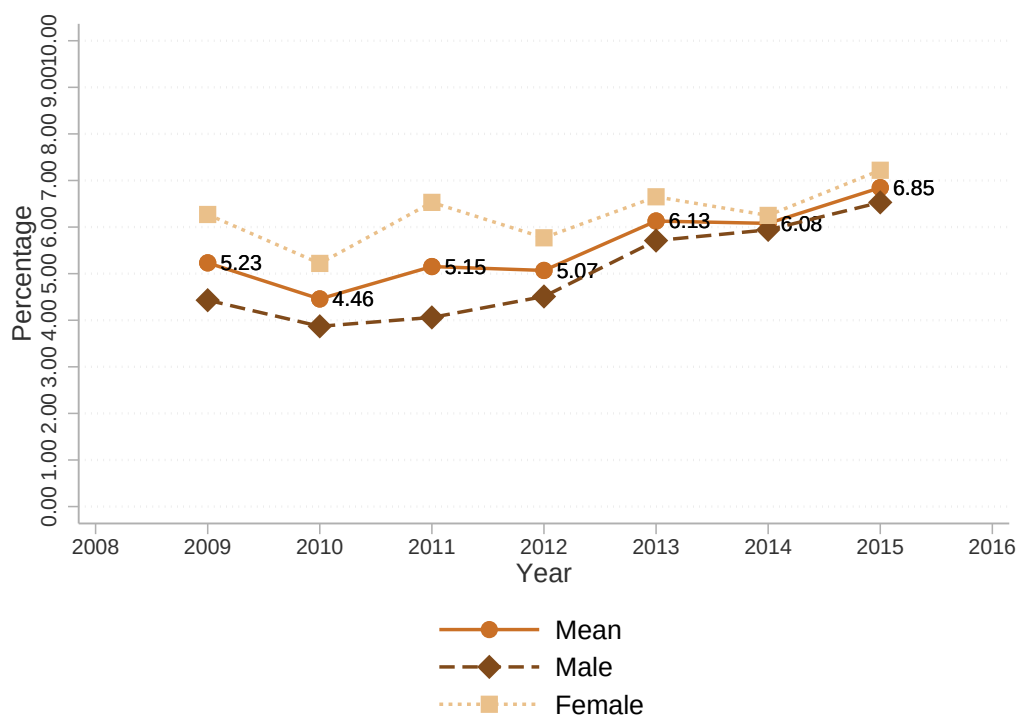
**Source:** EU-LFS survey data, own elaboration.

### (13.c) Long-term unemployment rate; Eurostat definition

Table 3.20 provides the unemployment rate by age, gender, nationality and education level, across years, following the Eurostat definition.

In comparing these data to those provided in Table 3.19, it is important to remember the different definitions of long-term unemployment rate. In this table, we use the Eurostat definition, according to which the reference population is that of the unemployed people, while in the CES-CSDD definition the reference population is the labour force, which is much larger.

Available figures show that the long-term unemployment rate, as defined by Eurostat, follows an inverse U-shaped trend from 2009 to 2015, and in 2015 it is about 3 percentage points higher than in 2009. Differently from Tables 3.19 and 3.18, it does not seem that this result is driven by changes of this indicator for a particular socio-demographic group.

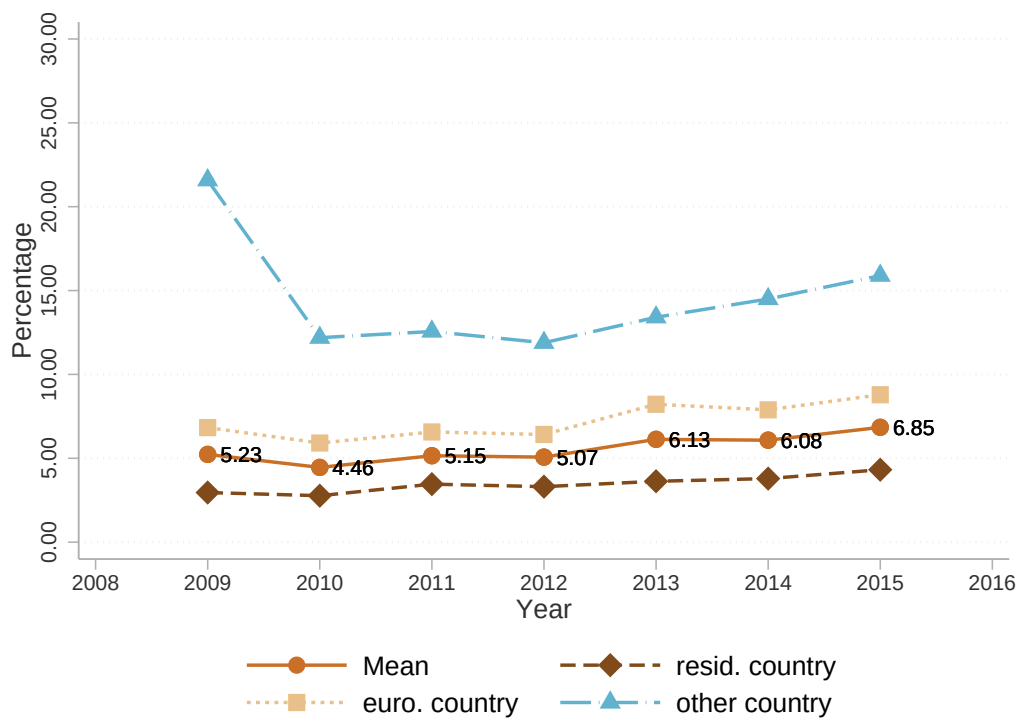
**Figure 3.24:** Unemployment rate, by sex.

Source: EU-LFS survey data, own elaboration.

**Table 3.19:** Unemployment rate, by different breakdowns; CES-CSDD definition.

|                  | Year      |           |           |           |           |           |           | Mean<br>% |
|------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                  | 2009<br>% | 2010<br>% | 2011<br>% | 2012<br>% | 2013<br>% | 2014<br>% | 2015<br>% |           |
| Age category     |           |           |           |           |           |           |           |           |
| 16-24            | 2.4       | 3.5       | 4.6       | 3.7       | 3.8       | 4.2       | 2.6       | 3.5       |
| 25-34            | 1.8       | 0.8       | 1.1       | 1.3       | 1.5       | 1.2       | 1.2       | 1.3       |
| 35-49            | 0.9       | 1.3       | 1.4       | 1.6       | 2.0       | 1.5       | 2.2       | 1.6       |
| 50-64            | 1.2       | 1.3       | 1.2       | 1.4       | 2.0       | 2.4       | 1.9       | 1.7       |
| Gender           |           |           |           |           |           |           |           |           |
| Male             | 1.0       | 1.2       | 1.3       | 1.4       | 1.9       | 1.8       | 2.1       | 1.5       |
| Female           | 1.7       | 1.4       | 1.6       | 1.9       | 2.1       | 1.7       | 1.8       | 1.8       |
| Country of birth |           |           |           |           |           |           |           |           |
| resid. country   | 0.9       | 0.9       | 0.8       | 1.1       | 1.1       | 1.4       | 1.3       | 1.1       |
| euro. country    | 1.6       | 1.6       | 2.1       | 2.0       | 2.8       | 2.0       | 2.5       | 2.1       |
| other country    | 3.9       | 5.8       | 3.8       | 4.4       | 2.7       | 5.5       | 4.7       | 4.4       |
| Education level  |           |           |           |           |           |           |           |           |
| Lower sec.       | 2.1       | 1.7       | 2.3       | 3.3       | 4.0       | 2.9       | 3.3       | 2.8       |
| Upper sec.       | 1.3       | 1.3       | 1.5       | 1.5       | 1.8       | 2.3       | 1.7       | 1.6       |
| Third lev.       | 0.9       | 1.1       | 0.9       | 1.0       | 1.2       | 0.9       | 1.3       | 1.0       |
| Mean             | 1.3       | 1.3       | 1.5       | 1.6       | 2.0       | 1.8       | 1.9       | 1.6       |

Source: EU-LFS survey data, own elaboration.

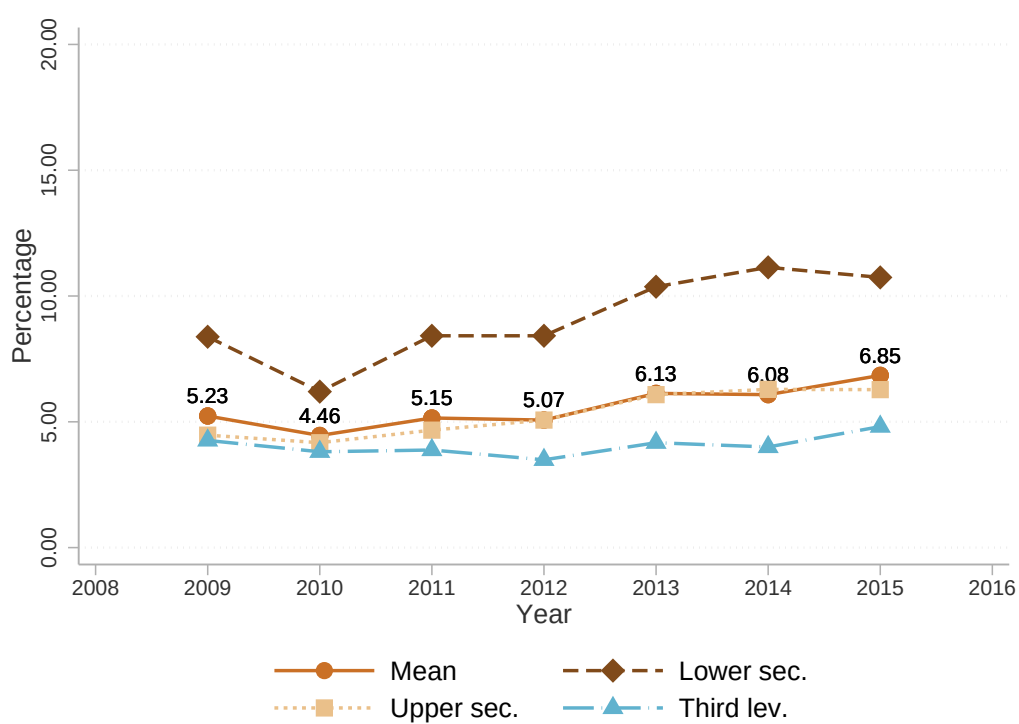
**Figure 3.25:** Unemployment rate, by nationality.

Source: EU-LFS survey data, own elaboration.

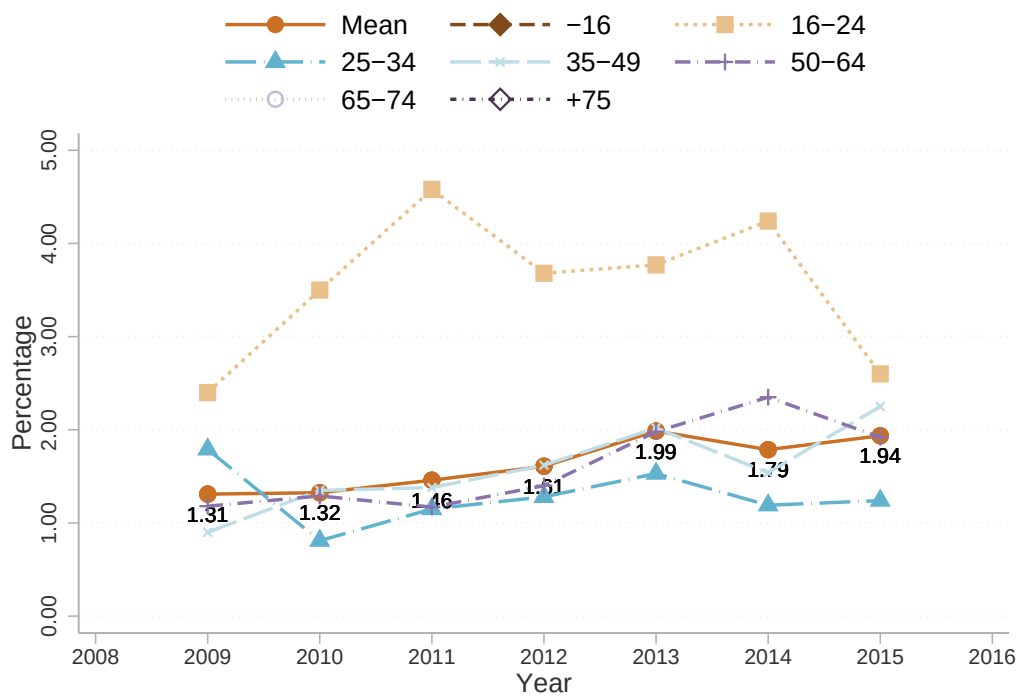
**Table 3.20:** Long-term unemployment rate, by different breakdowns; Eurostat definition.

|                        | Year |      |      |      |      |      |      |      |
|------------------------|------|------|------|------|------|------|------|------|
|                        | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Mean |
|                        | %    | %    | %    | %    | %    | %    | %    | %    |
| <b>Age category</b>    |      |      |      |      |      |      |      |      |
| 16-24                  | 12.8 | 22.9 | 22.7 | 19.8 | 20.0 | 14.4 | 13.1 | 17.2 |
| 25-34                  | 29.4 | 15.6 | 22.1 | 20.7 | 19.9 | 18.8 | 16.8 | 20.3 |
| 35-49                  | 22.9 | 38.0 | 31.6 | 41.4 | 41.2 | 35.1 | 39.2 | 36.1 |
| 50-64                  | 44.2 | 45.8 | 35.8 | 48.2 | 47.2 | 55.5 | 39.3 | 45.4 |
| <b>Gender</b>          |      |      |      |      |      |      |      |      |
| Male                   | 21.9 | 31.2 | 32.2 | 30.1 | 31.6 | 29.8 | 30.3 | 29.7 |
| Female                 | 26.6 | 26.9 | 24.0 | 31.8 | 31.3 | 26.8 | 24.1 | 27.2 |
| <b>Education level</b> |      |      |      |      |      |      |      |      |
| Lower sec.             | 24.1 | 26.2 | 26.1 | 37.8 | 37.3 | 24.4 | 29.3 | 29.5 |
| Upper sec.             | 27.7 | 31.2 | 32.5 | 27.9 | 29.4 | 34.7 | 26.1 | 29.9 |
| Third lev.             | 20.0 | 27.6 | 23.4 | 27.3 | 29.1 | 22.3 | 26.7 | 25.3 |
| <b>Mean</b>            | 24.4 | 29.0 | 27.6 | 30.9 | 31.5 | 28.4 | 27.3 | 28.5 |

Source: EU-LFS survey data, own elaboration.

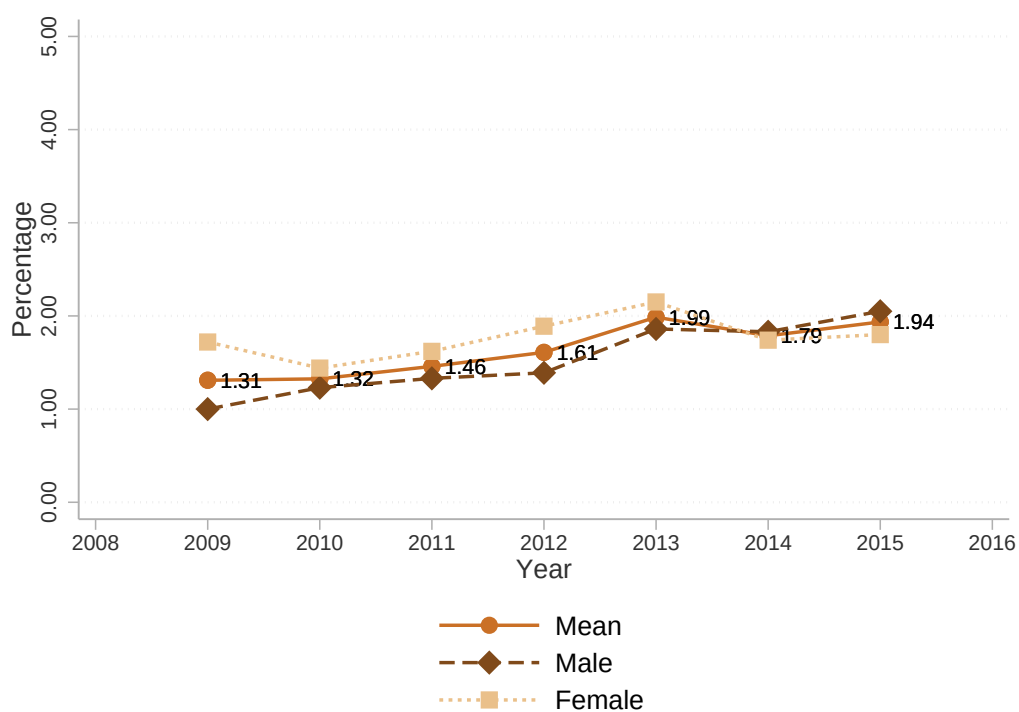
**Figure 3.26:** Unemployment rate, by education level.

**Source:** EU-LFS survey data, own elaboration.

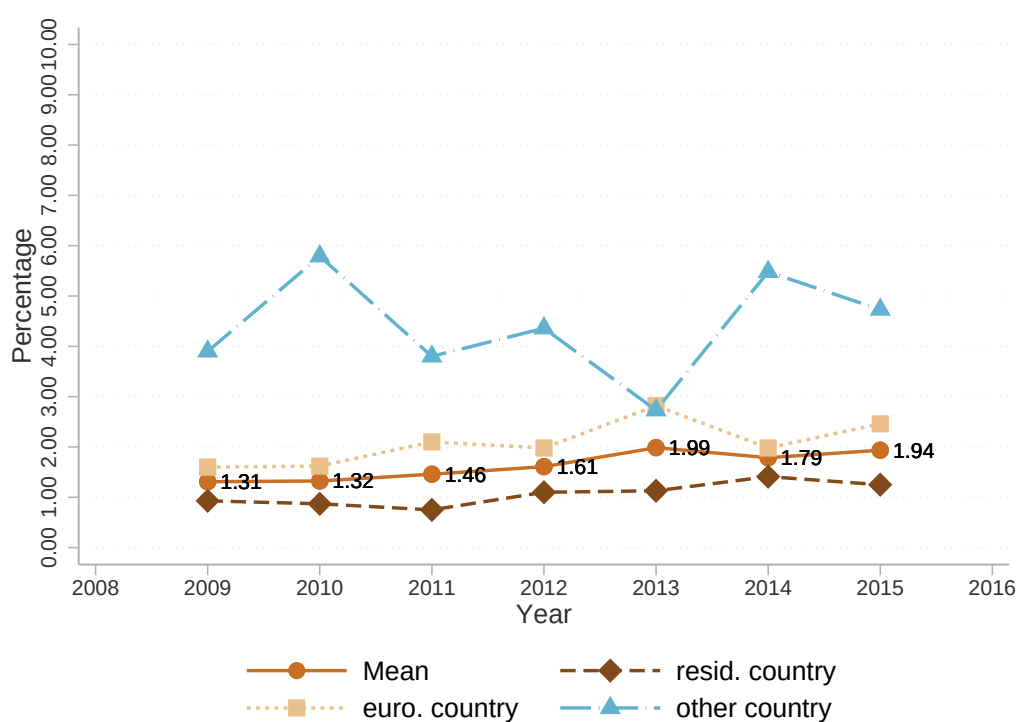
**Figure 3.27:** Long-term unemployment rate, by age; CES-CSDD definition.

**Source:** EU-LFS survey data, own elaboration.

**Figure 3.28:** Long-term unemployment rate, by sex; CES-CSDD definition.

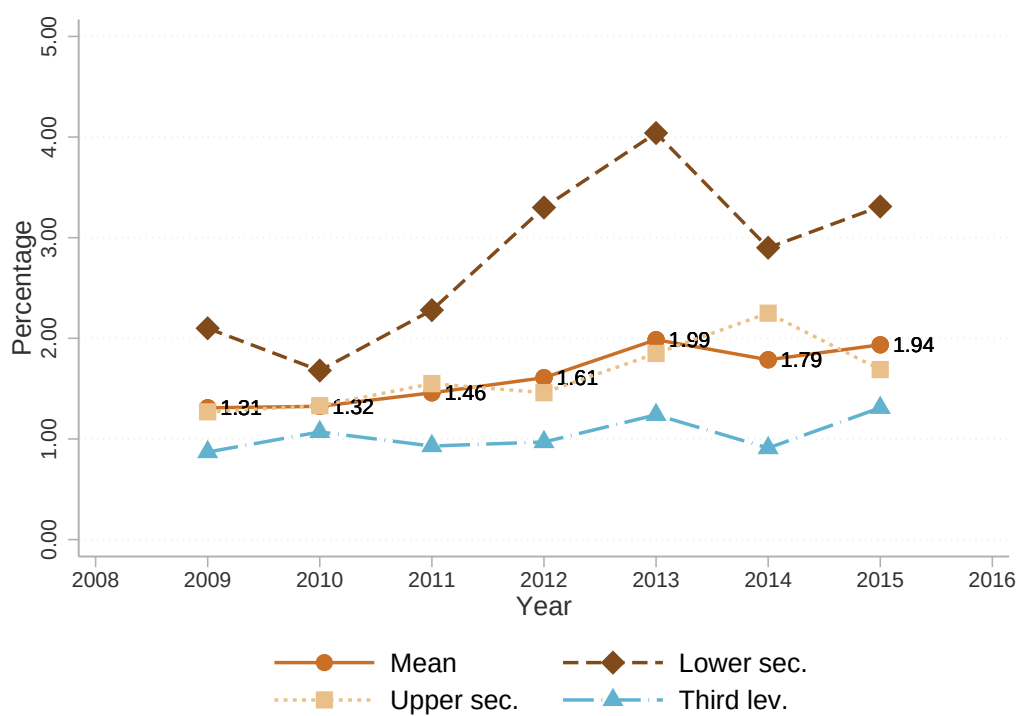


**Source:** EU-LFS survey data, own elaboration.

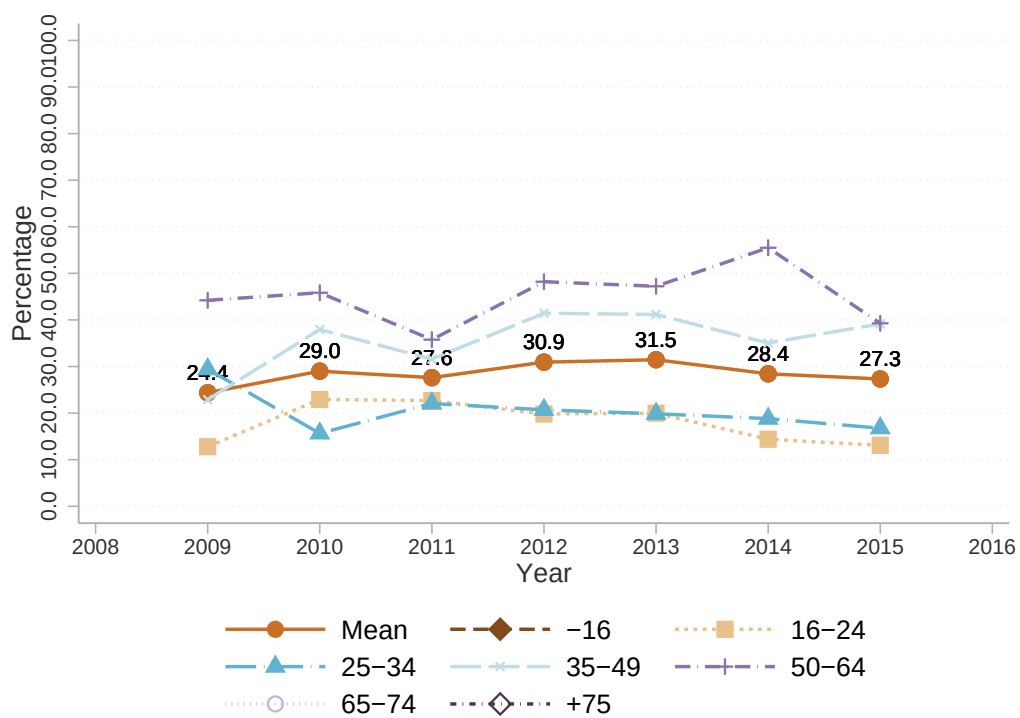
**Figure 3.29:** Long-term unemployment rate, by nationality; CES-CSDD definition.

**Source:** EU-LFS survey data, own elaboration.

**Figure 3.30:** Long-term unemployment rate, by education level; CES-CSDD definition.

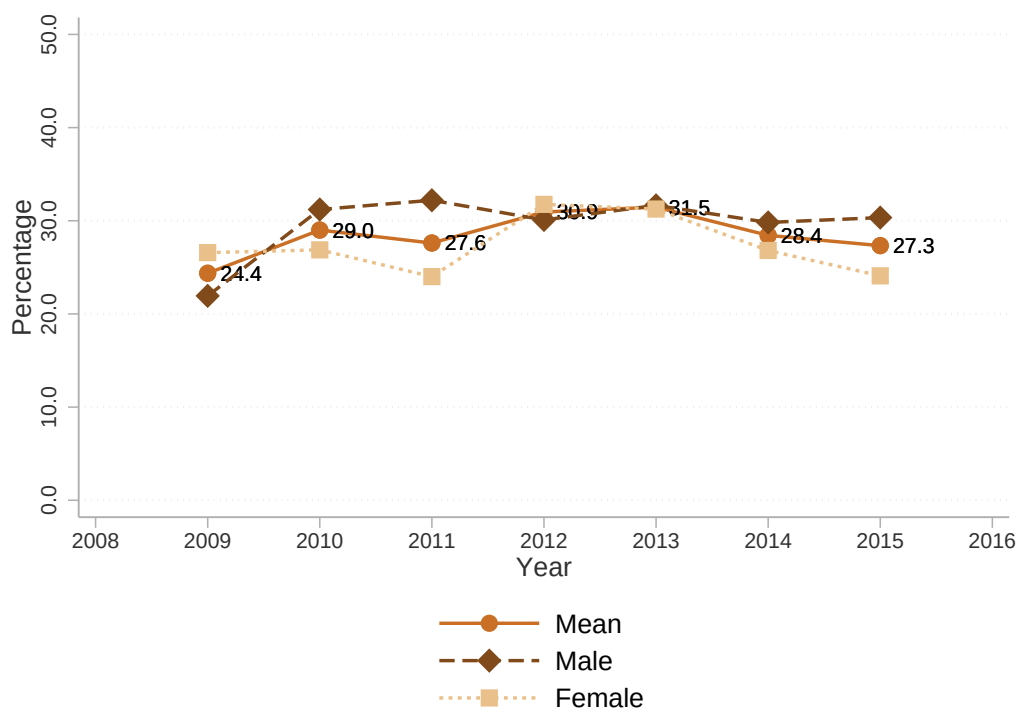


**Source:** EU-LFS survey data, own elaboration.

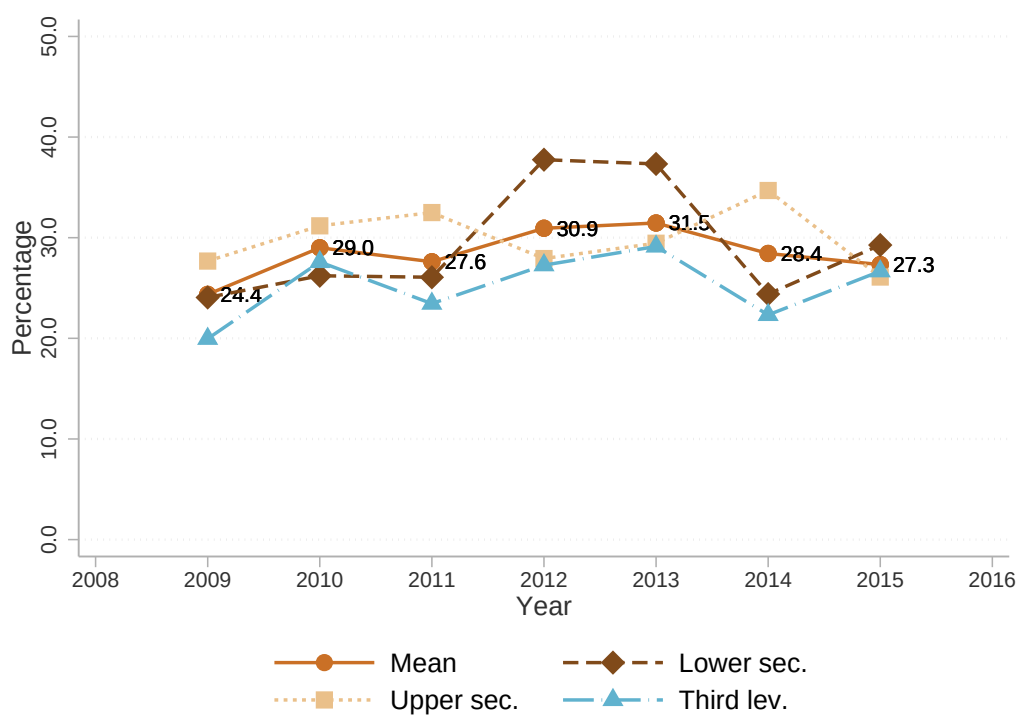
**Figure 3.31:** Long-term unemployment rate, by age; Eurostat definition.

**Source:** EU-LFS survey data, own elaboration.

**Figure 3.32:** Long-term unemployment rate, by sex; Eurostat definition.



**Source:** EU-LFS survey data, own elaboration.

**Figure 3.33:** Long-term unemployment rate, by education level; Eurostat definition.

**Source:** EU-LFS survey data, own elaboration.

### 3.2.3 (14.) Temporary job rate

This rate represents the percentage of workers with a temporary job contract. This indicator is computed for the period 2009-2015, is based on EU-LFS data, and uses the variable TEMP, that is, “Permanency of the job.” Similarly to the indicator on the employment rate, the computation is restricted to the population between 16 and 64 years of age.

Table 3.21 illustrates this indicator on the overall population, disaggregated by age, sex, and education level, across years.

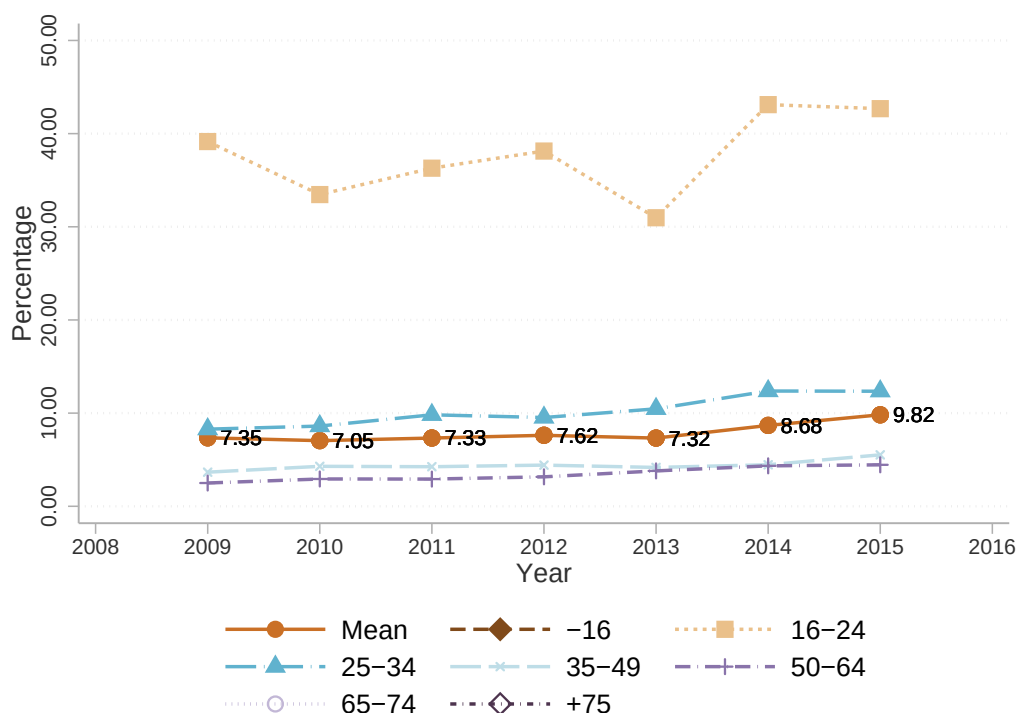
**Table 3.21:** Temporary job rate, by different breakdowns.

|                        | 2009 | 2010 | 2011 | Year | 2013 | 2014 | 2015 | Mean |
|------------------------|------|------|------|------|------|------|------|------|
|                        | %    | %    | %    | %    | %    | %    | %    | %    |
| <b>Age category</b>    |      |      |      |      |      |      |      |      |
| 16-24                  | 39.1 | 33.5 | 36.3 | 38.1 | 31.0 | 43.1 | 42.7 | 37.9 |
| 25-34                  | 8.3  | 8.6  | 9.8  | 9.5  | 10.5 | 12.4 | 12.4 | 10.3 |
| 35-49                  | 3.7  | 4.3  | 4.2  | 4.4  | 4.2  | 4.5  | 5.5  | 4.4  |
| 50-64                  | 2.5  | 2.9  | 2.9  | 3.2  | 3.8  | 4.3  | 4.5  | 3.5  |
| <b>Gender</b>          |      |      |      |      |      |      |      |      |
| Male                   | 6.2  | 6.1  | 6.4  | 7.2  | 5.9  | 7.8  | 10.0 | 7.1  |
| Female                 | 8.9  | 8.3  | 8.5  | 8.1  | 9.0  | 9.7  | 9.6  | 8.9  |
| <b>Education level</b> |      |      |      |      |      |      |      |      |
| Lower sec.             | 9.3  | 9.4  | 9.7  | 11.3 | 10.7 | 10.9 | 14.0 | 10.9 |
| Upper sec.             | 6.4  | 5.9  | 6.2  | 6.1  | 5.4  | 7.1  | 7.8  | 6.4  |
| Third lev.             | 7.5  | 7.1  | 7.1  | 7.3  | 7.6  | 9.0  | 9.4  | 7.9  |
| <b>Mean</b>            | 7.4  | 7.0  | 7.3  | 7.6  | 7.3  | 8.7  | 9.8  | 7.9  |

**Source:** EU-LFS survey data, own elaboration.

Figures 3.34, 3.35, and 3.36 draw the time trend for this indicator disaggregated by age, sex, and education level for the period under consideration.

Overall, Table 3.21 and Figure 3.34, 3.35 and 3.36 suggest that there has been an increase by 2.5 percentage points in the temporary job rate from 2009 to 2015. This increase appears to be driven by the increase in the temporary job rate of male workers and workers with a lower secondary education.

**Figure 3.34:** Temporary job rate, by age.

Source: EU-LFS survey data, own elaboration.

### 3.2.4 (15.) Forced part-time rate

The document “Avis commun CES-CSDD: PIBien-être” defines the forced part-time rate as the percentage of employed people who is working part-time and wished to work more.

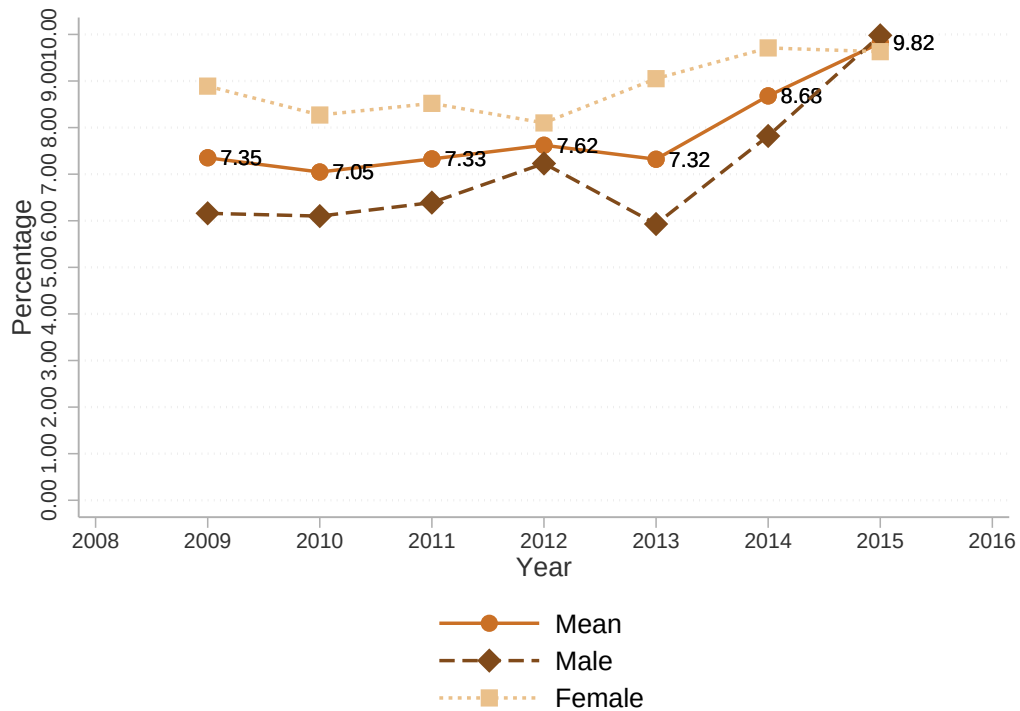
This indicator is computed for the period 2009-2015 and is based on EU-LFS data.

This indicator uses information from the following variables: ILOSTAT, that is, “ILO working status,” WISHMORE, that is, “Wish to work usually more than the current number of hours,” and, FTPT, that is, “Full-time / Part-time distinction.” Similarly to the indicator on the employment rate, the computation is restricted to the population between 16 and 64 years of age.

Table 3.22 illustrates this indicator on the overall population, disaggregated by sex, education level, income quintile, and marital status, across years.

Figures 3.37, 3.38, 3.39, and 3.40 draw the time trend for this indicator.

Overall, the forced part-time rate increased by 1 percentage point from 2009 to 2015. Moreover, this increase seems to be driven by female workers, workers with lower secondary education, and workers with an income in the first quintile of the income distribution, see Table 3.22.

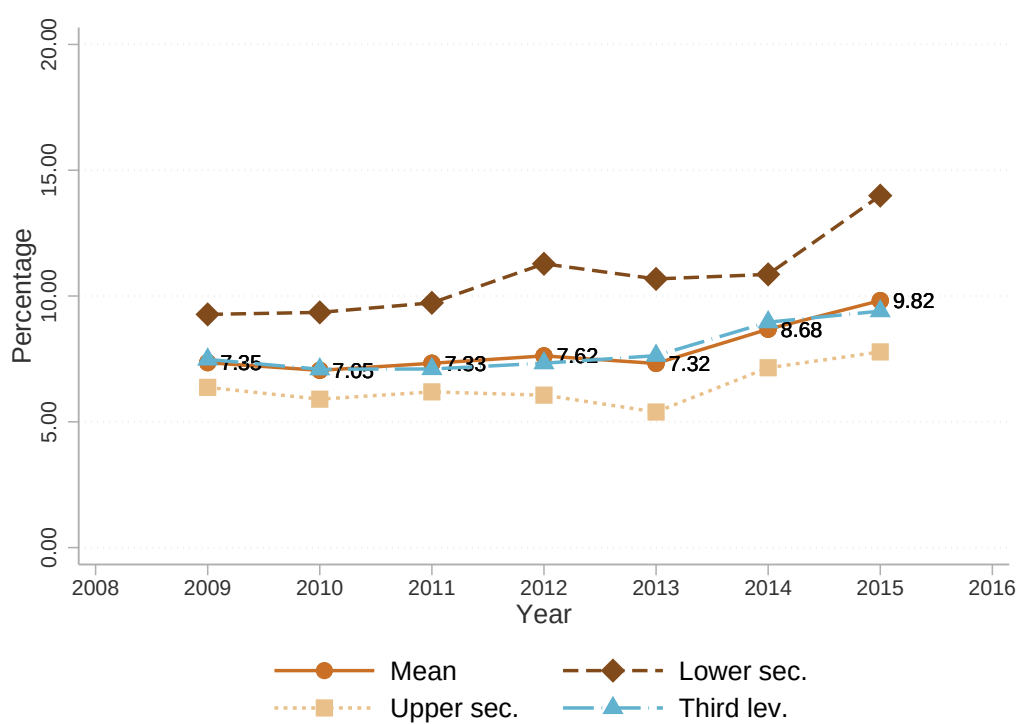
**Figure 3.35:** Temporary job rate, by sex.

**Source:** EU-LFS survey data, own elaboration.

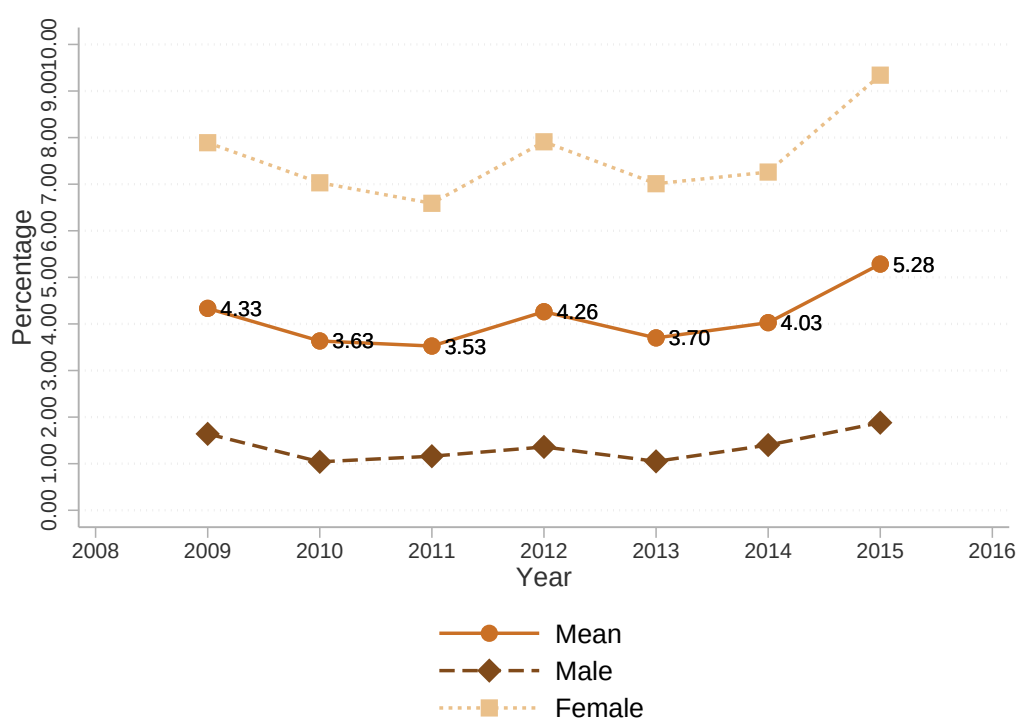
**Table 3.22:** Forced part-time rate, by different breakdowns.

|                        | Year |      |      |      |      |      |      | Mean |
|------------------------|------|------|------|------|------|------|------|------|
|                        | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |      |
|                        | %    | %    | %    | %    | %    | %    | %    | %    |
| <b>Gender</b>          |      |      |      |      |      |      |      |      |
| Male                   | 1.6  | 1.0  | 1.2  | 1.4  | 1.1  | 1.4  | 1.9  | 1.4  |
| Female                 | 7.9  | 7.0  | 6.6  | 7.9  | 7.0  | 7.3  | 9.3  | 7.6  |
| <b>Education level</b> |      |      |      |      |      |      |      |      |
| Lower sec.             | 6.7  | 5.7  | 6.1  | 7.4  | 7.0  | 7.0  | 9.3  | 7.1  |
| Upper sec.             | 4.1  | 3.6  | 3.2  | 4.7  | 3.6  | 4.4  | 4.7  | 4.1  |
| Third lev.             | 3.2  | 2.6  | 2.4  | 2.5  | 2.4  | 2.6  | 3.8  | 2.8  |
| <b>Income quintile</b> |      |      |      |      |      |      |      |      |
| 1                      | 12.1 | 12.0 | 14.3 | 16.4 | 14.1 | 15.0 | 19.1 | 14.7 |
| 2                      | 1.9  | 2.1  | 2.1  | 2.2  | 1.9  | 2.5  | 2.6  | 2.2  |
| 3                      | 1.8  | 1.3  | 1.2  | 1.5  | 0.9  | 0.8  | 1.1  | 1.2  |
| 4                      | 0.5  | 0.9  | 0.3  | 1.0  | 0.6  | 0.5  | 1.3  | 0.7  |
| 5                      | 1.9  | 0.2  | 0.2  | 0.2  | 0.3  | 0.1  | 0.4  | 0.5  |
| <b>Marital status</b>  |      |      |      |      |      |      |      |      |
| No longer married      | 6.7  | 5.3  | 5.3  | 5.9  | 5.2  | 6.3  | 6.7  | 5.9  |
| Single                 | 3.8  | 3.1  | 3.1  | 3.7  | 3.1  | 4.1  | 5.4  | 3.8  |
| Married                | 4.2  | 3.6  | 3.4  | 4.3  | 3.8  | 3.6  | 5.0  | 4.0  |
| <b>Mean</b>            | 4.3  | 3.6  | 3.5  | 4.3  | 3.7  | 4.0  | 5.3  | 4.1  |

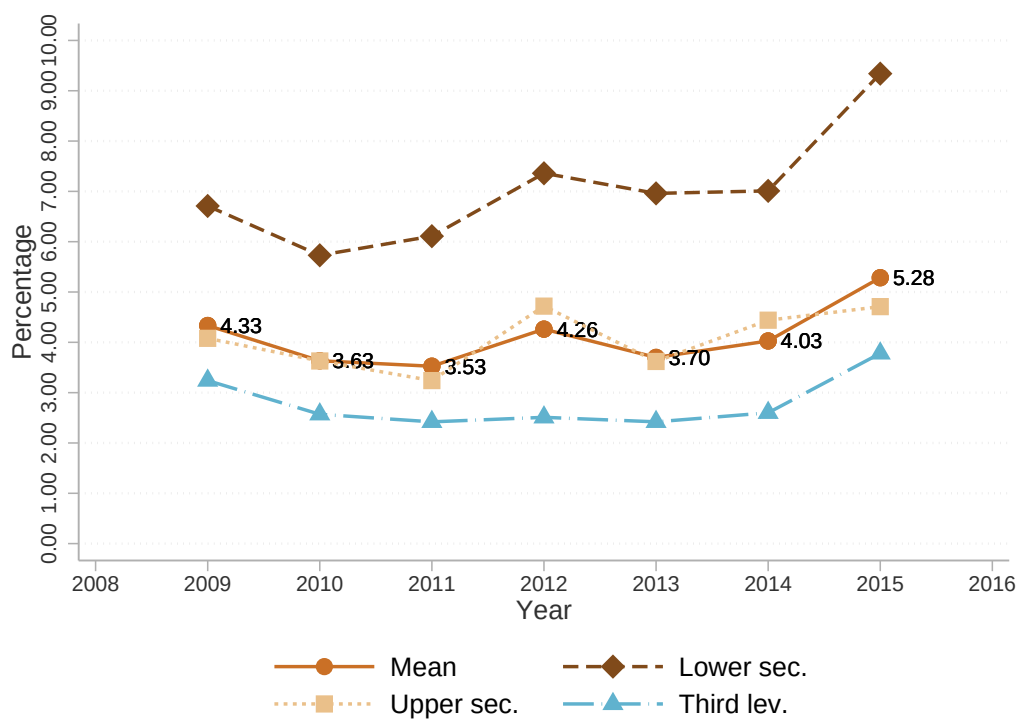
**Source:** EU-LFS survey data, own elaboration.

**Figure 3.36:** Temporary job rate, by education level.

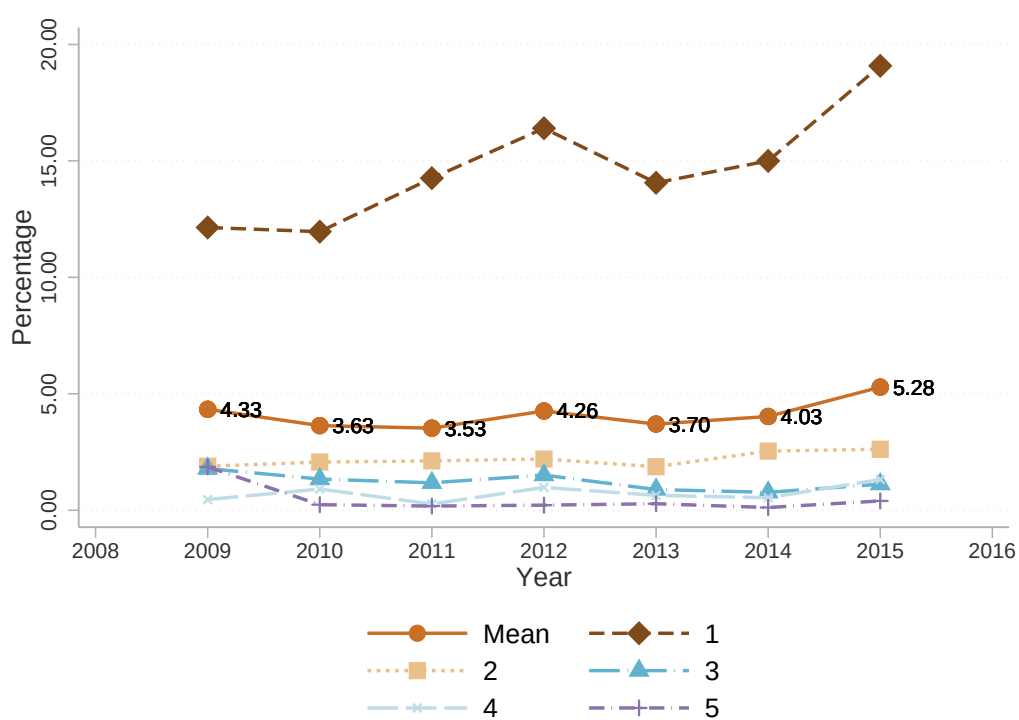
**Source:** EU-LFS survey data, own elaboration.

**Figure 3.37:** Forced part-time rate, by sex.

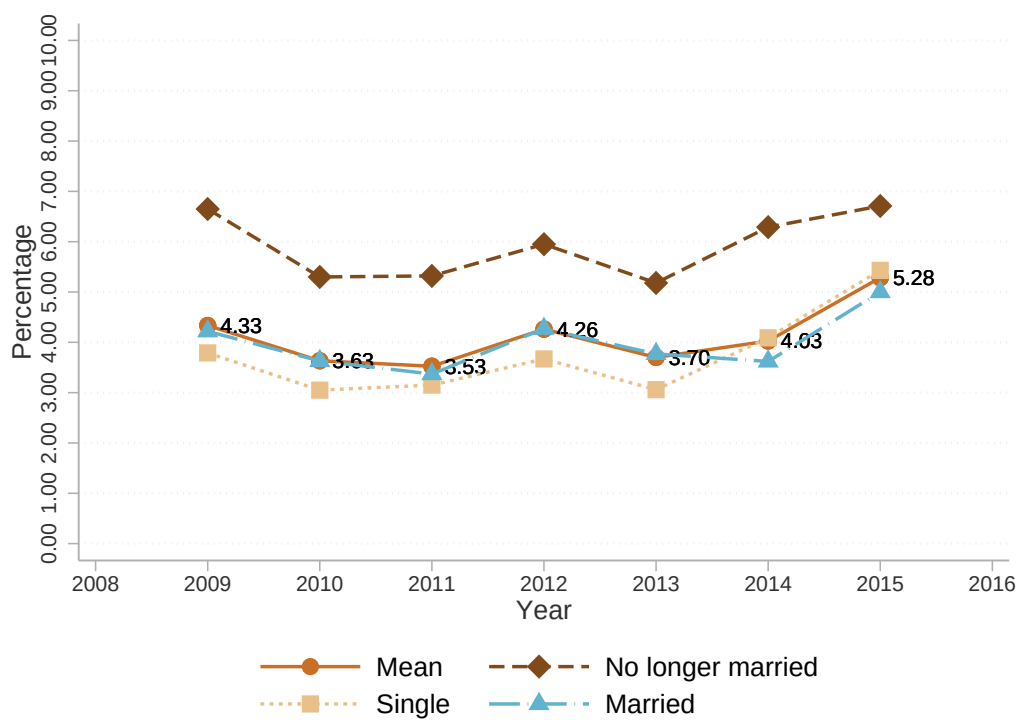
**Source:** EU-LFS survey data, own elaboration.

**Figure 3.38:** Forced part-time rate, by education level.

**Source:** EU-LFS survey data, own elaboration.

**Figure 3.39:** Forced part-time rate, by income quintile.

**Source:** EU-LFS survey data, own elaboration.

**Figure 3.40:** Forced part-time rate, by marital status.

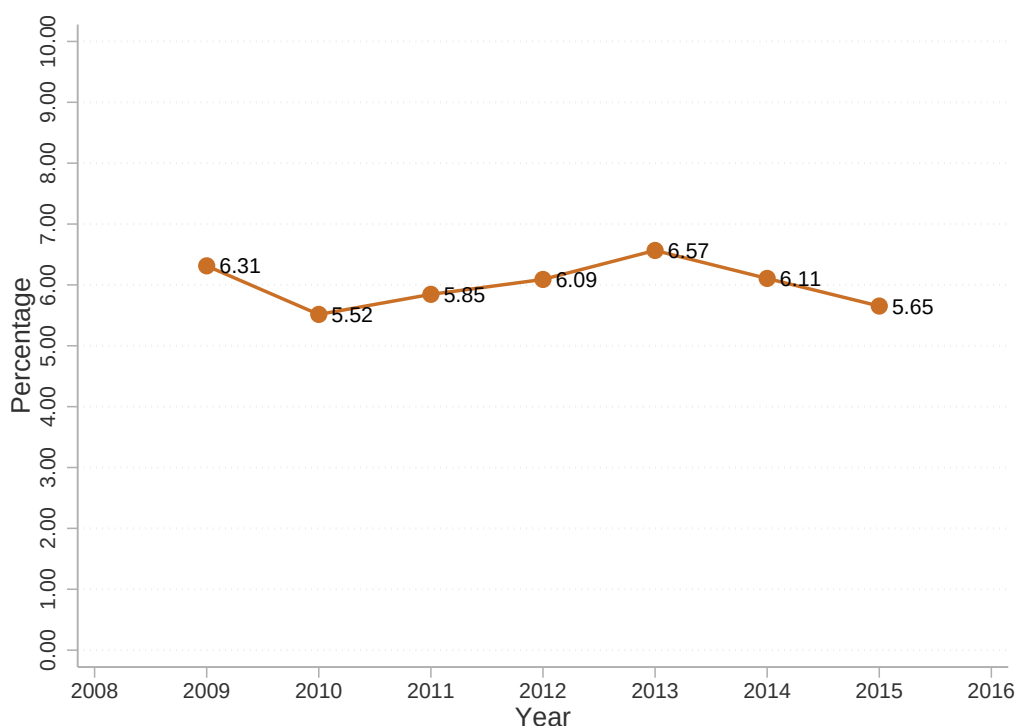
**Source:** EU-LFS survey data, own elaboration.

### 3.2.5 (16.) People living in household with low working intensity

As explained by Eurostat, this indicator “is defined as the number of persons living in a household having a work intensity between 0.20 and 0.45. The work intensity of a household is the ratio of the total number of months that all working-age household members have worked during the income reference year and the total number of months the same household members theoretically could have worked in the same period.” This indicator has been computed with EU-SILC data for the period 2009-2015; it is based on the variable RX050, that is, “Low work intensity status,” and is computed for people in the labour force who are between 18 and 59 years of age.

This indicator is presented only in a figure to have more immediate understanding of the time trend.

**Figure 3.41:** People living in household with low working intensity.



**Source:** EU-SILC survey data, own elaboration.

Overall, the percentage of people living in a household with low working intensity reduced since 2009 by 0.6 percentage point, see Figure 3.41. However, over the entire period considered in this report, this indicator has been quite volatile: it decreased from 2009 to 2010, then it increased for three consecutive years, and finally it reduced until 2015.

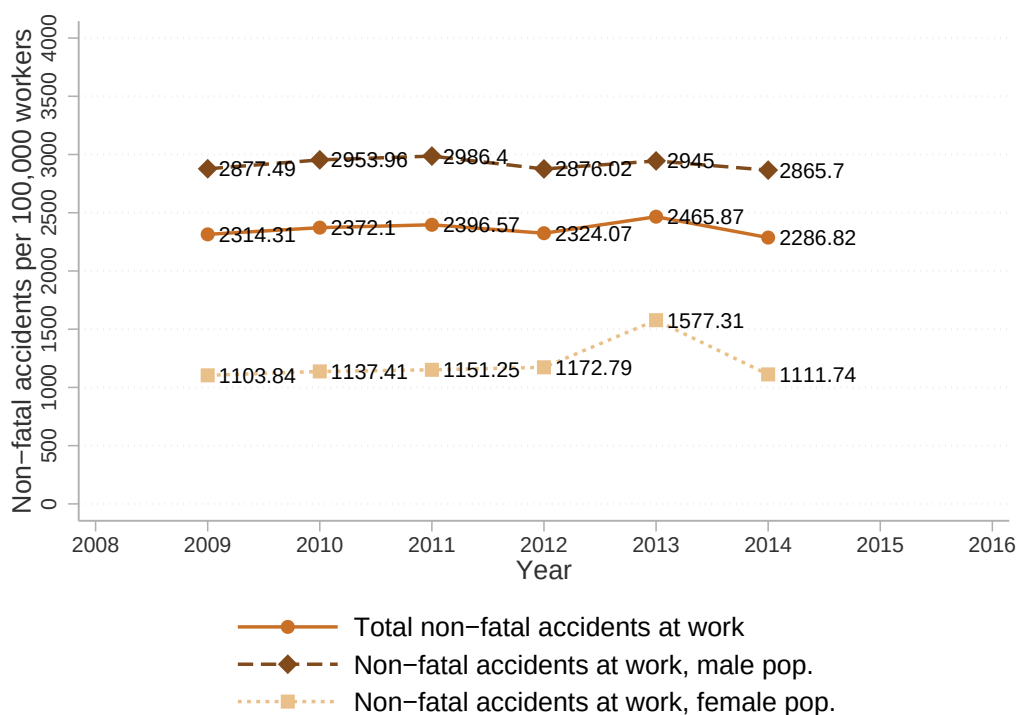
### 3.2.6 (17.) Accidents at work

We present separate figures for non-fatal and fatal accidents at work. Non-fatal accidents at work account only for accidents that caused the worker to lose more than 3 days of work. Both the sub-indicators are taken directly from the Eurostat website and are based on variable hsw\_mi01.<sup>26</sup> In turn Eurostat takes these data from the administrative data collection “European Statistics on Accidents at Work (European Statistics on Accidents at Work (ESAW)).”

Both sub-indicators represent standardized incidence rates, that is, the number of accidents per 100,000 workers adjusted for the relative sizes of economic sectors at EU level.<sup>27</sup>

#### (17.a) Non-fatal accidents at work

**Figure 3.42:** Accidents at work, by sex.



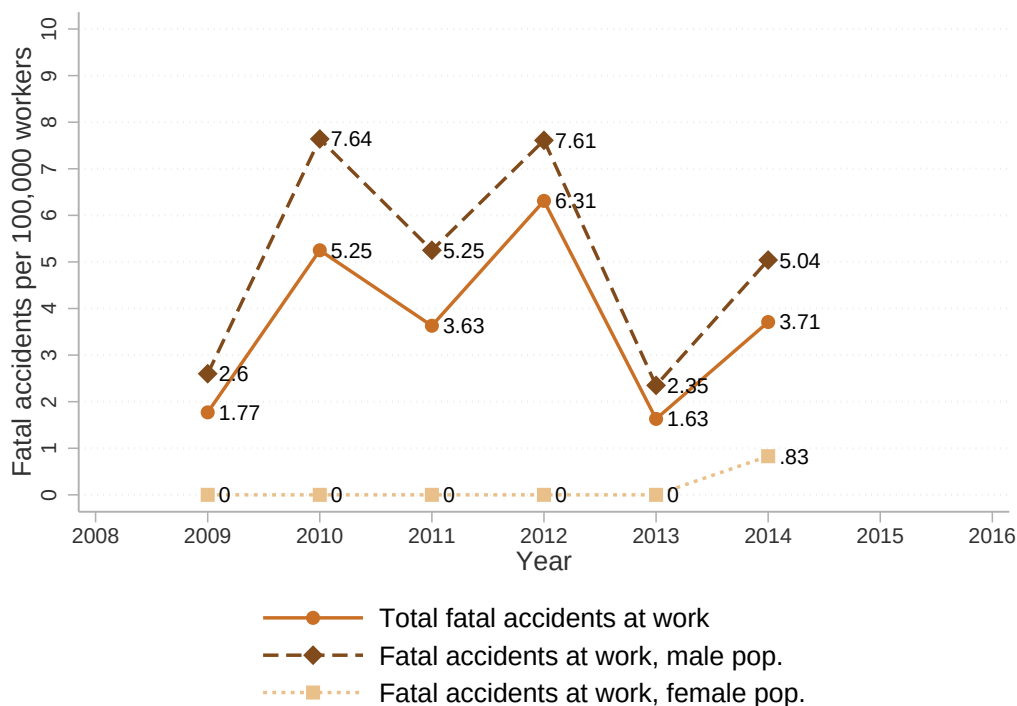
**Source:** European Statistics on Accidents at work data, own elaboration.

Figure 3.42 shows two interesting characteristics of the adjusted number of non-fatal accidents per 100,000 workers: i) the amount of non-fatal accidents remained quite stable during the period 2009 to 2014 – the last year for which we have available data; ii) the amount of non-fatal accidents is much higher for male workers – more than double in any year, which is probably due to the different type of jobs in which male and female workers are involved.

<sup>26</sup><http://ec.europa.eu/eurostat/web/health/health-safety-work/data/database>

<sup>27</sup>[http://ec.europa.eu/eurostat/cache/metadata/en/hsw\\_acc\\_work\\_esms.htm](http://ec.europa.eu/eurostat/cache/metadata/en/hsw_acc_work_esms.htm)

## (17.b) Fatal accidents at work

**Figure 3.43:** Fatalities at work, by sex.

**Source:** European Statistics on Accidents at work data, own elaboration.

Figure 3.43 shows two interesting characteristics of the adjusted number of fatal accidents per 100,000 workers: i) the amount of fatal accidents is quite low, volatile and increased over time by two fatalities over the period 2009 to 2014 – the last year for which we have available data; ii) the amount of fatal accidents for female workers is 0 for most of the period. The latter point mirrors the results showed in Figure 3.42.

### 3.2.7 (18.) Feeling of job insecurity

The “Avis commun CES-CSDD: PIBien-être” suggests to compute this indicator as the percentage of workers who declares to fear to lose their job within six months.

Because of data coverage, we compute two sub-indicators. The first sub-indicator exactly reflects the above definition; it can be computed from the “European Working Conditions Survey (European Working Conditions Survey (EWCS)),” with variables q77a, for wave 2010, and Q89g, for wave 2015. Because of data characteristics, generalizations to the entire population should be done carefully; the computations are carried on respondents. These data are freely accessible from the UK Data Service website.<sup>28</sup>

Because of the limited time period covered by EWCS data and the non-generalizability of the results, we compute a second sub-indicator, which measures the percentage of people who were employed over the past year and in the current year transitioned to unemployment. Data for this indicator are retrieved from the Eurostat website.<sup>29</sup>

These two sub-indicators differ with respect to three characteristics:

- 1 While the first sub-indicator provides a subjective measure on job security, the second sub-indicator provides an objective measure;
- 2 While the first sub-indicator is based on expectations, the second sub-indicator we illustrate is based on past events;
- 3 Since the first sub-indicator is based on survey data, we are able to present the statistics for different subgroups.

#### (18.a) Feeling of job insecurity

Table 3.23 illustrates the subjective sub-indicator on the overall population, and disaggregated by age, sex, income quintile, country of birth, occupation, working status, and education level, across years.

Table 3.23 suggests that the subjective measure of feeling of job insecurity is reduced by 2.5 percentage points from 2010 to 2015. This reduction seems to concern in similar manner all of the different demographic groups. We did not perform a cross-country comparison of this sub-indicator because of a different repartition of working situations across countries and waves, and because of the presence of answers among non-workers. For instance, unemployed or retired people, or people who did not answer the question on their employment status also provided an answer to this question, and this is not consistent across countries and waves. Hence, the interpretation of cross-country comparisons for this subindicator could be problematic.

#### (18.b) Feeling of job insecurity

Figure 3.44 illustrates the objective sub-indicator on the overall population, across years.

The trend of this objective indicator on the feeling of job insecurity does not seem to reflect the trend of the subjective sub-indicator. In fact, there appears to be only a slight

<sup>28</sup><https://www.ukdataservice.ac.uk/>

<sup>29</sup>[http://appsso.eurostat.ec.europa.eu/nui/show.do?query=BOOKMARK\\_DS-163765\\_QID\\_72DB291\\_UID\\_-3F171EB0&layout=TIME,C,X,0;GEO,L,Y,0;TRANS1Y,L,Z,0;WSTATUS,L,Z,1;SEX,L,Z,2;INDICATORS,C,Z,3;&zSelection=DS-163765WSTATUS,EMP;DS-163765TRANS1Y,TO\\_FT;DS-163765INDICATORS,OBS\\_FLAG;DS-163765SEX,T;&rankName1=WSTATUS\\_1\\_2\\_-1\\_2&rankName2=TRANS1Y\\_1\\_2\\_-1\\_2&rankName3=INDICATORS\\_1\\_2\\_-1\\_2&rankName4=SEX\\_1\\_2\\_-1\\_2&rankName5=TIME\\_1\\_0\\_0\\_0&rankName6=GEO\\_1\\_2\\_0\\_1&sortC=ASC\\_-1\\_FIRST&rStp=&cStp=&rDCh=&cDCh=&rDM=true&cDM=true&footnes=false&empty=false&wai=false&time\\_mode=NONE&time\\_most\\_recent=false&lang=EN&cfo=>%23%23%23%2C%23%23%23.%23%23%23](http://appsso.eurostat.ec.europa.eu/nui/show.do?query=BOOKMARK_DS-163765_QID_72DB291_UID_-3F171EB0&layout=TIME,C,X,0;GEO,L,Y,0;TRANS1Y,L,Z,0;WSTATUS,L,Z,1;SEX,L,Z,2;INDICATORS,C,Z,3;&zSelection=DS-163765WSTATUS,EMP;DS-163765TRANS1Y,TO_FT;DS-163765INDICATORS,OBS_FLAG;DS-163765SEX,T;&rankName1=WSTATUS_1_2_-1_2&rankName2=TRANS1Y_1_2_-1_2&rankName3=INDICATORS_1_2_-1_2&rankName4=SEX_1_2_-1_2&rankName5=TIME_1_0_0_0&rankName6=GEO_1_2_0_1&sortC=ASC_-1_FIRST&rStp=&cStp=&rDCh=&cDCh=&rDM=true&cDM=true&footnes=false&empty=false&wai=false&time_mode=NONE&time_most_recent=false&lang=EN&cfo=>%23%23%23%2C%23%23%23.%23%23%23)

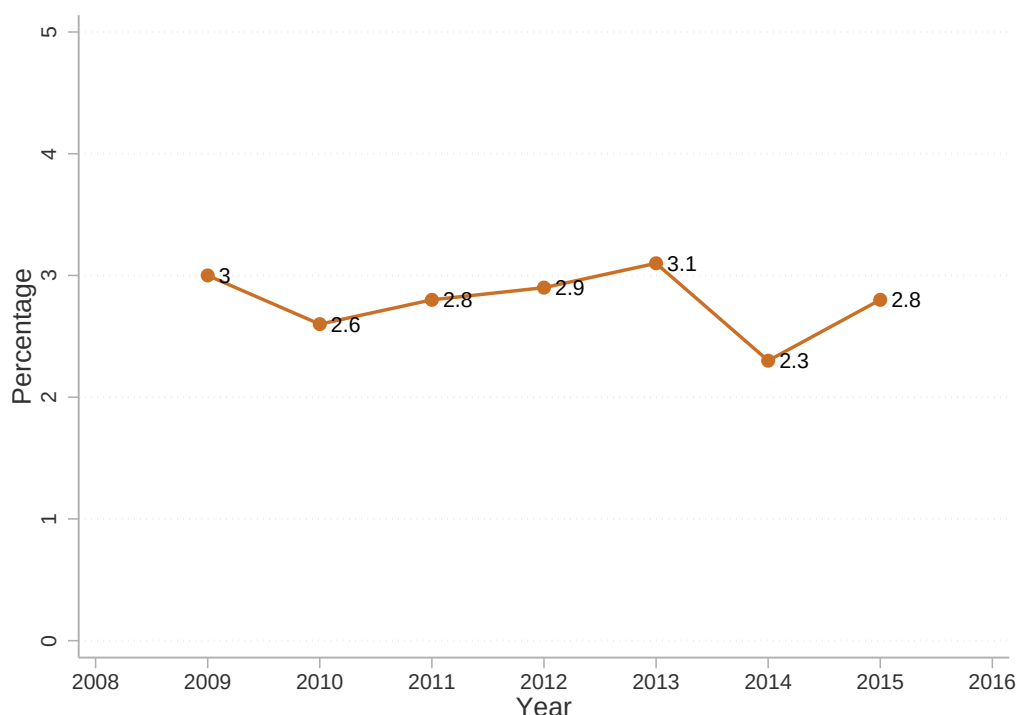
**Table 3.23:** Share of employees who are afraid to lose the job over the next six months, by various breakdowns.

|                                      | Year      |           |           |
|--------------------------------------|-----------|-----------|-----------|
|                                      | 2010<br>% | 2015<br>% | Mean<br>% |
| <b>Age group</b>                     |           |           |           |
| 16-24                                | 2.7       | 1.2       | 1.9       |
| 25-34                                | 3.1       | 0.9       | 2.1       |
| 35-49                                | 3.1       | 0.6       | 1.9       |
| 50-64                                | 3.3       | 0.3       | 1.6       |
| <b>Gender</b>                        |           |           |           |
| Male                                 | 3.1       | 0.6       | 2.0       |
| Female                               | 3.1       | 0.6       | 1.8       |
| <b>ILO working status</b>            |           |           |           |
| Employed                             | 3.1       | 0.6       | 1.9       |
| Unemployed                           | 3.1       | 1.7       | 2.6       |
| Inactive                             | 3.3       | 1.1       | 2.6       |
| <b>Country of birth</b>              |           |           |           |
| Local fam.                           | 3.4       | 0.6       | 2.1       |
| Foreign fam.                         | 2.9       | 0.7       | 1.7       |
| <b>Occupation (ISCO-08, 1 digit)</b> |           |           |           |
| manag., prof., tech. (1,2,3)         | 3.2       | 0.5       | 1.9       |
| clerks, sales (4,5)                  | 2.9       | 0.8       | 1.9       |
| skill. agr., craft (6,7)             | 2.9       | 0.7       | 1.8       |
| mach. oper., elem. occ. (8,9)        | 3.2       | 0.8       | 2.0       |
| <b>Income quintile</b>               |           |           |           |
| 1                                    | 2.5       | 1.0       | 1.4       |
| 2                                    | 2.7       | 0.8       | 1.3       |
| 3                                    | 3.1       | 0.8       | 1.6       |
| 4                                    | 3.2       | 0.5       | 1.2       |
| 5                                    | 3.2       | 0.3       | 1.2       |
| <b>Education level</b>               |           |           |           |
| Lower sec.                           | 3.0       | 0.6       | 1.8       |
| Upper sec.                           | 3.1       | 0.7       | 1.8       |
| Third lev.                           | 3.2       | 0.6       | 2.1       |
| <b>Mean</b>                          | 3.1       | 0.6       | 1.3       |

**Source:** EWCS survey data, own elaboration.

decrease in the share of people who were employed over the past year, but transitioned to unemployment in the current year.

**Figure 3.44:** Share of people who were employed over the past year, but transitioned to unemployment in the current year.



Source: EWCS survey data, own elaboration.

### 3.3 Domain III: Housing

The domain on housing includes five indicators which monitor housing conditions, costs and the availability of new homes.

Table 3.24 provides an overview of the indicators. Housing conditions and costs measures are sourced from the EU-SILC survey, while the number of new dwellings comes from STATEC's *Enquete sur le batiments achevés*. One observes that, overall, Luxembourg's residents have better housing conditions than those in other Western European countries. On average the available space and costs have remained stable over the period. When looking at the costs distribution, however, one notices wide variations across tenure status and income groups. The number of new homes has decreased over the period.

*Why does this domain matter?* Housing conditions and costs have a big impact on people's lives. People's homes are essential to meet the basic need of sheltering, and contribute to the feeling of personal safety and of having a personal space. Housing conditions also affect health and personal relations. Finally, housing costs represent a major financial concern. It is generally thought that homes should be affordable.

*Why do these indicators matter?* The number of rooms per person and the overcrowding rate are indicators of housing conditions. Housing costs represents typically a large share of households' budgets, and strongly affect consumption and savings choices. Number

**Table 3.24:** Domain 3, housing.

| N      | Indicators                                                                   | Description                                                                    | Cross country | Change |
|--------|------------------------------------------------------------------------------|--------------------------------------------------------------------------------|---------------|--------|
| 19     | Number of rooms per person                                                   | The number of rooms per person is about 2.3 over the period.                   | ● 2015        | ↔      |
| 20     | Overcrowding rate                                                            | The share of people living in overcrowded dwellings is 6.8% over the period.   | ● 2015        | ↔      |
| 21     | Share of housing costs on income                                             | Total housing costs do not change and are about 14.6% of household income.     | ● 2014        | ↔      |
| 22     | New dwellings                                                                | The number of new dwellings decreased between 2009 and 2013.                   | NA**          | ↘      |
| 23     | New dwellings in priority areas                                              | The number of new dwellings in priority areas decreased between 2009 and 2013. | NA**          | ↘      |
| Legend |                                                                              |                                                                                |               |        |
| ●      | Luxembourg score is in the top 25% among Western European countries.         |                                                                                |               |        |
| ●      | Luxembourg score is in line with the Western Europe average.                 |                                                                                |               |        |
| ●      | Luxembourg score belongs to the bottom 25% among Western European countries. |                                                                                |               |        |
| ↗      | Indicates an increase over time.                                             |                                                                                |               |        |
| ↔      | Indicates that the indicator did not change.                                 |                                                                                |               |        |
| ↘      | Indicates a decrease over time.                                              |                                                                                |               |        |
| NA'    | Time series is not available.                                                |                                                                                |               |        |
| NA*    | Data sourced from data producer, and thus not internationally comparable.    |                                                                                |               |        |
| NA**   | Data sourced from administrative records.                                    |                                                                                |               |        |

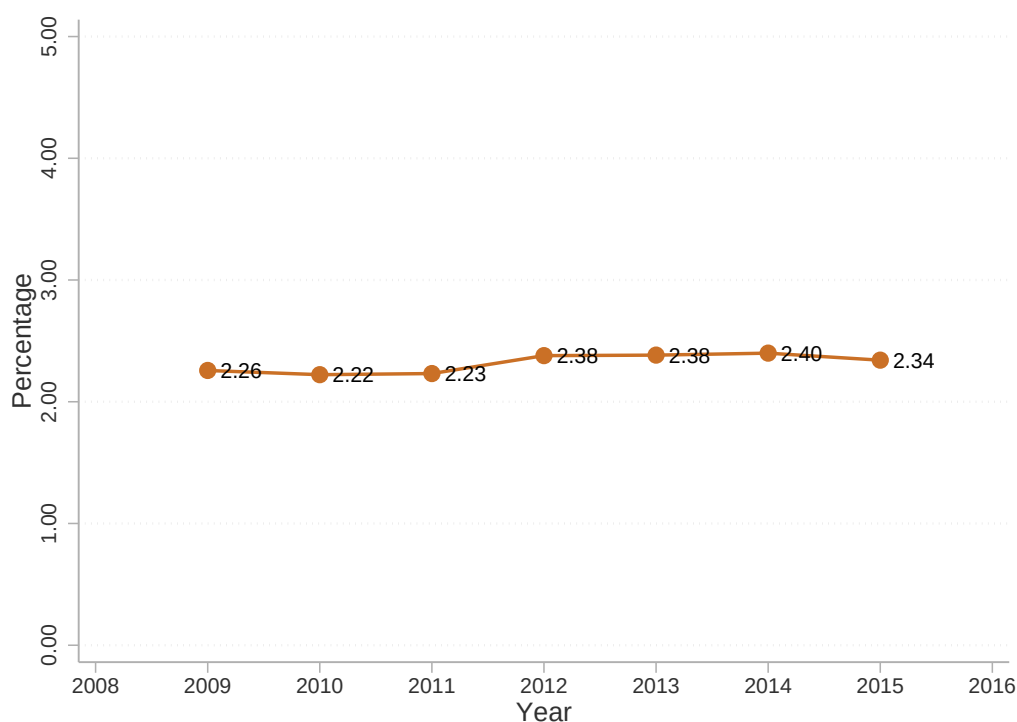
of new dwellings and number of new dwellings in priority areas are important indicators for Luxembourg's residents, because of the country's expanding population and limited territory.

### 3.3.1 (19.) Number of rooms per person

This indicator is intended to capture whether people live in crowded condition. It is computed dividing the number of rooms by the number of people living in a dwelling. Data is sourced from EU-SILC, and covers the period 2009-2015.<sup>30</sup>

Figure 3.45 shows that the number of rooms per person is higher than 2 and slightly increasing over the period of analysis. This places Luxembourg among the top scorers in Western Europe.

**Figure 3.45:** Number of rooms per person.



**Source:** EU-SILC survey data, own elaboration.

<sup>30</sup>Variables' codes are: HH030 ( "Number of rooms available to the household"), and HX040, ("Household size"). The definition of what a room is also from EU-SILC: "A room is defined as a space of a housing unit of at least 4 square meters such as normal bedrooms, dining rooms, living rooms and habitable cellars, attics, kitchens and other separated spaces used or intended for dwelling purposes with a high over 2 meters and accessible from inside the unit". (Source <https://circabc.europa.eu/sd/a/d7e88330-3502-44fa-96ea-eab5579b4d1e/SILC065%20operation%202013%20VERSION%20MAY%202013.pdf>.)

### 3.3.2 (20.) People living in overcrowded dwelling

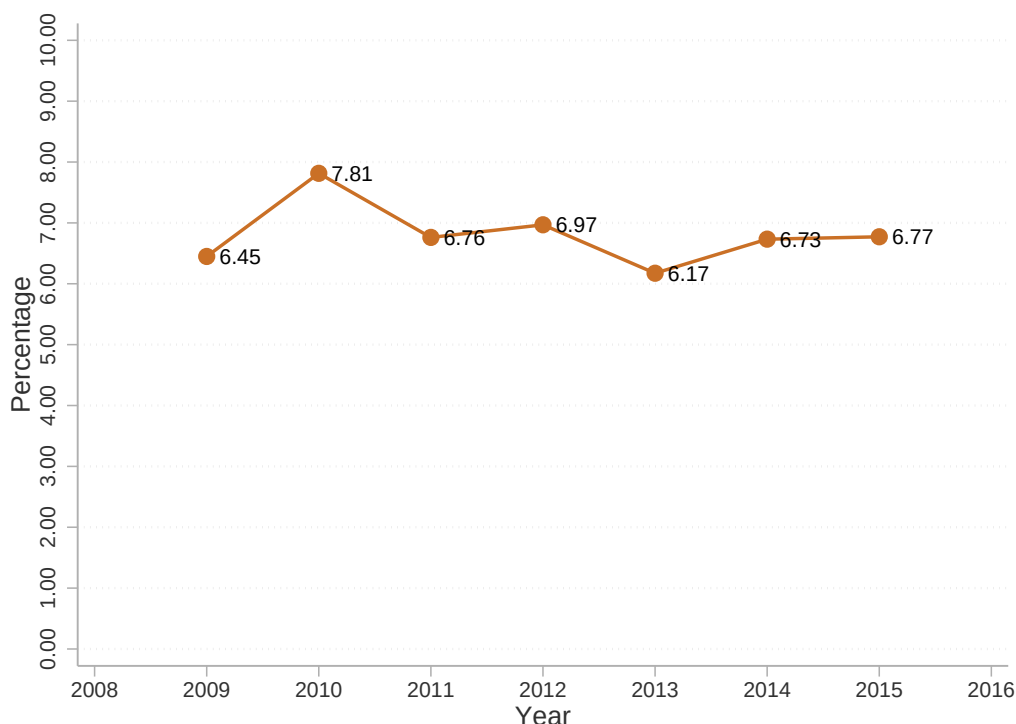
The *overcrowding rate* is defined by Eurostat as the percentage of the population living in an overcrowded household. A person is considered as living in an overcrowded household if the household does not have a minimum number of rooms equal to:<sup>31</sup>

- one room for the household;
- one room per couple in the household;
- one room for each single person aged 18 or more;
- one room per pair of single people of the same gender between 12 and 17 years of age;
- one room for each single person between 12 and 17 years of age and not included in the previous category;
- one room per pair of children under 12 years of age.

This indicator is computed with EU-SILC data and is available at yearly frequency over the period 2009-2015.<sup>32</sup>

Figure 3.46 shows the time series evolution of this indicator over the period. The overcrowding rate exhibits a nearly-flat trend. At the end of the period, the overcrowding rate is slightly higher than at the beginning of the period, and one also observes a peak in 2010. On average, it is about 6.8%.

**Figure 3.46:** Percentage of people living in overcrowded dwellings.



**Source:** EU-SILC survey data, own elaboration.

<sup>31</sup>[http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Overcrowding\\_rate](http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Overcrowding_rate)

<sup>32</sup>The indicator is sourced from variable HX120, that is, “Overcrowded household.”.

### 3.3.3 (21.) Total housing costs as share of household income

Eurostat defines this indicator as “the total housing costs (‘net’ of housing allowances)” out of “disposable income (‘net’ of housing allowances).”<sup>33</sup> Housing costs, in turn, are the “monthly costs connected with the households right to live in the accommodation. The costs of utilities (water, electricity, gas and heating) resulting from the actual use of the accommodation are also included.”<sup>34</sup> Costs vary depending on the status of people living in the dwellings, whether they are owners, owners paying a mortgage, or tenants paying a market or reduced fee.<sup>35</sup>

This indicator is compiled using data sourced from the EU-SILC’s 2009-2015 waves.<sup>36</sup> The indicator is available at yearly frequency for the entire period covered by this report. (Note that in 2009 costs are missing for tenant status because, up until that survey wave, tenant status was not considered.)

Table 3.25 gives the evolution of housing costs by tenure status and income quintiles. It also reports yearly and period averages. Figures 3.47 and 3.48 depict the time series evolution of the indicator. The average share of total housing costs on disposable income remained constant over the period, at about 14.6%. When considering tenure status and the distribution of income, however, one observes wide variations in costs. Housing costs are higher and increasing for tenants. Housing costs are three times higher for people in the bottom income quintile than people in the top quintile. Moreover, lower earners have faced an increase in housing costs over the period of analysis.

While Figure 3.48 suggests that the share of total housing costs on disposable income does not vary by income quintile over the period, Figure 3.47 suggests that it increased mainly for tenants.

<sup>33</sup>[http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Housing\\_cost\\_overburden\\_rate](http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Housing_cost_overburden_rate)

<sup>34</sup>Source: "DESCRIPTION OF TARGET VARIABLES: Cross-sectional and Longitudinal, 2013 operation" (SILC065 operation 2013 VERSION MAY 2013). <https://circabc.europa.eu/sd/a/d7e88330-3502-44fa-96ea-eab5579b4d1e/SILC065%20operation%202013%20VERSION%20MAY%202013.pdf>

<sup>35</sup> More in detail, this is what is included in the housing costs:

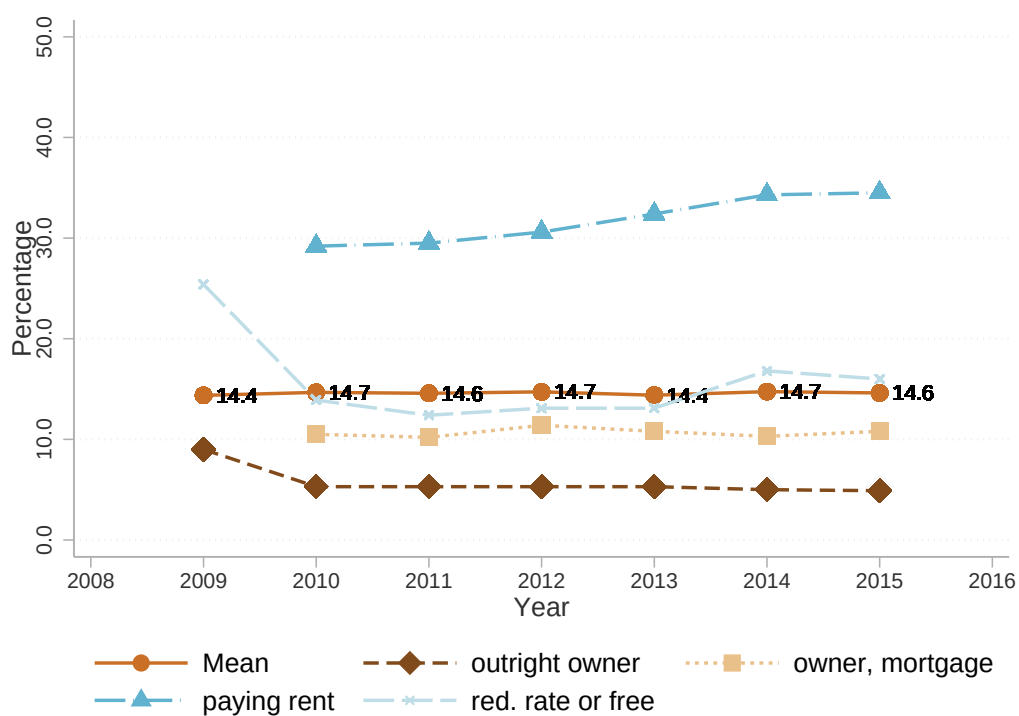
- 1 Mortgage interest payments (net of any tax relief), gross of housing benefits (i.e. housing benefits should not be deducted from the total housing cost), structural insurance, mandatory services and charges (sewage removal, refuse removal, etc.), regular maintenance and repairs, taxes, and the cost of utilities (water, electricity, gas and heating).
- 2 Rent payments, gross of housing benefits (i.e. housing benefits should not be deducted from the total housing cost), structural insurance (if paid by the tenants), services and charges (sewage removal, refuse removal, etc.) (if paid by the tenants), taxes on dwelling (if applicable), regular maintenance and repairs and the cost of utilities (water, electricity, gas and heating).
- 3 Rent payments, gross of housing benefits (i.e. housing benefits should not be deducted from the total housing cost), structural insurance (if paid by the tenants), services and charges (sewage removal, refuse removal, etc.) (if paid by the tenants), taxes on dwelling (if applicable), regular maintenance and repairs and the cost of utilities (water, electricity, gas and heating).
- 4 Gross of housing benefits (i.e. housing benefits should not be deducted from the total housing cost), structural insurance (if paid by the rent free tenant), services and charges (sewage removal, refuse removal, etc.) (if paid by the rent free tenant), taxes on dwelling (if applicable), regular maintenance and repairs and the cost of utilities (water, electricity, gas and heating).

<sup>36</sup>The indicator is computed using the formula:  $THC = 100 * (12 * HH070 - HY070G) / (HY020 - HY070G)$ , where HH070 is the monthly total housing cost, HY020 is the yearly total disposable household income, and HY070G represents the yearly housing allowances.

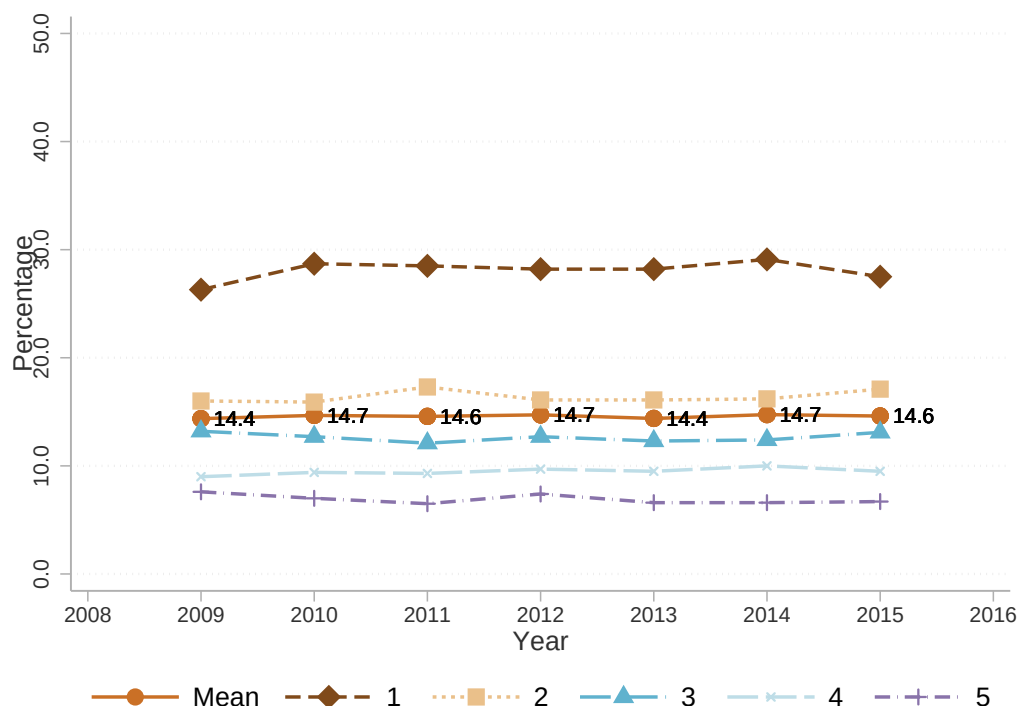
**Table 3.25:** Relative part of dwelling costs.

|                        | 2009 | 2010 | 2011 | Year | 2012 | 2013 | 2014 | 2015 | Mean |
|------------------------|------|------|------|------|------|------|------|------|------|
|                        | %    | %    | %    |      | %    | %    | %    | %    | %    |
| <b>Tenure status</b>   |      |      |      |      |      |      |      |      |      |
| outright owner         | 9.0  | 5.3  | 5.3  |      | 5.3  | 5.3  | 5.0  | 4.9  | 6.1  |
| owner, mortgage        |      | 10.5 | 10.2 |      | 11.4 | 10.8 | 10.3 | 10.8 | 10.7 |
| paying rent            |      | 29.2 | 29.5 |      | 30.6 | 32.4 | 34.3 | 34.5 | 31.6 |
| red. rate or free      | 25.4 | 13.9 | 12.4 |      | 13.1 | 13.1 | 16.8 | 16.0 | 19.6 |
| <b>Income quintile</b> |      |      |      |      |      |      |      |      |      |
| 1                      | 26.3 | 28.7 | 28.5 |      | 28.2 | 28.2 | 29.1 | 27.5 | 28.1 |
| 2                      | 16.0 | 15.9 | 17.3 |      | 16.1 | 16.1 | 16.2 | 17.1 | 16.4 |
| 3                      | 13.2 | 12.7 | 12.1 |      | 12.7 | 12.3 | 12.4 | 13.1 | 12.7 |
| 4                      | 9.0  | 9.4  | 9.3  |      | 9.7  | 9.5  | 10.0 | 9.5  | 9.5  |
| 5                      | 7.6  | 7.0  | 6.5  |      | 7.4  | 6.6  | 6.6  | 6.7  | 6.9  |
| <b>Mean</b>            | 14.4 | 14.7 | 14.6 |      | 14.7 | 14.4 | 14.7 | 14.6 | 14.6 |

Source: EU-SILC survey data, own elaboration.

**Figure 3.47:** Relative part of dwelling costs, by tenure status.

Source: EU-SILC survey data, own elaboration.

**Figure 3.48:** Relative part of dwelling costs, by income quintile.

Source: EU-SILC survey data, own elaboration.

### 3.3.4 (22.-23.) Number of new dwellings per year, in the whole country and in priority areas

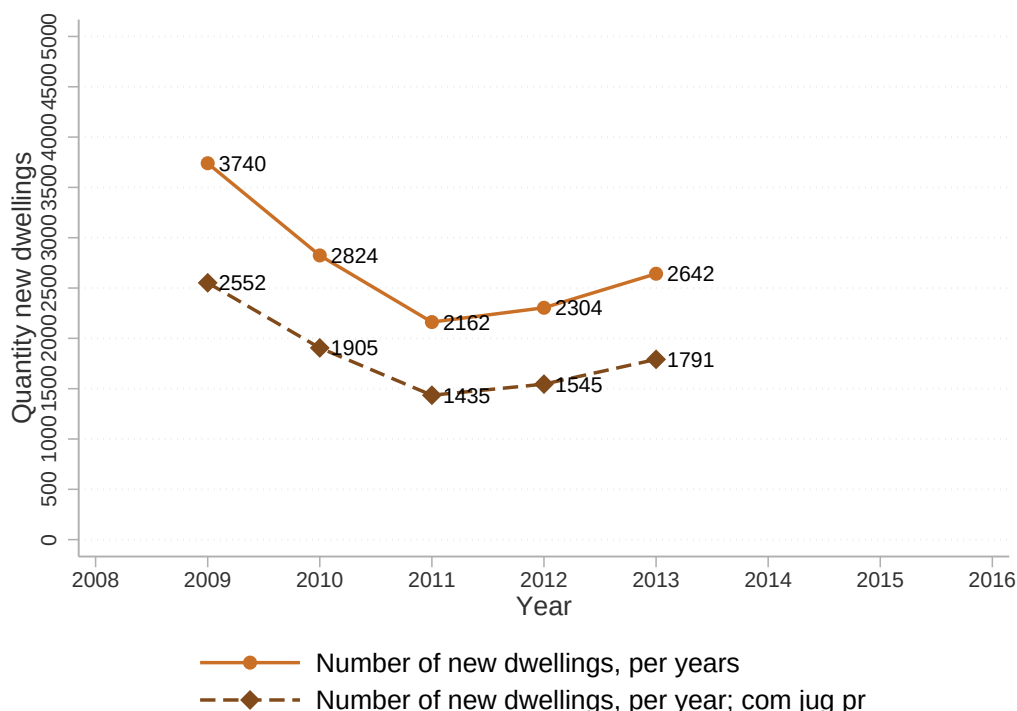
Indicator 22 reports the number of new dwellings per year. This is a statistics produced by STATEC, for which observations are available every year. (At the time of elaborating this report, the latest available observation was for the year 2013.)<sup>37</sup>

Indicator 23 concerns the number of new dwelling in priority zones. Part of new dwellings are located in areas that have been identified as “priority areas” by public planning tools. (Priority areas are areas to be developed with higher priority – “Siedlungsschwerpunkte”.) currently, Luxembourg counts as many as 43 such areas.<sup>38</sup>

Figure 3.49 depicts the evolution over time of the two indicators. New dwellings and new dwellings in priority areas follow a similar pattern, which is expected as the latter is a sub-sample of the first indicator. One observes that, overall, the number of new homes has decreased over the period, despite a slight increase in the last two years of observations. The number of new dwellings has gone down from 3,740 in 2009 to 2,642 in 2013. The number of new dwelling in priority areas decreased from 2,552 units in 2009 to 1,791 units in 2013.

<sup>37</sup>One can see <http://www.statistiques.public.lu/catalogue-publications/regards/2015/PDF-15-2015.pdf> Peltrier (2015)

<sup>38</sup>Refer to the following document: <http://amenagement-territoire.public.lu/fr/plans-caractere-reglementaire/plans-sectoriels/logement.html>, then click on “Présentation du PSL.”

**Figure 3.49:** Number of new dwellings per year.

Source: STATEC Enquête bâtiments achevés, own elaboration.

### 3.4 Domain IV: Health

This section illustrates the eight indicators that compose the health domain. Table 3.26 summarises the main information resulting from the indicators, it reports the overall time trends and, whenever possible, it compares the scores from Luxembourg with those from other Western European countries. We observe that for three indicators Luxembourg ranks in the top quartile compared to other Western European countries; four times, Luxembourg is in line with the average of Western European countries; and in one case it scores among the worst performers in Western Europe.

*Why does this domain matter?* Good health is one of the most important aspects for people's quality of life. Health affects the number of years people live as well as their quality. Moreover, health also affects a number of other domains such as access to education, to the job market, to social relations, and it affects people's productivity and wealth. Additionally, a bad health generates undesirable individual and social costs. Finally, a good health is often mentioned as one of the most important components of a good life in individual level studies.

*Why do these indicators matter?* Various measures of life expectancy are relevant to measure the longevity of the population. However, a long life does not necessarily mean a good quality of life, in particular if bad health conditions hamper it. This is why, along with life expectancy, we consider also the number of healthy years that an adult person can

**Table 3.26:** Domain 4, health.

| N    | Indicators                                    | Description                                                                                                                                                                                                                                                                                                                               | Cross country | Change |
|------|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|
| 24.a | Life expectancy at birth                      | Whether it is measured at birth, 1, 15, 45 or 65 years of age, this indicator stays constant over time. However, this indicator is higher in Luxembourg than in most Western European countries.                                                                                                                                          | ● 2013        | ↔      |
| 24.b | Life expectancy in good conditions, by gender | While from 2009 to 2012 women had about 66 healthy life years, in 2013-2014 this measure reduced by 3 years. There is a similar trend for men: they enjoyed about 65.5 healthy life years from 2009 to 2012, and about 64 in 2013-2014. For both genders, Luxembourg residents fare as well as people in most Western European countries. | ● 2014        | ↘      |
| 25   | Prevalence of mental problems                 | The share of people who died because of mental health problems increased since 2009, when it was around 20 per hundred thousand people, to reach 43 per hundred thousand in 2013.                                                                                                                                                         | ● 2013        | ↗      |
| 26   | Suicide rate                                  | The suicide rate follows an inverted U shape trend: it went from 8.8 suicides per hundred thousand per year to about 9.5 suicides per hundred thousand per year in 2010 and 2011. The suicide rate decreased until 2013 to 6.6 suicides per hundred thousand per year.                                                                    | ● 2013        | ↘      |
| 27   | Death by cause                                | Most of death by causes reduced from 2009 to 2013, except deaths caused by a coronary artery disease, endocrine disorders, diabetes, mental diseases, and diseases affecting the genitourinary system.                                                                                                                                    | ● 2013        | ↔      |
| 28   | Consumption of drugs (psychotropics), by type | The average per capita consumption of psychotropics, in boxes units, slightly decreased since 2009. The analysis by breakdown reveals that only for non-EU immigrants the consumption of psychotropics remained constant over time.                                                                                                       | NA**          | ↘      |

To be continued over next page

| Continued |                                                                                              |                                                                                                                                                                                                                                                                                                                            |                          |        |
|-----------|----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------|
| N         | Indicators                                                                                   | Description                                                                                                                                                                                                                                                                                                                | International comparison | Change |
| 29        | Share of adults declaring to be in good or very good health                                  | In 2009 about 74% of respondents declared to be in good or very good health. Six years later the share amounted to 70.5%. The worst changes happened among women (-3 percentage points) and people in the age group 35-65 (on average -2.5 percentage points).                                                             | ● 2015                   | ↘      |
| 30        | Share of adults declaring to have chronic diseases                                           | The trend of this indicator reflects the one of indicator 29: the share of adults with chronic diseases increased from 22% to 23.2%. The worst changes happened among women (+2 percentage points), people in the age group 50-64 (+5 percentage points), and people in the fourth income quintile (+6 percentage points). | ● 2015                   | ↗      |
| 31        | Share of adults declaring to be limited in their everyday activity because of health reasons | This indicator increased from 20.1% in 2009 to 25.7% in 2015. The worst changes happened for people above 75 years old (+11.5 percentage points), and for clerks and sales persons (+13 percentage points).                                                                                                                | ● 2015                   | ↗      |
| Legend    |                                                                                              |                                                                                                                                                                                                                                                                                                                            |                          |        |
| ●         | Luxembourg score is in the top 25% among Western European countries.                         |                                                                                                                                                                                                                                                                                                                            |                          |        |
| ●         | Luxembourg score is in line with the Western Europe average.                                 |                                                                                                                                                                                                                                                                                                                            |                          |        |
| ●         | Luxembourg score belongs to the bottom 25% among Western European countries.                 |                                                                                                                                                                                                                                                                                                                            |                          |        |
| ↗         | Indicates an increase over time.                                                             |                                                                                                                                                                                                                                                                                                                            |                          |        |
| ↔         | Indicates that the indicator did not change.                                                 |                                                                                                                                                                                                                                                                                                                            |                          |        |
| ↘         | Indicates a decrease over time.                                                              |                                                                                                                                                                                                                                                                                                                            |                          |        |
| NA'       | Time series is not available.                                                                |                                                                                                                                                                                                                                                                                                                            |                          |        |
| NA*       | Data sourced from data producer, and thus not internationally comparable.                    |                                                                                                                                                                                                                                                                                                                            |                          |        |
| NA**      | Data sourced from administrative records.                                                    |                                                                                                                                                                                                                                                                                                                            |                          |        |

expect to live free from chronic diseases. The longer is the life spent free from chronic diseases, the higher is the quality of life. Life expectancy and healthy life years allow to monitor the length and quality of life. The number of death by causes is an indicator that informs about the most common causes of life termination. Prevalence of mental problems, suicide rate and consumption of medical drugs (psychotropics) convey complementary information on the mental health of the population, and on drug consumption. Finally, we included a set of indicators based on self-reported evaluation of respondent's health. These are: the share of adults declaring to be in good or very good health, the share of adults declaring to have chronic diseases, and the share of adults declaring to be limited in their everyday activity because of health reasons. The former provides subjective information on general health conditions, the second indicator provides a more objective overview of health conditions, while the third one allows to observe the direct effect of health on life.

The main source of data for the indicators in this domain is the “European Health for All Family (European Health for All Family (HFA))” database, which is managed by the “World Health Organization (WHO).”<sup>39</sup>

Whenever an indicator could not be computed with data from this source, an alternative source was used. As explained by the WHO website: “HFA data are compiled from various sources, including a network of country experts, WHO/Europe's technical programmes, and partner organizations such as the statistical office of the European Union (Eurostat), the Organisation for Economic Co-operation and Development, and United Nations agencies.”

These data can be obtained and analysed through the public Application Programming Interface (Application Programming Interface (API)) called “Data Presentation System (Data Presentation System (DPS))”<sup>40</sup>; these data are updated yearly and the access is free – users are only required to download the API software. The indicators from the HFA cover the period 2009-2013. Self-reported information on people's health is sourced from the EU-SILC and it covers the period 2009-2015.

### 3.4.1 (24.) Life Expectancy

We included two sub-indicators to monitor life expectancy: first, we monitor life expectancy at various ages; second, we consider the number of healthy life years by gender.

#### (24.a) Life Expectancy by age

The sub-indicator on life expectancy at various ages is a statistics obtained from the World Health Organization (WHO), and compiled within the HFA database.

The life expectancy by age is measured by age-standardized death rates (Age-standardized death rates (SDR)), which “are calculated using the direct method, i.e. they represent what the crude rate would have been if the population had the same age distribution as the European standard population...”<sup>41</sup>

Whether we consider life expectancy measured at birth, at 1, at 15, at 45 or at 65 years of age, this indicator does not show a significant variation over time: the trend points to a slight improvement which is presumably a consequence of the fact that Luxembourg is

<sup>39</sup><http://www.euro.who.int/en/data-and-evidence/databases/european-health-for-all-family-of-databases-hfa-db>.

<sup>40</sup><http://www.euro.who.int/en/data-and-evidence/databases/european-health-for-all-family-of-databases-hfa-db/data-presentation-system-software-dps>

<sup>41</sup><http://data.euro.who.int/hfad/help/Technical%20notes.htm>

**Figure 3.50: Life Expectancy, by age.**

**Source:** WHO/Europe European Health for All database, own elaboration.

a developed country which has already achieved significant improvements granting long lives (see figure 3.50). It is unsurprising that life expectancy for young generations is longer than for older ones.

These figures are comparable with those from other sources. The levels and the trends are consistent with those elaborated directly at Statec <sup>42</sup> Figures on life expectancy at birth are also consistent with those available on the Eurostat website <sup>43</sup> and with those elaborated by Statec. <sup>44</sup>

<sup>42</sup>For year 2009 and 2010 see 2011, see Osier (2012); for years 2012 and 2013 see Peltier (2015).

<sup>43</sup><http://ec.europa.eu/eurostat/tgm/refreshTableAction.do?tab=table&plugin=1&pcode=tsdph100&language=en>.

<sup>44</sup>[http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=12883&IF\\_Language=eng&MainTheme=2&FldrName=2&RFPath=96](http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=12883&IF_Language=eng&MainTheme=2&FldrName=2&RFPath=96).

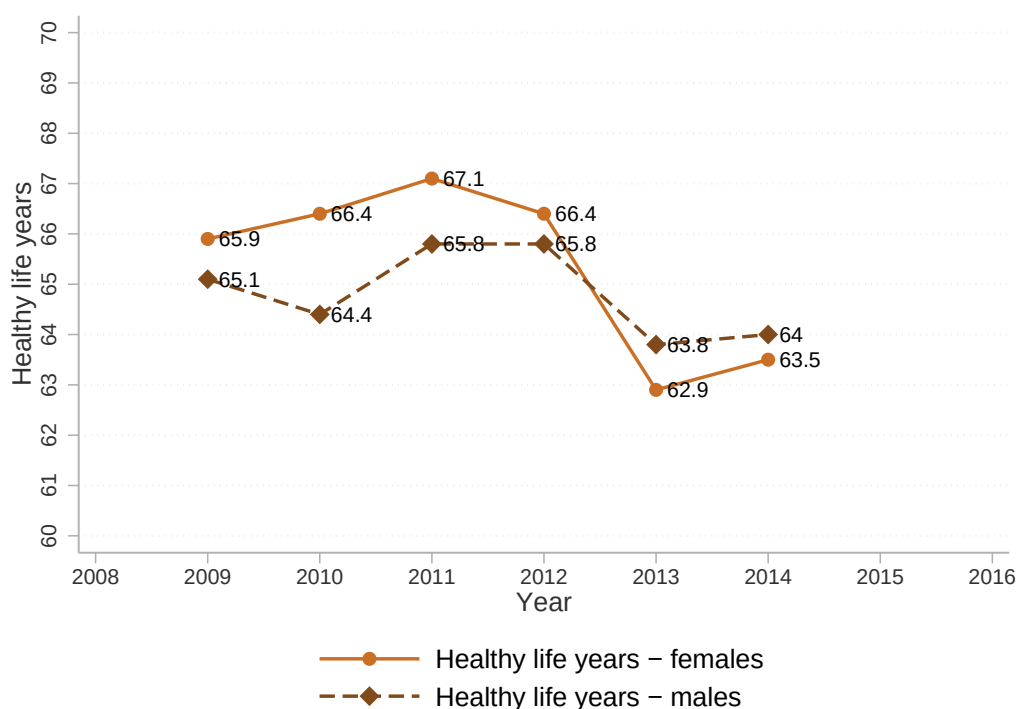
**(24.b) Life expectancy in good conditions, by gender**

Until 2015, life expectancy in good conditions was one of the indicators included in the list of Sustainable Development Indicators (Sustainable Development Indicators (SDIs))<sup>45</sup>, which was used to monitor the Sustainable Development Strategy (European Union Sustainable Development Strategy (EU-SDS)) of the European Union. These figures were updated every second year and are still available on the Eurostat website.<sup>46</sup>

This indicator is also known as disability-free life expectancy (Disability-Free Life Expectancy (DFLE)) because it provides the average amount of years during which a new born person is expected to live without disability or free from any limitation in functioning.<sup>47</sup>

Life expectancy in good conditions is computed based on population's proportions in healthy and unhealthy conditions, and on mortality information, for various age-groups. A healthy condition is defined by the absence of limitations in functioning/disability. The indicator is computed for men and women separately. Available data cover the period 2009-2014.

**Figure 3.51:** Life Expectancy in good conditions, by gender.



**Source:** WHO/Europe European Health for All database, own elaboration.

Figure 3.51 indicates that the number of healthy life years reduced for both men and women from 2009 to 2014. In case of women, the number of healthy life years went from 65.9 in 2009 to 64 in 2014; for men, they went from 65.1 to 64 over the same period. In

<sup>45</sup><http://ec.europa.eu/eurostat/web/sdi/indicators>

<sup>46</sup><http://ec.europa.eu/eurostat/web/sdi/eu-sds>.

<sup>47</sup>[http://ec.europa.eu/eurostat/cache/metadata/DE/tsdph100\\_esmsip.htm](http://ec.europa.eu/eurostat/cache/metadata/DE/tsdph100_esmsip.htm).

other words, women lost about 2.5 healthy life years in 5 years, against a loss of 1 year for men.

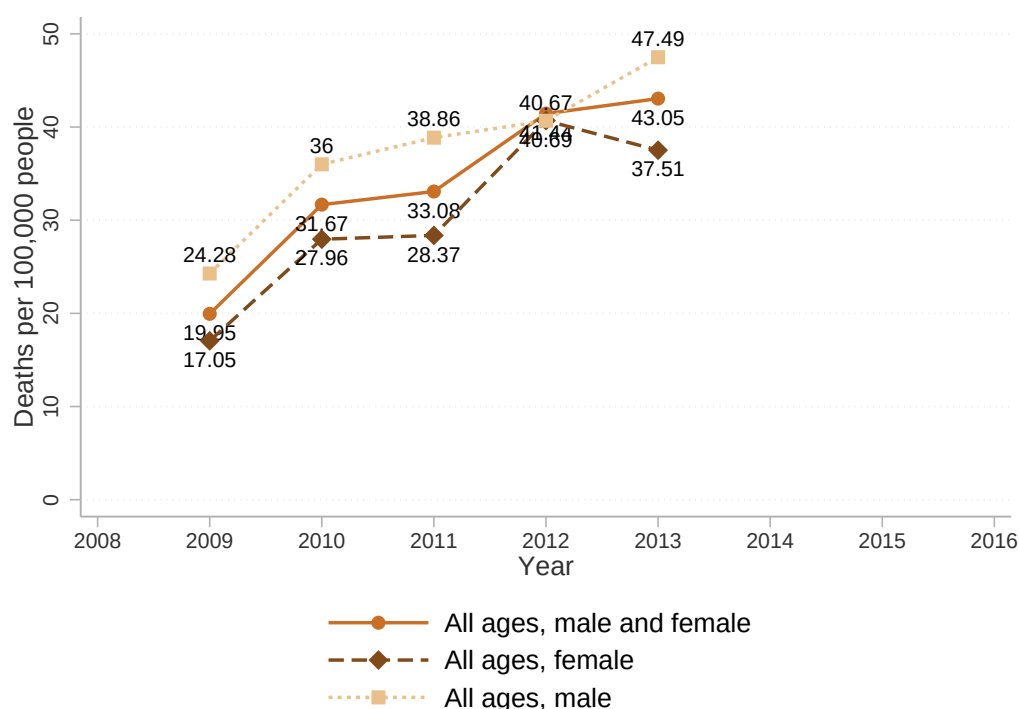
### 3.4.2 (25.) Prevalence of mental problems

Mental problems are defined as “mental disorders, diseases of nervous system and sense organs,” and their prevalence on the population is measured in terms of SDR. We analyse the prevalence of mental problems by gender and age. Figures are issued from the HFA database, and they refer to the amount of deaths caused by mental health problems by various demographic groups. Possible mental health problems leading to deaths can be: encephalities, meningitis, various forms of sclerosis, mental deficiency, schizophrenia, epilepsy, neuritis, Parkinson syndrome, etc.

These figures cannot be compared with other sources such as the statistics provided by Eurostat. The figures provided by the European statistical office do not provide a measure of the prevalence of aggregate mental problems.. Rather, they provide information on: i) deaths from mental and behavioural disorders, Alzheimer’s disease and intentional self-harm; ii) extent of depressive disorders; iii) mental healthcare; iv) healthcare beds and personnel.<sup>48</sup>

#### (25.a) Prevalence of mental problems, by gender

**Figure 3.52:** Prevalence of mental problems, by gender.



**Source:** WHO/Europe European Health for All database, own elaboration.

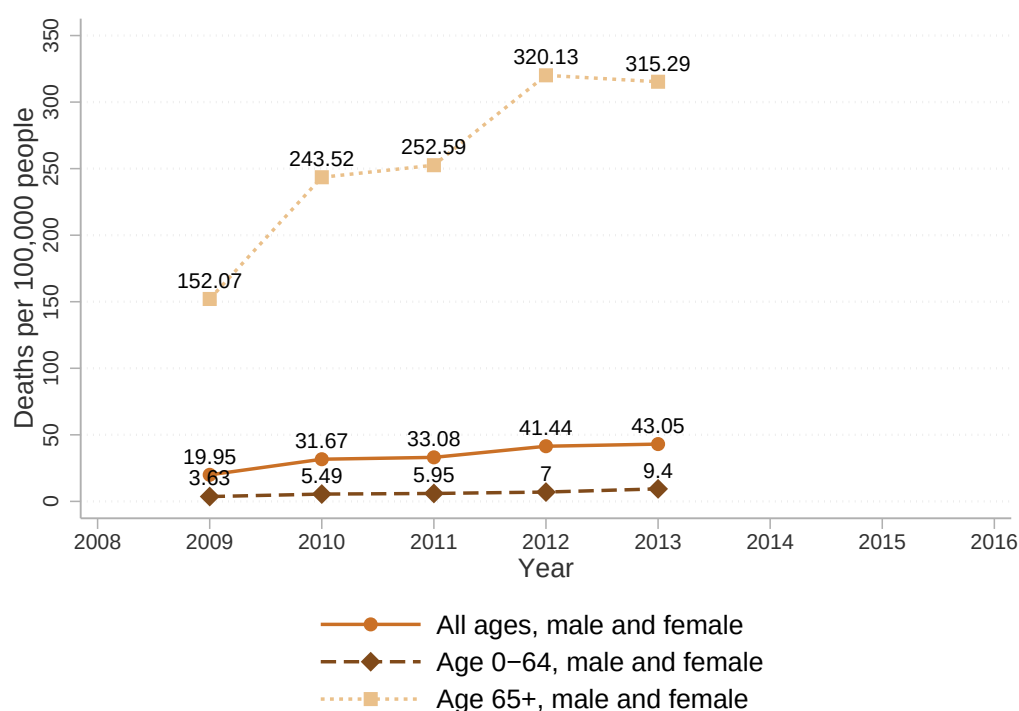
Figure 3.52 shows that, on average, the number of deaths due to mental health problems has increased since 2009, when it was around 20 per hundred thousand people. By 2013, the share of people who died because of mental health problems was 43 per hundred

<sup>48</sup>Complete information is available at [http://ec.europa.eu/eurostat/statistics-explained/index.php/Mental\\_health\\_and\\_related\\_issues\\_statistics](http://ec.europa.eu/eurostat/statistics-explained/index.php/Mental_health_and_related_issues_statistics).

thousand. In other words, available figures indicate a doubling of the incidence of death due to mental problems. This increase affects more men than women: in 2009, 24 per hundred thousand men was affected by a mental problem compared to 17 per hundred thousand women. In 2013, the share of men who died because of mental problems was 47 per hundred thousand people (+0.23‰), while the share of women was 37 per hundred thousand people (+0.20‰).

### (25.b) Prevalence of mental problems, by age

**Figure 3.53:** Prevalence of mental problems, by age.



**Source:** WHO/Europe European Health for All database, own elaboration.

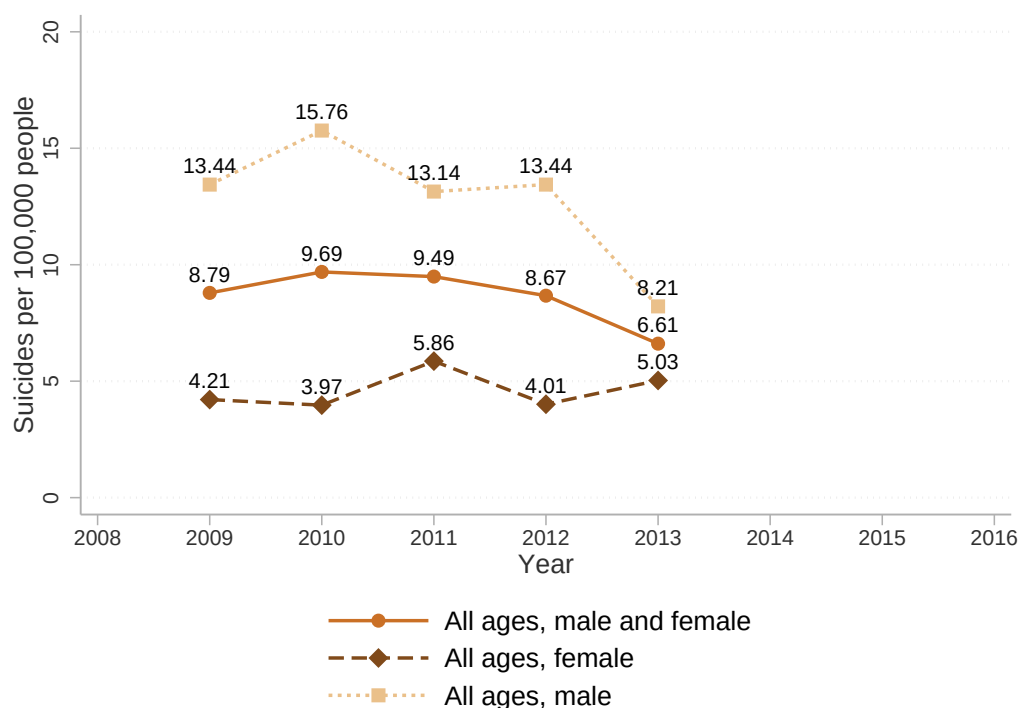
Figure 3.53 illustrates the changes in the prevalence of mental problems by age groups. Unsurprisingly, mental problems are more frequent among people older than 65 years than among young ones. However, the prevalence of mental problems increased the most among people below age 65 (about 2.5 times, while it was about 2 times among over 65 years old people). Considering both life expectancy and the number of healthy life years, figures suggest that people live longer, but the proportion of healthy life reduced.

### 3.4.3 (26.) Suicide rate

We analyse this indicator by looking at the suicide rates by gender and age. Figures are issued from the HFA database. Both sub-indicators are measured in terms of SDR.<sup>49</sup>

#### (26.a) Suicide rate, by gender

**Figure 3.54:** Suicide rate, by gender.



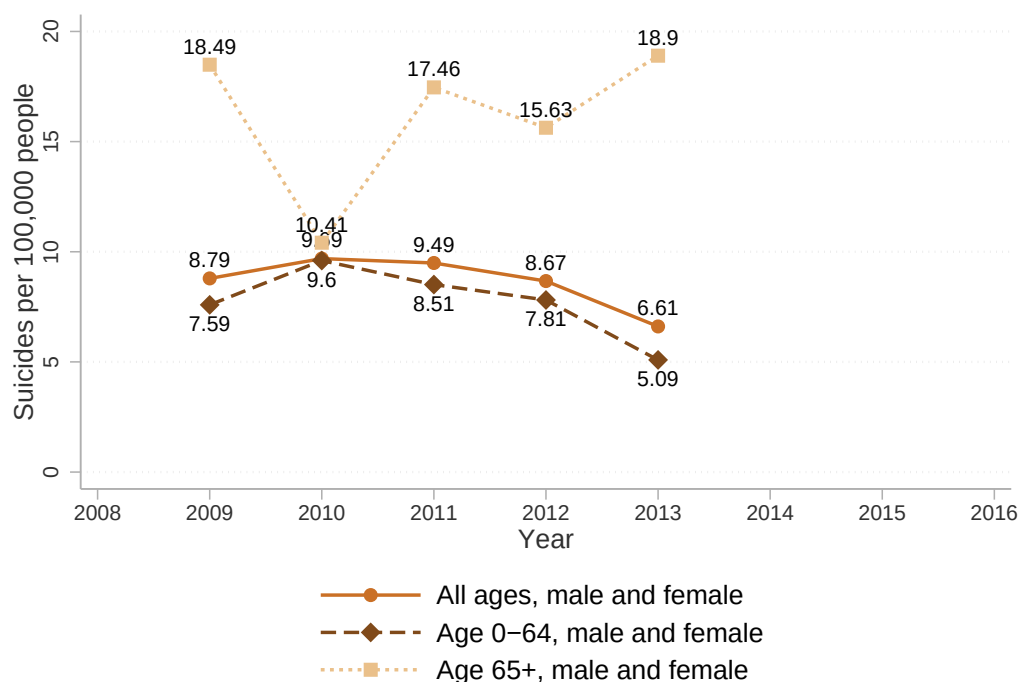
**Source:** WHO/Europe European Health for All database, own elaboration.

The suicide rate follows an inverted U shape trend: it went from 8.8 suicides per hundred thousand people per year to about 9.5 in 2010 and 2011. Subsequently, the the share of suicides decreased to 6.6 per hundred thousand in 2013. The decomposition by gender (see figure 3.54) indicates that such decline is driven by men: in 2009 the suicide rate among men was 13.4 per hundred thousand. In 2013, this share amounted to 8.21 per hundred thousand, i.e. a reduction of nearly 5 points in four years. In case of women, the trend is slightly pointing upwards: in 2009 the suicide rate among women was 4.21 per hundred thousand. Four years later, it amounted to 5 per hundred thousand people.

#### (26.b) Suicide rate, by age

While the suicide rate reduced over the period 2009-2013, the situation for elderly people – 65 years old or more – did not improve. The trend of this variable for elderly people is U-shaped. It drops between 2009 and 2010 (from 18.5 per hundred thousand people

<sup>49</sup>Details on the number of suicides by age group and suicide mode are available online on STATEC's website: [http://www.statistiques.public.lu/stat/TableView/tableView.aspx?ReportId=13019&IF\\_Language=fra&MainTheme=3&FldrName=3&RFPPath=118](http://www.statistiques.public.lu/stat/TableView/tableView.aspx?ReportId=13019&IF_Language=fra&MainTheme=3&FldrName=3&RFPPath=118).

**Figure 3.55:** Suicide rate, by age.

**Source:** WHO/Europe European Health for All database, own elaboration.

to 10.4) and subsequently it goes back to the initial level (18.9 per hundred thousand people). Unfortunately, the time series available is too short to evaluate the reliability of the figures in 2010. However, we emphasise that this information is consistent with the figures available on the OECD website.<sup>50</sup> The trend for people below the age of 65 basically follows the average trend of the overall population (see figure 3.55).

<sup>50</sup><https://data.oecd.org/healthstat/suicide-rates.htm>

**3.4.4 (27.) Death by cause**

This variable illustrates the repartition of deaths by causes. Figures are issued from the HFA database, and they are available from 2009 to 2013 for various deaths causes. The list of causes includes: circulatory, ischaemic, cerebrovascular diseases, neoplasm, etc. The complete list of deaths causes is available in the legend of table 3.27. This information is measured in terms of SDR.

Figures indicate a generalised decrease in the number of deaths (see, for instance, column 1 which provides the SDR for all death causes), except deaths caused by a coronary or artery disease (3), endocrine disorders (18), diabetes (19), mental diseases (21), and diseases affecting the genitourinary system (22).

**Table 3.27:** Death by cause. Each column provides information on the age-standardised death rate (SDR) per cause of death. The numbers on top of the columns refer to the death causes listed in the legend.

|             | (1)   | (2)   | (3)  | (4)  | (5)   | (6)  | (8)  | (9)  | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) | (19) | (21) | (22) | (24) | (25)  |
|-------------|-------|-------|------|------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| <b>Year</b> |       |       |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |
| 2009        | 527.8 | 182.2 | 43.6 | 46.4 | 162.7 | 37.8 | 24.4 | 40.3 | 6.8  | 8.8  | 6.8  | 15.5 | 43.9 | 22.1 | 27.1 | 10.1 | 8.4  | 5.9  | 19.9 | 4.6  | 55.7 | 158.1 |
| 2010        | 524.4 | 167.3 | 45.2 | 43.1 | 156.9 | 32.5 | 25.5 | 41.6 | 4.8  | 9.7  | 4.8  | 12.3 | 36.4 | 17.4 | 25.3 | 11.5 | 13.6 | 9.7  | 31.7 | 9.5  | 61.1 | 146.6 |
| 2011        | 520.0 | 163.8 | 46.4 | 37.3 | 157.4 | 32.2 | 23.4 | 40.4 | 5.3  | 9.5  | 5.5  | 12.4 | 40.6 | 20.8 | 24.7 | 8.7  | 11.3 | 7.6  | 33.1 | 8.2  | 58.4 | 148.1 |
| 2012        | 495.9 | 151.8 | 40.2 | 33.1 | 152.7 | 35.5 | 20.6 | 36.4 | 4.6  | 8.7  | 4.6  | 11.5 | 34.5 | 18.9 | 25.4 | 11.8 | 11.4 | 7.3  | 41.4 | 7.0  | 56.2 | 136.3 |
| 2013        | 476.6 | 141.2 | 45.9 | 29.1 | 142.8 | 28.5 | 23.3 | 37.6 | 5.2  | 6.6  | 5.4  | 10.9 | 33.7 | 18.5 | 20.9 | 9.6  | 14.0 | 9.5  | 43.0 | 6.3  | 56.9 | 127.9 |

**Source:** WHO/Europe European Health for All database, own elaboration.

**Legend:** Included causes: (1) All-causes, (2) Circulatory, (3) Ischaemic, (4) Cerebrovascular, (5) Neoplasm, (6) Trac.Bronc.Lung.cancer., (8) Breast, (9) Inj.pois., (10) Traff.acc., (11) Suicide, (12) Transport, (13) Inf.par., (14) Respiratory, (15) Bronchitis, (16) Digestive, (17) Liver, (18) Endocrine, (19) Diabete, (21) Mental, (22) Genitourinary, (24) Alcohol, (25) Smocking. Omitted causes: (7) Cervix cancer, (20) Blood diseases, and (23) Tuberculosis are omitted having a value lower than 3 SDR per 100,000 inhabitants.

STATEC's website provides information about death rate by gender.<sup>51</sup> However, these figures are not immediately comparable with those reported in this report. The reason is that the information on STATEC's website provides a larger variety of causes of death, which in the data we use are grouped for the sake of international comparability.

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<sup>51</sup><http://www.statistiques.public.lu>; see "Décès par cause (Classification selon la révision de 1993) 1998 - 2015."

### 3.4.5 (28.) Consumption of drugs, by type

Figures on drug consumption, and in particular on psychotropics, are issued from administrative data of the “Inspection Générale de la Sécurité Sociale (Inspection générale de la sécurité sociale (IGSS))”. The standard measure of psychotropics consumption is the “average maintenance dose per day for a drug used for its main indication in adults (Drug Dose per Day (DDD)).” Depending on the kind of drug, the way the DDD is expressed varies: the doses can be measured in milligrams, micrograms, units, thousand units, million units, millimoles, and millilitres.<sup>52</sup> To provide a synthetic view of the number of different types of psychotropics consumed in Luxembourg, we refer to the quantity of boxes of drugs used per capita in one year. We emphasise that these figures are Luxembourg-specific and they cannot be compared across countries.

Table 3.28 reports the average number of boxes of drugs used per year. We distinguish between anxiolytics, hypnotics and sedatives, and antidepressants. The average consumption of psychotropics per user – in boxes units – remained substantially constant over time, while the consumption of antidepressants sensibly reduced. In 2009 the average resident consumed 7.3 boxes of antidepressants, 6.6 of hypnotics or sedatives, and 5.6 of anxiolytics. In 2014, these share declined to 5.4, 6.5 and 5.1, respectively.

**Table 3.28:** Average number of boxes of drugs consumed per capita. Figures are organised by prescribed drug: anxiolytics, hypnotics and sedatives, and antidepressants.

|                         | Year          |               |               |               |               |               | Mean<br>Boxes |
|-------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
|                         | 2009<br>Boxes | 2010<br>Boxes | 2011<br>Boxes | 2012<br>Boxes | 2013<br>Boxes | 2014<br>Boxes |               |
| <b>Prescribed drug</b>  |               |               |               |               |               |               |               |
| Anxiolytics             | 5.6           | 5.6           | 5.6           | 5.5           | 5.2           | 5.1           | 5.4           |
| Hypnotics and sedatives | 6.6           | 6.6           | 6.6           | 6.6           | 6.6           | 6.5           | 6.6           |
| Antidepressant          | 7.3           | 7.4           | 6.4           | 6.3           | 6.1           | 5.4           | 6.4           |

**Source:** IGSS data, own elaboration.

Our figures indicate that the consumption is fairly equally distributed across socio-demographic groups, except for working status and nationality (see table 3.29). Inactive and retired people consumed on average about 3 boxes more per person per year than others. While the figure for retired people may reflect the confounding effect of age (retired people are older than others, and older people may need more drugs), the figure for inactive people requires a more in depth analysis. Available figures also indicate that nationals consumed about 1.5 boxes per capita per year more than EU immigrants, and about two times more boxes than extra-EU immigrants.

<sup>52</sup>[https://www.whooc.no/atc\\_ddd\\_index/](https://www.whooc.no/atc_ddd_index/)

**Table 3.29:** Average number of boxes of drug consumed per capita by various socio-demographic characteristics and over time.

|                        | 2009  | 2010  | 2011  | Year<br>2012 | 2013  | 2014  | Mean  |
|------------------------|-------|-------|-------|--------------|-------|-------|-------|
|                        | Boxes | Boxes | Boxes | Boxes        | Boxes | Boxes | Boxes |
| <b>Age category</b>    |       |       |       |              |       |       |       |
| below 16               | 2.5   | 2.3   | 2.1   | 2.1          | 2.3   | 2.4   | 2.3   |
| 16-24                  | 2.7   | 3.0   | 2.6   | 2.6          | 2.4   | 2.3   | 2.6   |
| 25-34                  | 3.9   | 4.0   | 3.8   | 3.8          | 3.5   | 3.2   | 3.7   |
| 35-49                  | 5.3   | 5.3   | 5.0   | 5.0          | 4.7   | 4.4   | 4.9   |
| 50-64                  | 6.8   | 6.9   | 6.6   | 6.5          | 6.3   | 5.9   | 6.5   |
| 65-74                  | 7.5   | 7.6   | 7.3   | 7.3          | 7.2   | 6.9   | 7.3   |
| above 75               | 7.7   | 7.8   | 7.4   | 7.4          | 7.3   | 7.1   | 7.4   |
| <b>Gender</b>          |       |       |       |              |       |       |       |
| Male                   | 6.1   | 6.2   | 5.9   | 5.9          | 5.7   | 5.4   | 5.8   |
| Female                 | 6.5   | 6.6   | 6.2   | 6.2          | 6.0   | 5.7   | 6.2   |
| <b>Income quintile</b> |       |       |       |              |       |       |       |
| 1                      | 6.3   | 6.4   | 6.0   | 6.0          | 5.7   | 5.5   | 6.0   |
| 2                      | 6.3   | 6.5   | 6.2   | 6.1          | 5.8   | 5.5   | 6.0   |
| 3                      | 6.8   | 6.9   | 6.5   | 6.5          | 6.3   | 6.0   | 6.5   |
| 4                      | 6.5   | 6.7   | 6.3   | 6.3          | 6.1   | 5.8   | 6.3   |
| 5                      | 5.8   | 5.8   | 5.5   | 5.5          | 5.3   | 4.9   | 5.4   |
| <b>Working status</b>  |       |       |       |              |       |       |       |
| Unemployed             | 5.4   | 5.3   | 4.9   | 4.9          | 4.5   | 4.3   | 4.8   |
| Employed               | 4.5   | 4.6   | 4.3   | 4.3          | 4.1   | 3.8   | 4.2   |
| Inactive               | 7.1   | 7.3   | 7.0   | 7.0          | 6.8   | 6.5   | 7.0   |
| Retired                | 7.7   | 7.8   | 7.4   | 7.4          | 7.3   | 7.0   | 7.4   |
| <b>Nationality</b>     |       |       |       |              |       |       |       |
| euro. country          | 5.2   | 5.3   | 5.1   | 5.1          | 4.9   | 4.6   | 5.0   |
| resid. country         | 6.9   | 7.0   | 6.6   | 6.6          | 6.4   | 6.1   | 6.6   |
| other country          | 3.7   | 4.0   | 3.9   | 3.9          | 3.8   | 3.6   | 3.8   |

Source: IGSS data, own elaboration.

### 3.4.6 (29.) Share of adults declaring to be in good or very good health

The share of adults declaring to be in good or very good health is computed using EU-SILC data for the period 2009-2015. The variable informing this indicator is PH010, i.e. “General health”. The concept is operationalised by a question about how a person perceives his/her health in general using one of the answer categories very good/ good/ fair/ bad/ very bad. This indicator provides a subjective evaluation of the respondent’s own health. It is important to integrate people’s own view and perception about their own health for two reasons: first, some recent studies documented that people are good evaluators of their own conditions; second, people’s own perception may affect their behaviours and choices independently from their objective health status.

Table 3.30 reports the share of adults declaring to be in good or very good health by year and by various socio-demographic breakdowns. On average, nearly three quarters of the residents report to be in good or very good health. Richer, more educated, and younger people report on average to have a better health than others. The health gap between men and women on average is 4.8%. However, the share of people declaring to be in good or very good health declined over time: it was 73.9% in 2009 and it reached 70.5% in

2015. The worst changes happened among women (-3 percentage points) and people in the age group 35-65 (on average -2.5 percentage points). A close look at the changes by occupation reveals that, while clerks, sales managers, managers, and professionals are on average healthier than other workers and machine operators, the latter group did not experience a significant change over time. On the contrary, figures indicate worsening health conditions for people in the first group. In particular, subjective health among clerks and sales managers declined by nearly 8 percentage points between 2009 and 2015.

**Table 3.30:** Share of adults declaring to be in good or very good health by various socio-demographic breakdowns and over time.

|                                      | Year      |           |           |           |           |           |           | Total |
|--------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------|
|                                      | 2009<br>% | 2010<br>% | 2011<br>% | 2012<br>% | 2013<br>% | 2014<br>% | 2015<br>% |       |
| <b>Sex</b>                           |           |           |           |           |           |           |           |       |
| male                                 | 76.4      | 76.7      | 75.1      | 75.2      | 73.9      | 74.6      | 72.5      | 74.9  |
| female                               | 71.6      | 74.0      | 70.2      | 72.6      | 69.9      | 71.2      | 68.6      | 71.1  |
| <b>Age group</b>                     |           |           |           |           |           |           |           |       |
| 16-24                                | 93.8      | 93.8      | 92.7      | 92.9      | 89.7      | 92.7      | 90.0      | 92.1  |
| 25-34                                | 87.2      | 91.0      | 87.2      | 88.3      | 87.5      | 88.4      | 86.2      | 88.0  |
| 35-49                                | 80.5      | 80.3      | 77.7      | 77.6      | 76.5      | 76.9      | 75.4      | 77.9  |
| 50-64                                | 66.5      | 66.6      | 62.2      | 64.6      | 62.1      | 61.8      | 60.3      | 63.4  |
| 65-74                                | 47.6      | 53.7      | 54.8      | 57.0      | 53.3      | 58.0      | 54.9      | 54.3  |
| above 75                             | 39.6      | 40.4      | 36.5      | 38.4      | 36.5      | 41.9      | 35.9      | 38.5  |
| <b>Occupation (ISCO-08, 1 digit)</b> |           |           |           |           |           |           |           |       |
| man., prof., tech. (1,2,3)           | 81.3      | 81.8      | 79.6      | 80.7      | 78.6      | 79.6      | 78.6      | 80.0  |
| clerks, sales (4,5)                  | 74.3      | 75.4      | 72.0      | 72.4      | 67.7      | 69.9      | 66.6      | 71.0  |
| skill. agr., craft (6,7)             | 64.4      | 66.4      | 63.9      | 65.3      | 67.5      | 65.0      | 63.1      | 65.1  |
| mach. oper., elem. (8,9)             | 58.3      | 63.0      | 58.0      | 58.6      | 57.7      | 59.8      | 58.5      | 59.2  |
| <b>Education level</b>               |           |           |           |           |           |           |           |       |
| Lower sec.                           | 65.3      | 67.1      | 62.4      | 65.0      | 64.0      | 63.8      | 60.8      | 64.1  |
| Upper sec.                           | 77.4      | 79.4      | 77.5      | 76.9      | 73.8      | 75.7      | 72.8      | 76.2  |
| Third lev.                           | 85.9      | 86.2      | 84.4      | 85.3      | 83.5      | 83.4      | 81.7      | 84.2  |
| <b>Income quintile</b>               |           |           |           |           |           |           |           |       |
| 1                                    | 67.4      | 69.5      | 63.1      | 67.8      | 68.0      | 68.1      | 63.4      | 66.7  |
| 2                                    | 65.7      | 70.3      | 69.3      | 70.7      | 68.1      | 65.7      | 65.5      | 67.9  |
| 3                                    | 72.8      | 72.6      | 70.8      | 71.4      | 69.8      | 73.3      | 70.0      | 71.5  |
| 4                                    | 79.3      | 79.5      | 75.2      | 77.1      | 73.2      | 77.0      | 73.0      | 76.3  |
| 5                                    | 83.0      | 83.5      | 82.9      | 80.9      | 79.2      | 79.2      | 79.8      | 81.2  |
| <b>Total</b>                         | 73.9      | 75.3      | 72.6      | 73.9      | 71.9      | 72.9      | 70.5      | 73.0  |

**Source:** EU-SILC survey data, own elaboration.

**3.4.7 (30.) Share of adults declaring to have chronic disease**

The share of adults declaring to have a chronic disease is computed using EU-SILC data for the period 2009-2015. The variable informing this indicator is PH020 which refers to respondents who “suffer from a chronic(long-standing) illness or condition.” This indicator uses self-reported information to compute the share of the population that is affected by at least a chronic disease, i.e. a long-standing illness or health problem. The concept is operationalised by a question asking if the respondent suffers from any longstanding (of a duration of at least six months) illness or health problem.

The share of adults with chronic diseases increased from 22% in 2009 to 23.2% in 2015 (see table 3.31). In other words, nearly one resident out of five declares to have a chronic disease and this share did not reduce, indicating a persistent situation of poor health. Chronic diseases seem to affect more women (23.7% on average) than men (20.3%). Figures also provide some expected patterns: the share of people with chronic diseases is lower among richer, more educated and young residents than others. However, the changes over time reveal some remarkable patterns. For instance, the share of people affected by chronic diseases increased the most among people in the fourth income quintile, among people with upper secondary education, and for people in the age group 50-64. The average increase across the overall population hides these sources of heterogeneity.

**Table 3.31:** Share of adults declaring to have a chronic disease by various socio-demographic breakdowns and over time.

|                                      | Year |      |      |      |      |      |      | Total |
|--------------------------------------|------|------|------|------|------|------|------|-------|
|                                      | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |       |
|                                      | %    | %    | %    | %    | %    | %    | %    | %     |
| <b>Sex</b>                           |      |      |      |      |      |      |      |       |
| male                                 | 20.3 | 20.6 | 19.4 | 18.7 | 21.1 | 20.8 | 21.1 | 20.3  |
| female                               | 23.6 | 22.9 | 22.2 | 21.5 | 25.9 | 24.4 | 25.3 | 23.7  |
| <b>Age group</b>                     |      |      |      |      |      |      |      |       |
| 16-24                                | 7.8  | 9.9  | 9.2  | 8.0  | 11.0 | 9.3  | 10.3 | 9.4   |
| 25-34                                | 12.6 | 8.6  | 10.0 | 9.4  | 12.3 | 11.6 | 12.7 | 11.0  |
| 35-49                                | 18.4 | 17.9 | 16.3 | 15.9 | 18.5 | 17.6 | 17.9 | 17.5  |
| 50-64                                | 25.6 | 29.9 | 27.5 | 28.0 | 31.7 | 29.7 | 30.5 | 29.0  |
| 65-74                                | 40.0 | 37.4 | 37.0 | 35.4 | 40.9 | 39.3 | 37.4 | 38.2  |
| above 75                             | 48.7 | 43.8 | 43.7 | 41.6 | 45.3 | 44.9 | 47.5 | 45.0  |
| <b>Occupation (ISCO-08, 1 digit)</b> |      |      |      |      |      |      |      |       |
| man., prof., tech. (1,2,3)           | 18.0 | 18.2 | 17.3 | 16.2 | 19.4 | 18.8 | 18.7 | 18.1  |
| clerks, sales (4,5)                  | 23.2 | 22.3 | 21.6 | 21.9 | 25.4 | 27.1 | 27.1 | 24.2  |
| skill. agr., craft (6,7)             | 25.8 | 24.6 | 23.1 | 24.1 | 25.9 | 25.7 | 29.0 | 25.4  |
| mach. oper., elem. (8,9)             | 30.8 | 29.6 | 29.0 | 28.4 | 32.8 | 28.2 | 27.3 | 29.4  |
| <b>Education level</b>               |      |      |      |      |      |      |      |       |
| Lower sec.                           | 27.3 | 25.8 | 25.7 | 25.2 | 28.1 | 26.9 | 28.6 | 26.8  |
| Upper sec.                           | 19.1 | 19.5 | 18.7 | 17.9 | 22.6 | 22.1 | 23.2 | 20.5  |
| Third lev.                           | 15.5 | 16.5 | 14.5 | 13.7 | 15.8 | 16.1 | 15.7 | 15.4  |
| <b>Income quintile</b>               |      |      |      |      |      |      |      |       |
| 1                                    | 21.8 | 22.0 | 23.5 | 22.5 | 26.0 | 24.2 | 23.1 | 23.3  |
| 2                                    | 28.2 | 23.9 | 21.9 | 22.1 | 24.0 | 25.1 | 26.3 | 24.5  |
| 3                                    | 23.0 | 22.8 | 22.0 | 22.1 | 25.7 | 24.1 | 23.7 | 23.4  |
| 4                                    | 19.2 | 20.9 | 19.7 | 18.8 | 24.1 | 20.4 | 25.0 | 21.2  |
| 5                                    | 18.3 | 19.3 | 17.4 | 15.8 | 18.4 | 19.7 | 18.2 | 18.1  |
| <b>Total</b>                         | 22.0 | 21.7 | 20.8 | 20.1 | 23.5 | 22.6 | 23.2 | 22.0  |

Source: EU-SILC survey data, own elaboration.

### 3.4.8 (31.) Share of adults declaring to be limited in their everyday activity because of health reasons

The share of adults declaring to be limited in their everyday activity because of health reasons is computed using EU-SILC data for the period 2009-2015. The variable informing this indicator is PH030 which refers to respondents who experience “limitation in activities because of health problems”, i.e. people who perceive long-standing limitations in usual activities due to health problems. The concept is operationalised by using the Global Activity Limitation Indicator (GALI) for observing limitation in activities people usually do because of one or more health problems. The limitation should have lasted for at least the past six months. Three answer categories are possible: ‘severely limited’, ‘limited but not severely’ or ‘not limited at all’.

The share of residents declaring to be limited in their everyday activities because of health reasons increased by 5.6% between 2009 and 2015 (see table 3.32): on average, in 2009, one out of five residents declared to be limited in their daily activity because of health reasons. In 2015 this share reached the level of one every four residents. This increase affects uniformly nearly all the considered socio-demographic breakdowns. In particular, the worst changes happened for people above 75 years old (+11.5 percentage points), in the age group 50-64 (+10 percentage points), for clerks and sales persons (+13 percentage points) and for people in the fourth income quintile (+9 percentage points).

As with many previous indicators, women tend to fare worst than men – the average difference between the two groups is about 4 percentage points. In addition the share of women limited in their daily activity because of health reasons went from 21.8% in 2009 to 29.3% in 2015. The share of men went from 18.4% to 22% in the same period.

**Table 3.32:** Share of adults declaring to be limited in their everyday activity because of health reasons by various socio-demographic breakdowns and over time.

|                                      | Year |      |      |      |      |      |      |       |
|--------------------------------------|------|------|------|------|------|------|------|-------|
|                                      | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Total |
|                                      | %    | %    | %    | %    | %    | %    | %    | %     |
| <b>Sex</b>                           |      |      |      |      |      |      |      |       |
| male                                 | 18.4 | 18.9 | 17.2 | 17.7 | 21.9 | 21.6 | 22.0 | 19.7  |
| female                               | 21.8 | 21.0 | 20.1 | 21.2 | 25.3 | 26.0 | 29.3 | 23.6  |
| <b>Age group</b>                     |      |      |      |      |      |      |      |       |
| 16-24                                | 5.9  | 7.3  | 5.7  | 6.1  | 8.2  | 7.3  | 9.9  | 7.2   |
| 25-34                                | 10.0 | 9.1  | 8.6  | 9.8  | 11.6 | 12.1 | 12.0 | 10.5  |
| 35-49                                | 17.1 | 15.4 | 14.1 | 15.9 | 19.7 | 19.6 | 20.4 | 17.4  |
| 50-64                                | 23.6 | 27.3 | 25.4 | 26.0 | 31.5 | 31.9 | 33.7 | 28.6  |
| 65-74                                | 36.6 | 32.2 | 31.3 | 29.5 | 37.9 | 37.6 | 39.9 | 35.1  |
| above 75                             | 49.1 | 48.5 | 47.1 | 49.2 | 55.4 | 51.6 | 60.6 | 51.7  |
| <b>Occupation (ISCO-08, 1 digit)</b> |      |      |      |      |      |      |      |       |
| man., prof., tech. (1,2,3)           | 15.1 | 14.8 | 14.2 | 14.0 | 18.1 | 18.4 | 18.4 | 16.2  |
| clerks, sales (4,5)                  | 17.5 | 20.5 | 19.0 | 22.1 | 27.3 | 25.8 | 30.3 | 23.5  |
| skill. agr., craft (6,7)             | 28.8 | 28.1 | 26.0 | 25.5 | 29.5 | 31.0 | 33.4 | 28.9  |
| mach. oper., elem. (8,9)             | 32.7 | 27.3 | 26.1 | 28.1 | 33.2 | 33.8 | 34.4 | 30.7  |
| <b>Education level</b>               |      |      |      |      |      |      |      |       |
| Lower sec.                           | 26.4 | 25.6 | 25.0 | 25.3 | 30.3 | 31.3 | 33.5 | 28.1  |
| Upper sec.                           | 17.7 | 17.4 | 16.4 | 17.5 | 22.1 | 22.3 | 24.3 | 19.7  |
| Third lev.                           | 11.2 | 11.9 | 10.5 | 11.2 | 13.7 | 14.2 | 16.0 | 12.8  |
| <b>Income quintile</b>               |      |      |      |      |      |      |      |       |
| 1                                    | 23.0 | 23.9 | 22.4 | 23.7 | 26.0 | 26.7 | 29.7 | 25.1  |
| 2                                    | 25.0 | 23.5 | 20.9 | 23.6 | 26.7 | 27.2 | 28.7 | 25.1  |
| 3                                    | 21.1 | 22.9 | 19.6 | 20.3 | 24.8 | 23.4 | 27.0 | 22.7  |
| 4                                    | 17.3 | 15.7 | 17.4 | 16.2 | 22.2 | 22.4 | 26.3 | 19.7  |
| 5                                    | 14.9 | 14.6 | 13.7 | 14.6 | 19.2 | 19.9 | 17.2 | 16.3  |
| <b>Total</b>                         | 20.1 | 20.0 | 18.7 | 19.4 | 23.6 | 23.8 | 25.7 | 21.7  |

Source: EU-SILC survey data, own elaboration.

### 3.5 Domain V: Work-life balance

This section illustrates the six indicators that compose the domain on health. Table 3.33 provides an overview of the results and, whenever possible, it reports the overall time trend. Table 3.33 illustrates also how individual indicators in Luxembourg fare with respect to the same indicators from other Western European countries, for the most recent year on which there are available data. We observe that for four indicators Luxembourg scores close to the average of Western European countries; and it scores only once in the bottom quartile of the indicators scores.

*Why does this domain matter?* The well-being of individuals and their household is strongly affected by the ability to combine working time, family commitments and

**Table 3.33:** Domain 5, work-life balance.

| N             | Indicators                                                                                            | Description                                                                                                                         | Cross country | Change |
|---------------|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|
| 32            | Long hours rate out of employee population                                                            | Although the percentage of people working long hours has been steady from 2009 to 2014 around 0.04%, it increased to 0.09% in 2015. | ● 2015        | ↗      |
| 33            | Leisure and occupation time                                                                           | The average hours spent in leisure and any occupation but working, during weekdays, in 2014, was 15 hours.                          | NA*           | NA'    |
| 34            | Employment rate of women with children in mandatory schooling age                                     | The employment rate of women with children in mandatory schooling age increased steadily from 2009 to 2015, when it reached 73%.    | ● 2015        | ↗      |
| 35            | Time spent commuting                                                                                  | The time spent commuting during weekdays, in 2014, was 65 minutes.                                                                  | NA*           | NA'    |
| 36            | Share of parental leave in the couple                                                                 | This indicator shows a modest increase in the share of parental leave taken by fathers; it passed from 30.6% to 31.7% in 2015.      | NA**          | ↗      |
| 37.a          | Satisfaction with work-life balance, employed and non-employed (i.e., unemployed and inactive people) | On average, people in the labour force have a satisfaction with their time use of 7.2 out of 10 points.                             | ● 2013        | NA'    |
| 37.b          | Satisfaction with work-life balance, only employed                                                    | On average, employed people have a satisfaction with their time use of 6.6 out of 10 points.                                        | ● 2013        | NA'    |
| 37.c          | Satisfaction with work-life balance, only non-employed (i.e., unemployed and inactive people)         | On average, non-employed people have a satisfaction with their time use of 7.9 out of 10 points.                                    | ● 2013        | NA'    |
| <b>Legend</b> |                                                                                                       |                                                                                                                                     |               |        |
| ●             | Luxembourg score is in the top 25% among Western European countries.                                  |                                                                                                                                     |               |        |
| ●             | Luxembourg score is in line with the Western Europe average.                                          |                                                                                                                                     |               |        |
| ●             | Luxembourg score belongs to the bottom 25% among Western European countries.                          |                                                                                                                                     |               |        |
| ↗             | Indicates an increase over time.                                                                      |                                                                                                                                     |               |        |
| ↔             | Indicates that the indicator did not change.                                                          |                                                                                                                                     |               |        |
| ↘             | Indicates a decrease over time.                                                                       |                                                                                                                                     |               |        |
| NA'           | Time series is not available.                                                                         |                                                                                                                                     |               |        |
| NA*           | Data sourced from data producer, and thus not internationally comparable.                             |                                                                                                                                     |               |        |
| NA**          | Data sourced from administrative records.                                                             |                                                                                                                                     |               |        |

personal life. A good work-life balance also supports socialization and the participation to the community life.

*Why do these indicators matter?* The indicators on long working hours, leisure and occupation time, satisfaction with work-life balance, and time spent commuting present an overview on how people's time is shared between working life and private life.

The indicator on the employment rate of women with children in mandatory schooling age gives a measure of the mothers' ability to combine working time and family commitments.

The share of parental leave between fathers and mothers is an essential aspect of well-being. In particular, an increased participation of fathers to the education and to the general supervision of their children allows the reduction of the inequality of opportunities, with respect to mothers. The equality of opportunities as well as of the participation to the society between men and women is an important goal to achieve a sustainable development.

### 3.5.1 (32.) Long hours rate out of the employees population

This indicator provides the share of workers working very long hours each week of the year (i.e., longer than 50 hours). It has been computed with EU-LFS data for the period 2009-2015, and is based on the variable HWUSUAL, that is, "Number of hours per week usually worked in main job." Table 3.34 describes the yearly trend of this indicator.

**Table 3.34:** Long hours rate out of the employees population.

|             | Mean<br>% |
|-------------|-----------|
| <b>Year</b> |           |
| 2009        | 0.02      |
| 2010        | 0.03      |
| 2011        | 0.04      |
| 2012        | 0.04      |
| 2013        | 0.04      |
| 2014        | 0.04      |
| 2015        | 0.09      |
| <b>Mean</b> | 0.04      |

**Source:** EU-LFS survey data, own elaboration.

The percentage of people working long hours has been steady during most part of the period we are considering in this report, around 0.04%, but it doubled in 2015.

### 3.5.2 (33.) Leisure and occupation time

The document “Avis commun CES-CSDD: PIBien-être” defines leisure and occupation activities as follows. Leisure is an activity conducted by individuals for their own pleasure, while occupation is represented by several type of activities, for instance: sleeping, personal hygiene, and other personal services, such as cooking.

However, these two activities cannot easily be disentangled. Since some occupation activities are conducted for pleasure (e.g., cooking). Hence, we consider the time spent for the two activities together as the time not spent for working.

The information concerning hours spent per day not-working is drawn from the TUS. The first and only available wave, when we conducted the analyses, refers to year 2014. These data can be obtained internally, without application to other Institutes.

The hours spent not working, in a given day, is given by subtracting the sum of all of the working activities (activities 111 to 115 and 910 in TUS) from the hours in a day, that is, 24.

This indicator is computed on full-time workers, who were working in at least one of the two survey days (i.e., two weekdays, two weekend days, one weekday and one weekend day).

Table 3.35 reports the hours spent not working during weekdays, weekends, and on average during both types of day (i.e., weekday and weekend day), by age, gender, nationality, education level, marital status, and income quintile.

The average amount of hours spent in leisure and any other occupation except working, during weekdays, in 2014, was 15 hours, while during weekends it was 22.3 hours. It is worth noting that the amount of time spent not-working during weekdays increases with the income quintile, and it is larger for Luxembourgian people and for men.

**Table 3.35:** Hours spent in leisure and any occupation but working, for full-time workers, by various breakdowns, and by weekday, weekend, week.

|                        | Day              |                  |               |
|------------------------|------------------|------------------|---------------|
|                        | Weekday<br>Hours | Weekend<br>Hours | Week<br>Hours |
| <b>Age category</b>    |                  |                  |               |
| 16-24                  | 14.61            | 20.48            | 16.29         |
| 25-34                  | 15.07            | 22.55            | 17.19         |
| 35-49                  | 14.93            | 22.38            | 17.06         |
| 50-64                  | 15.36            | 22.32            | 17.35         |
| 65-74                  | 15.50            | 24.00            | 17.93         |
| <b>Gender</b>          |                  |                  |               |
| Male                   | 14.77            | 22.12            | 16.86         |
| Female                 | 15.53            | 22.65            | 17.56         |
| <b>Nationality</b>     |                  |                  |               |
| resid. country         | 15.30            | 22.17            | 17.26         |
| euro. country          | 14.80            | 22.60            | 17.02         |
| other country          | 14.88            | 20.87            | 16.59         |
| <b>Education level</b> |                  |                  |               |
| Lower sec.             | 14.88            | 21.66            | 16.81         |
| Upper sec.             | 15.40            | 21.55            | 17.16         |
| Third lev.             | 14.82            | 23.39            | 17.26         |
| <b>Marital status</b>  |                  |                  |               |
| Single                 | 14.97            | 22.26            | 17.04         |
| Married - PACS         | 15.07            | 22.23            | 17.11         |
| No longer married      | 15.17            | 23.11            | 17.44         |
| <b>Income quintile</b> |                  |                  |               |
| 1                      | 14.82            | 21.99            | 16.86         |
| 2                      | 14.84            | 22.51            | 17.03         |
| 3                      | 14.93            | 21.95            | 16.93         |
| 4                      | 15.23            | 22.32            | 17.25         |
| 5                      | 15.29            | 22.67            | 17.40         |
| <b>Mean</b>            | 15.04            | 22.31            | 17.11         |

**Source:** TUS survey data, own elaboration.

### 3.5.3 (34.) Employment rate of women with children in mandatory schooling age

This indicator provides the employment rate of women with children in mandatory schooling age. It has been computed with EU-LFS data for the period 2009-2015, and is based

on a combination of several variables.<sup>53</sup>

Table 3.36 shows the employment rate of women with children in mandatory schooling age in each year.

**Table 3.36:** Employment rate of women with children in mandatory schooling age.

|             | Mean<br>% |
|-------------|-----------|
| <b>Year</b> |           |
| 2009        | 68.35     |
| 2010        | 68.97     |
| 2011        | 69.06     |
| 2012        | 72.60     |
| 2013        | 72.10     |
| 2014        | 74.79     |
| 2015        | 72.94     |
| <b>Mean</b> | 71.11     |

**Source:** EU-LFS survey data, own elaboration. .

We can observe a positive trend: the employment rate of mothers with children in mandatory school age has been (almost) monotonically increasing over the period 2009-2015.

Table 3.37 shows the employment rate of women with children in mandatory schooling age in each year and on average across years, by mothers' age and education level.

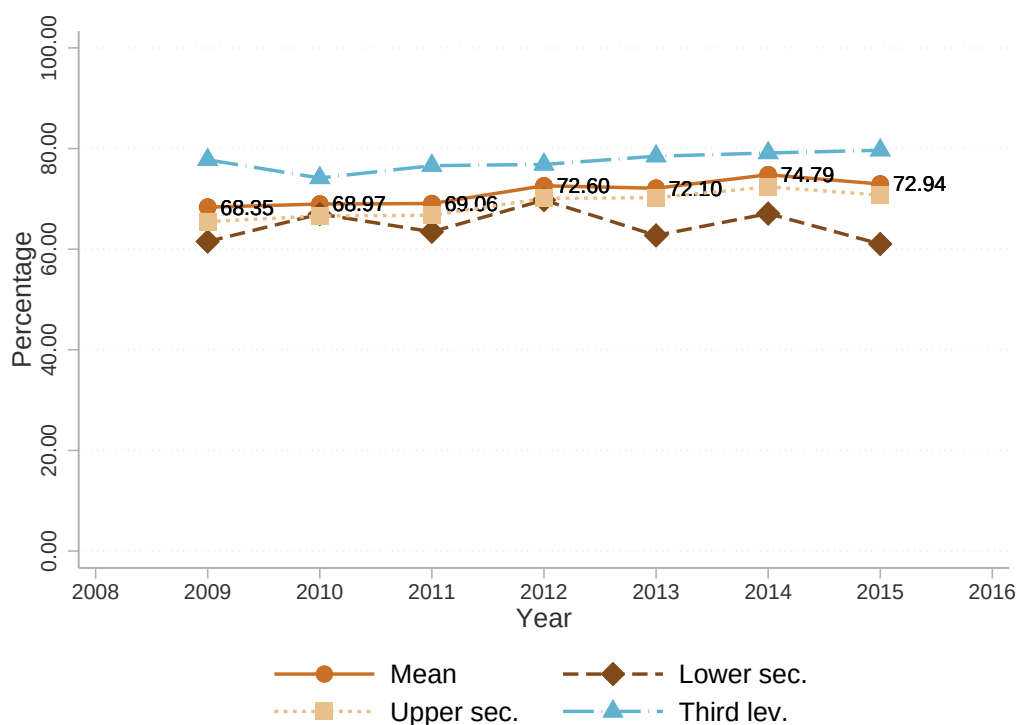
The employment rate of women with children in mandatory schooling age increased steadily from 2009 to 2015, when it reached about 73%. The increase of this indicator does not clearly characterize mothers with lower secondary education, while it concerns the most mothers between 25 and 49 years of age and mothers with upper secondary education. Figures 3.56 and 3.57 illustrates the time trend of this indicator by mothers' education and age respectively.

<sup>53</sup>HHNUM, that is, "Serial number of household;"HHMOTH, that is, "Sequence number of mother;" HH-FATH, that is, "Sequence number of father;" HHSEQNUM, that is, "Sequence number in the household," the variable HWUSUAL, that is, "Number of hours per week usually worked in main job." Other combinations of variables are possible, but do not allow to explore this entire period, because they are not included in the dataset for year 2015, namely HHPERS, that is, "Definition of children and adults;" HHNB0014, that is, "Number of children in the household aged less than 15;" HHCHILDR, that is, "Presence of the children of the person in the household." However, other versions of this indicator produced with these variables give very similar results for periods up to 2014. To the best of our knowledge, this indicator on employment rate of women with children in mandatory schooling age has never been constructed before and, in the way we construct it, it could allow to study the trend of this rate from 1983 up to now. Thus, this indicator opens new avenues of research possibilities on long-term mothers' well-being and labour market outcomes.

**Table 3.37:** Employment rate of women with children in mandatory schooling age, by age and educational level.

|                 | Year      |           |           |           |           |           |           | Mean<br>% |
|-----------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                 | 2009<br>% | 2010<br>% | 2011<br>% | 2012<br>% | 2013<br>% | 2014<br>% | 2015<br>% |           |
|                 |           |           |           |           |           |           |           |           |
| Age category    |           |           |           |           |           |           |           |           |
| 16-24           | 45.2      | 57.2      | 63.3      | 56.0      | 58.5      | 64.2      | 33.7      | 53.6      |
| 25-34           | 72.8      | 70.7      | 70.7      | 73.7      | 71.9      | 75.5      | 75.2      | 72.7      |
| 35-49           | 67.3      | 70.1      | 69.2      | 72.8      | 74.4      | 75.4      | 75.3      | 71.8      |
| 50-64           | 61.7      | 45.3      | 57.5      | 64.9      | 50.7      | 65.2      | 52.6      | 57.0      |
|                 |           |           |           |           |           |           |           |           |
| Education level |           |           |           |           |           |           |           |           |
| Lower sec.      | 61.5      | 67.0      | 63.5      | 69.7      | 62.7      | 67.1      | 61.0      | 64.9      |
| Upper sec.      | 65.5      | 66.6      | 66.7      | 70.1      | 70.2      | 72.4      | 70.7      | 68.6      |
| Third lev.      | 77.8      | 74.2      | 76.6      | 76.8      | 78.5      | 79.1      | 79.7      | 77.5      |
| Mean            | 68.4      | 69.0      | 69.1      | 72.6      | 72.1      | 74.8      | 72.9      | 71.1      |

Source: EU-LFS survey data, own elaboration.

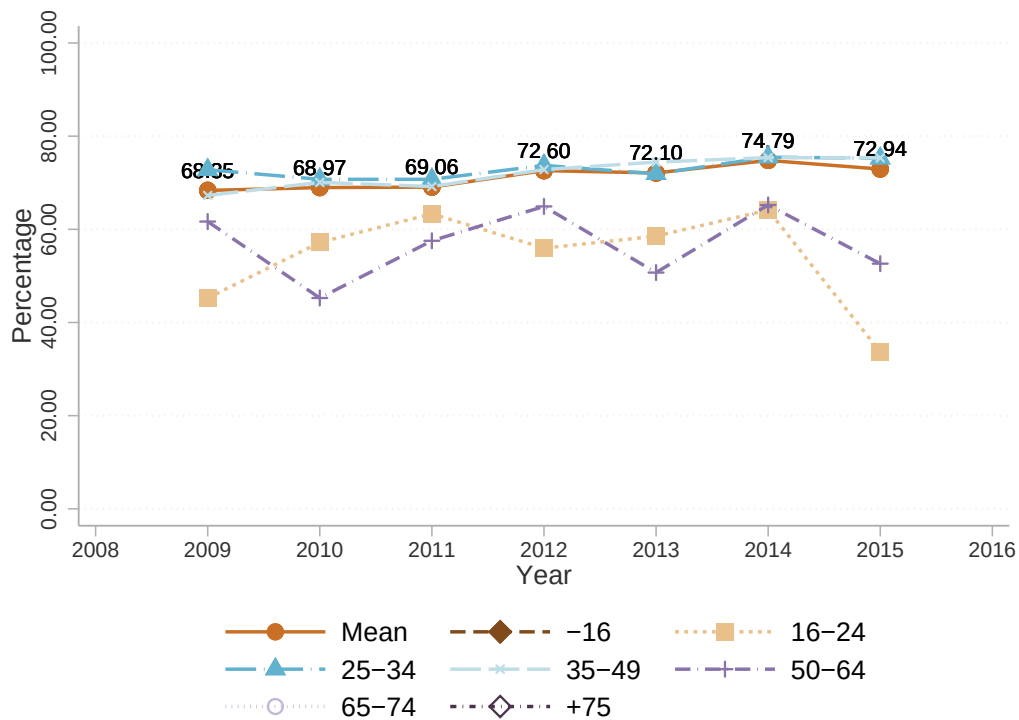
**Figure 3.56:** Employment rate of women with children in mandatory schooling age, by education level.

Source: EU-LFS survey data, own elaboration.

### 3.5.4 (35.) Time spent commuting

The information on minutes per day spent commuting is extracted from the TUS. The first and only available wave when we conducted the analyses refer to year 2014. These data can be obtained internally, without application to external institutes. This indicator is

**Figure 3.57:** Employment rate of women with children in mandatory schooling age, by age.



Source: EU-LFS survey data, own elaboration.

computed as the time spent travelling to work and back home (activity 910 in TUS). This indicator is computed on full-time workers, who were working in at least one of the two survey days (i.e., two weekdays, two weekend days, one weekday and one weekend day).

Table 3.38 reports the hours spent commuting during weekdays, weekends, and on average during both days, by age, gender, nationality, education level, marital status, and income quintile.

The time spent commuting during weekdays, in 2014, was 65 minutes. The time spent commuting during weekdays decreases with the increase in the income quintile and in age, it is lower for Luxembourgian people and decreases with the increase in the education. Moreover, while the difference in commuting time by gender is about non-existent during weekdays, it tends to increase during weekends – women commute less. During the week-end the minutes-gap increases also by education level and income quintile.

**Table 3.38:** Time that full-time workers spend commuting, by various breakdowns, and by weekday, weekend, week.

|                        | Weekday<br>Minutes | Day<br>Weekend<br>Minutes | Week<br>Minutes |
|------------------------|--------------------|---------------------------|-----------------|
| <b>Age category</b>    |                    |                           |                 |
| 16-24                  | 75.45              | 68.37                     | 74.62           |
| 25-34                  | 64.42              | 52.25                     | 63.61           |
| 35-49                  | 63.11              | 57.25                     | 62.71           |
| 50-64                  | 67.46              | 63.49                     | 67.19           |
| 65-74                  | 41.07              | 0.00                      | 41.07           |
| <b>Gender</b>          |                    |                           |                 |
| Male                   | 66.33              | 61.37                     | 65.94           |
| Female                 | 63.29              | 53.51                     | 62.70           |
| <b>Nationality</b>     |                    |                           |                 |
| resid. country         | 61.96              | 56.56                     | 61.58           |
| euro. country          | 67.79              | 58.49                     | 67.16           |
| other country          | 68.70              | 70.94                     | 68.94           |
| <b>Education level</b> |                    |                           |                 |
| Lower sec.             | 69.61              | 66.81                     | 69.36           |
| Upper sec.             | 62.98              | 56.66                     | 62.36           |
| Third lev.             | 63.03              | 44.58                     | 62.43           |
| <b>Marital status</b>  |                    |                           |                 |
| Single                 | 66.98              | 56.61                     | 66.25           |
| Married - PACS         | 64.03              | 59.77                     | 63.72           |
| No longer married      | 64.43              | 56.05                     | 63.93           |
| <b>Income quintile</b> |                    |                           |                 |
| 1                      | 68.79              | 66.69                     | 68.62           |
| 2                      | 67.67              | 61.76                     | 67.21           |
| 3                      | 67.38              | 66.16                     | 67.29           |
| 4                      | 60.25              | 41.84                     | 59.04           |
| 5                      | 62.40              | 54.39                     | 62.00           |
| <b>Mean</b>            | <b>65.02</b>       | <b>58.52</b>              | <b>64.56</b>    |

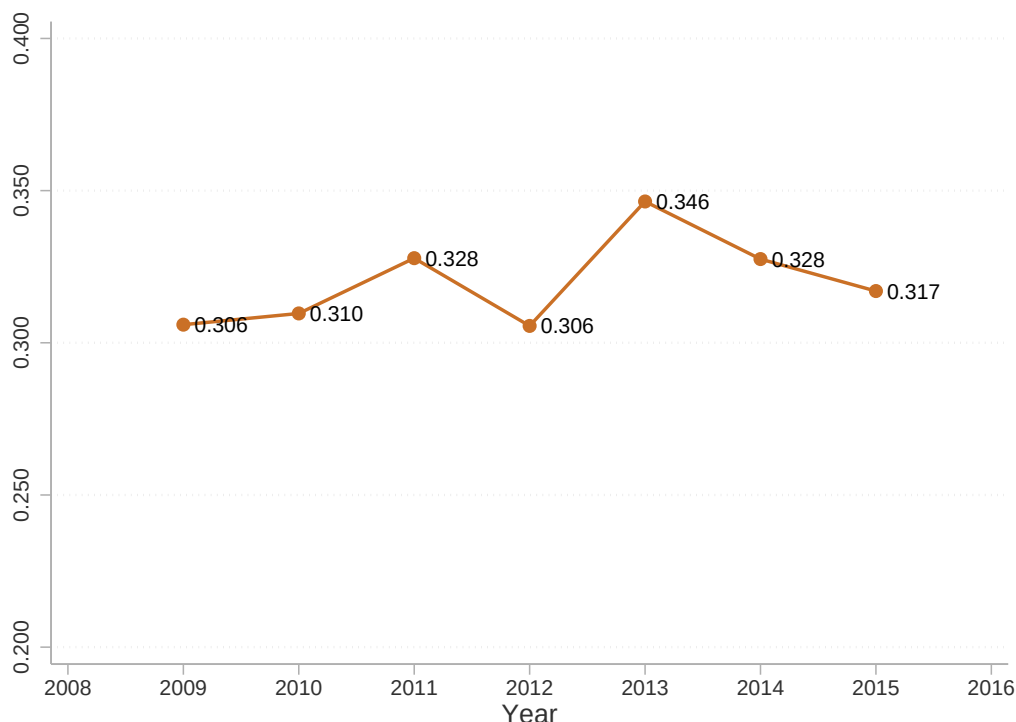
**Source:** TUS survey data, own elaboration.

### 3.5.5 (36.) Share of parental leave in the couple

This indicator is given by the sum of the paternity leaves, divided by the sum of the maternity leaves. If this indicator equals 1, mothers and fathers share equally their leaves. If this indicator is lower than 1, mothers take more leaves than fathers. If it is larger than 1, fathers take more leaves. This indicator includes first and second parental leaves as well as full- and half-time parental leaves.

The data for this indicator can be obtained directly from yearly reports prepared by the “Caisse nationale des prestations familiales (Caisse nationale des prestations familiales (CNPF));” these reports can be downloaded by the website of the institute.<sup>54</sup> Figure 3.58 shows the trend of the share of paternal leave over the period 2009-2015. This indicator shows a high volatility, and a modest average increase in the share of parental leaves taken by fathers: it went from 30.6% in 2009 to 31.7% in 2015. This share reached a pick in 2013, when it was 34.6%.

<sup>54</sup>See <http://cae.public.lu/fr/publications.html> and download “Rapport d’activités 2015.”

**Figure 3.58:** Share of parental leaves.

**Source:** Caisse Nationale des Prestations Familiales data, own elaboration.

### 3.5.6 (37.) Satisfaction with work-life balance

In this section, we provide the share of people declaring to be satisfied with their time use. This definition differs from that in the “Avis commun CES-CSDD: PIBien-être,” which recommends to focus on the work-life balance; we opted for a different focus, based on the available data. This statistic is based on EU-SILC data for 2013, with the variable PW120, that is, “Satisfaction with time use;” this variable ranges between 0 (‘not at all’) to 10 (‘a lot’).

Satisfaction with time use is computed in three ways, which differ based on the reference population and are meant to capture the satisfaction with time use of workers: the first sub-indicator includes all the people, the second indicator includes only employed workers, and the third sub-indicator includes non-employed people (i.e., unemployed and inactive people).

#### (37.a) Satisfaction with work-life balance; employed and non-employed

Figure 3.59 illustrates the satisfaction with time use of all the people, by gender, income quintile, nationality, age, and education level.

Independently from the working status, the average time use satisfaction is 7.2 points out of 10. Luxembourgian people, young and old ones, as well as people with secondary education tend to be more satisfied.

**Figure 3.59:** Satisfaction with work life balance, by different breakdowns; employed and non-employed.



**Source:** EU-SILC survey data, own elaboration.

### (37.b) Satisfaction with work-life balance; only employed

Figure 3.60 illustrates the satisfaction with time use of employed workers alone, by gender, income quintile, nationality, age, and education level.

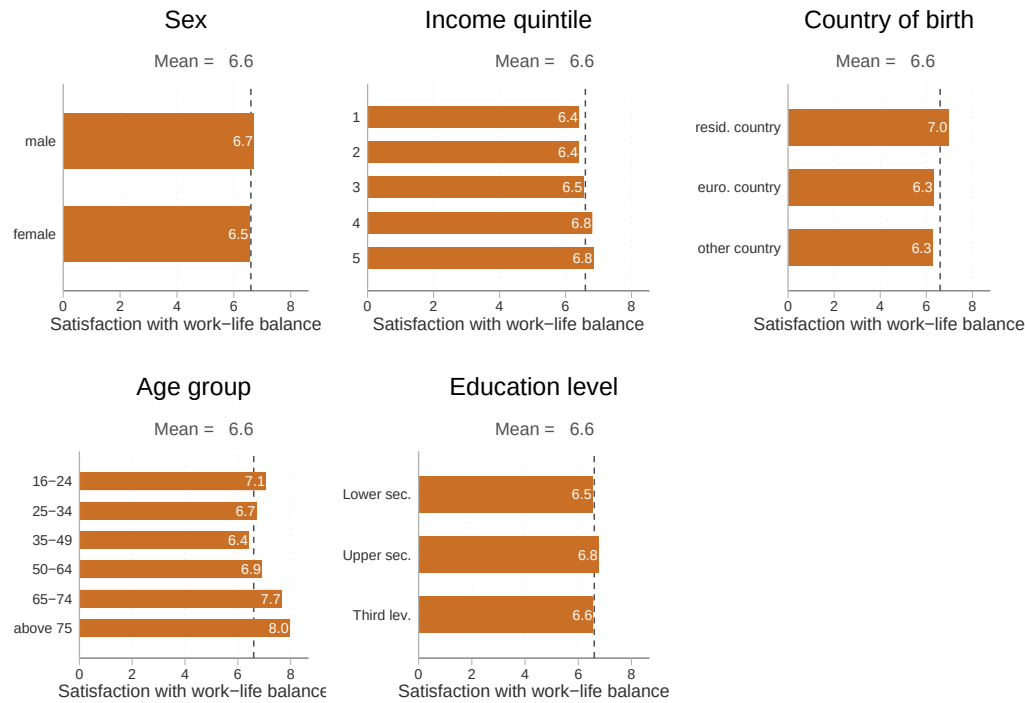
The average time use satisfaction of employed people is 6.6 points out of 10. Luxembourgian people as well as young and old people tend to be more satisfied. Additionally, people in the top quintiles of the income distribution tend to be more satisfied.

### (37.c) Satisfaction with work life balance; only non-employed people

Figure 3.61 illustrates the satisfaction with time use of non-employed people (i.e., unemployed and inactive people), by gender, income quintile, nationality, age, and education level.

The average satisfaction with time use of non-employed people is 7.9 out of 10. Luxembourgian people as well as young and old people tend to be more satisfied. Additionally, people in the first quintile of the income distribution tend to be the most dissatisfied: 7.2 out of 10, against the average of 7.9.

**Figure 3.60:** Satisfaction with work life balance, by various breakdowns; only employed.



**Source:** EU-SILC survey data, own elaboration.

**Figure 3.61:** Satisfaction with work life balance, by various breakdowns; only non-employed.



Source: EU-SILC survey data, own elaboration.

**Source:** EU-SILC survey data, own elaboration.

## 3.6 Domain VI: Education and skills

The Education and Skills domain includes four indicators: educational attainment; young people having left education early; reading skills; civic skills of students.

Table 3.39 gives an overall view of this quality of life's domain. Despite an improvement in educational attainments, three out of four indicators place Luxembourg among the worst performing countries in Europe. Overall, indicators in this domain exhibit worrying trends.

*Why does this domain matter?* People's education and skills are widely regarded as important contributing factors to societies' welfare and individuals' well-being and outcomes. Education contributes to human capital formation. Countries' knowledge and skills are key determinants of innovation, technological gains and productivity. Moreover, education favours social mobility and is linked to civic engagement.

*Why do these indicators matter?* In general, learning is important throughout the life course. Widespread evidence links individuals' outcomes with education. People with university degrees earn higher salaries than non-graduates. In contrast, early school leavers have higher chances to be socially excluded, are more vulnerable to economic shocks and are less engaged in public life. Reading skills foster the ability to play an active role in society, to achieve life goals, and to develop knowledge. Civic engagement reflect two types of knowledge and understanding: i) knowledge and understanding of people, institutions and processes concerning aspects of the civic life (i.e. voting); ii) knowledge and understanding of the opportunities to participate and engage in the society.

### 3.6.1 (38.) Education attainment

This indicator is a broad measure of skills in the population. It is computed as the share of the labour force with a higher education diploma. The reference group is people between 20-74 years of age. The indicator is compiled from EU-LFS data.<sup>55</sup>

Table 3.40 shows the percentage of people with a university degree in each year over the period 2009-2015. The share of people with university degree increased steadily from 35 to 45 percent between 2009 and 2014. In 2015, this share seems to have declined sharply by 6 percent points. This latter figure is hard to interpret and would require further investigation in coming years.

Table 3.41 shows the indicator computed by age and by gender. The evolution of the share of tertiary-educated people in the various groups follow the same overall pattern:

<sup>55</sup>Possible sources of data for compiling the indicator are EU-LFS and EU-SILC. One problem is that the classification of educational levels provided by the International Standard Classification of Education (ISCED) has changed over the period. As a result, EU-SILC and EU-LFS use International Standard Classification of Education (ISCED)-97 up to 2013 and ISCED-11 afterwards. EU-LFS, however, includes also a variable that divides the levels of education into three groups (i.e., lower secondary education, upper secondary education, and tertiary education), which is consistently based on the ISCED-97 classification over the entire period. This is basically a ISCED 1-digit classification. The variable code is HATLEV1D, that is, "Level of education (ISCED-97, 3 levels). As this variable is not available for the EU-SILC data, to avoid data manipulations to ensure consistency, we have opted for sourcing data from EU-LFS.

**Table 3.39:** Domain 6, education and skills.

| N             | Indicators                                                                   | Description                                                                                                                                                                                | Cross country | Change |
|---------------|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|
| 38            | Educational attainment                                                       | The share of people with university degree increased by about 3% from 2009 to 2015.                                                                                                        | ● 2015        | ↗      |
| 39            | Young people having left education early                                     | The share of people who left education early has increased by about 8 percentage points from 2009 to 2015.                                                                                 | ● 2015        | ↗      |
| 40            | Reading skills (at 15 years of age)                                          | The ability of a 15 years old average student to understand written text follows an inverse U shape trend; however, on average, it seems to have increased over time.                      | ● 2015        | ↗      |
| 41            | Civic skills of students (at 14 years of age)                                | As time series for this indicator is not available, its assessment is based on a cross-country comparison. Luxembourg's score is at the lower bottom of the Western European distribution. | ● 2009        | NA'    |
| <b>Legend</b> |                                                                              |                                                                                                                                                                                            |               |        |
| ●             | Luxembourg score is in the top 25% among Western European countries.         |                                                                                                                                                                                            |               |        |
| ●             | Luxembourg score is in line with the Western Europe average.                 |                                                                                                                                                                                            |               |        |
| ●             | Luxembourg score belongs to the bottom 25% among Western European countries. |                                                                                                                                                                                            |               |        |
| ↗             | Indicates an increase over time.                                             |                                                                                                                                                                                            |               |        |
| ↔             | Indicates that the indicator did not change.                                 |                                                                                                                                                                                            |               |        |
| ↘             | Indicates a decrease over time.                                              |                                                                                                                                                                                            |               |        |
| NA'           | Time series is not available.                                                |                                                                                                                                                                                            |               |        |
| NA*           | Data sourced from data producer, and thus not internationally comparable.    |                                                                                                                                                                                            |               |        |
| NA**          | Data sourced from administrative records.                                    |                                                                                                                                                                                            |               |        |

**Table 3.40:** Share of people with university degree.

|             | Mean<br>% |
|-------------|-----------|
| <b>Year</b> |           |
| 2009        | 34.68     |
| 2010        | 35.37     |
| 2011        | 36.83     |
| 2012        | 38.86     |
| 2013        | 41.04     |
| 2014        | 45.43     |
| 2015        | 39.79     |
| <b>Mean</b> | 39.01     |

**Source:** EU-LFS survey data, own elaboration.

a steady increase between 2009 and 2014, and a fall in the last year of the sample. Interestingly, the gender gap in education narrows over the period.

**Table 3.41:** Share of people with university degree, by age and gender.

|                     | Year      |           |           |           |           |           |           | Mean<br>% |
|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                     | 2009<br>% | 2010<br>% | 2011<br>% | 2012<br>% | 2013<br>% | 2014<br>% | 2015<br>% |           |
| <b>Age category</b> |           |           |           |           |           |           |           |           |
| 25-34               | 44.73     | 43.68     | 46.50     | 49.21     | 48.89     | 52.47     | 49.95     | 48.07     |
| 35-49               | 35.19     | 37.72     | 37.58     | 41.30     | 44.42     | 50.71     | 43.17     | 41.58     |
| 50-64               | 25.68     | 25.36     | 28.15     | 27.39     | 30.45     | 33.17     | 27.85     | 28.43     |
| <b>Gender</b>       |           |           |           |           |           |           |           |           |
| Male                | 37.64     | 38.80     | 39.42     | 41.51     | 42.70     | 47.40     | 39.60     | 41.13     |
| Female              | 31.67     | 31.87     | 34.18     | 36.13     | 39.33     | 43.41     | 40.00     | 36.84     |

**Source:** EU-LFS survey data, own elaboration.

### 3.6.2 (39.) Young people who left education early

This indicator captures the relevance of early leaving from school in Luxembourg. The indicator is computed as the percentage of people that left education and training early in the age group 20-24 (termed as early leavers). Early leavers from education and training are those people that have completed at most a lower secondary education and are not in further education or training during the four weeks preceding the survey.<sup>56</sup> Data are sourced from the EU-LFS and are available from 2009 till 2015.

Figure 3.62 presents the evolution of the number of early leavers between 2009 and 2015. This data show that, at the end of the period, the percentage of young people who left education early was 9 percentage points higher than at the beginning of the period. One also observes a dip in 2013, and a sharp increase afterwards.

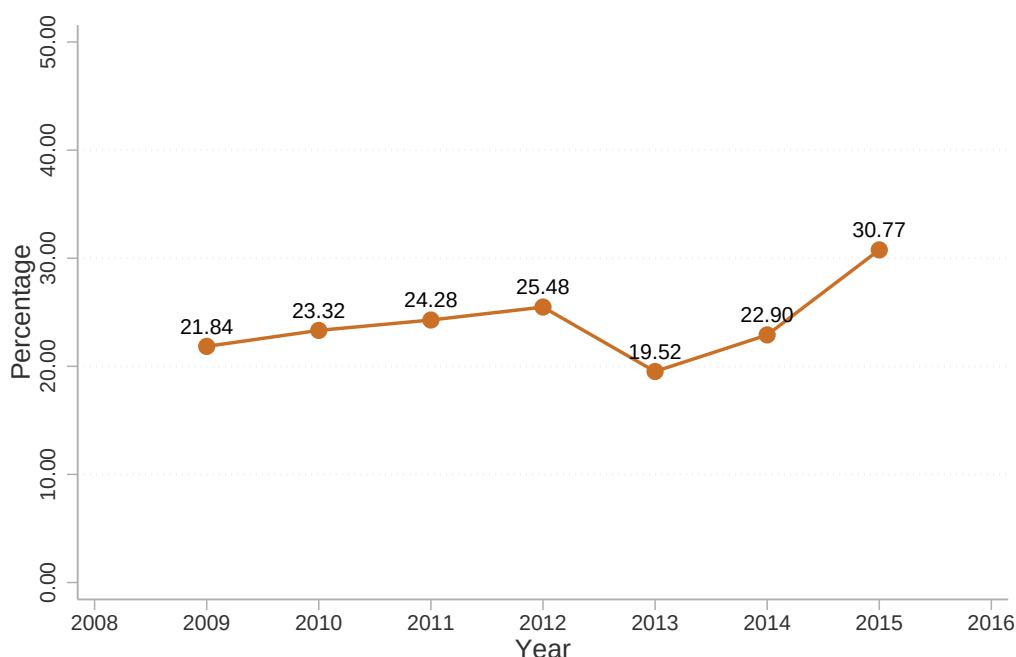
This data, however, should be interpreted with care. This is for two reasons. Firstly, the underlying classification of the levels of education and training has changed from ISCED-97 to ISCED-11. The change has been implemented in 2014.<sup>57</sup> Secondly, official Eurostat figures are computed for the age group 18-24. The data at hand, however, do not allow us to recover figures for this age group.<sup>58</sup> As a result, Eurostat provides different results for Luxembourg. According to Eurostat, the percentage of early leavers is lower. Noticeably, however, it follows a similar time pattern than the indicator in this report.<sup>59</sup>

<sup>56</sup>[http://ec.europa.eu/eurostat/cache/metadata/EN/t2020\\_40\\_esmsip.htm](http://ec.europa.eu/eurostat/cache/metadata/EN/t2020_40_esmsip.htm)

<sup>57</sup>The construction of this indicator is based on the following variables: EDUC4WN, that is, “Education or training received during last 4 weeks,”; HAT97LEV, that is, “Highest level of education or training successfully completed (ISCED-97)”. Following the change in classification of educational levels, we used HAT11LEV, that is, “Highest level of education or training successfully completed (ISCED-11)”. Note that this is a three digit ISCED classification.

<sup>58</sup>EU-LFS data do not indicate the age of respondents, but age groups. A possible alternative solution would be to aggregate two groups and consider people within 15-24 years of age. This, however, would have produced an underestimate of the share of people who left education early, since most people continue studying until the end of high school.

<sup>59</sup>[http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=edat\\_lfse\\_14&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=edat_lfse_14&lang=en)

**Figure 3.62:** Percentage of early leavers in Luxembourg 2009-2015.

Source: EU-LFS survey data, own elaboration.

### 3.6.3 (40.-41.) Reading skills and Civic skills

This subsection presents two indicators, namely reading and civic skills.

#### 40 Reading skills

This indicator measures students' reading literacy. This concept captures students' ability to access, interpret, and evaluate written texts.<sup>60</sup> It is obtained from the score on reading performance provided by OECD-led survey "Programme for International Student Assessment (PISA)." The PISA survey is administered every three years and targets students at the end of the compulsory education period. Here, we use data from the 2009, 2012, and 2015 waves.<sup>61</sup>

The OECD (OECD, 2013b) reports that results for Luxembourg are statistically significantly below the OECD average. This datum is consistent over the period.<sup>62</sup>

PISA survey data are harmonised to ensure cross-country comparability. Nonetheless, comparability issues remain, which suggests that the indicators from the survey

<sup>60</sup>OECD (2013b) defines reading literacy as "understanding, using, reflecting on and engaging with written texts, in order to achieve one's goals, to develop one's knowledge and potential, and to participate in society".

<sup>61</sup>Figures were obtained from OECD publications accessible online. For the three waves, one can see, respectively, <https://www.oecd.org/pisa/pisaproducts/46619703.pdf> OECD (2010), see <https://www.oecd.org/pisa/keyfindings/pisa-2012-results-overview.pdf> OECD (2014), and <https://www.oecd.org/pisa/pisa-2015-results-in-focus.pdf> OECD (2018).

<sup>62</sup>For 2009, the mean reading skills score among OECD countries/regions, from the PISA survey, is 493, with the maximum value being 556 (i.e. Shanghai-China) and the minimum value being 314 (i.e. Kyrgyzstan). For 2012, the mean reading skills score among OECD countries/regions, from the PISA survey, is 496, with the maximum value being 570 (i.e. Shanghai-China) and the minimum value being 384 (i.e. Peru). For 2015, the mean reading skills score among OECD countries/regions, from the PISA survey, is 493, with the maximum value being 535 (i.e. Singapore) and the minimum value being 347 (i.e. Lebanon).

should be interpreted with caution. Results from PISA tests are criticised for a number of reasons. Recent studies, based on the PISA waves used in this report, have pointed out the following problems. Firstly, the same question posed in different languages places different cognitive demands on students, which undermines the comparability of the answers (El Masri et al., 2016). Secondly, the underlying characteristics of the sample deviates from those of the effective population (Freitas et al., 2016), pointing to representativeness problems. Lastly, the ways available to respondents for answering questions – the test mode (e.g. whether the test is administrated with pencil and paper or through a computer) – could affect the tests' results (Jerrim, 2016).

#### 41 Civic skills

This indicator measures students knowledge and understanding of their civic and citizenship education. This includes understanding of public institutions, of the voting system, and of chances and means of participating and engaging in society. The indicator is obtained from the survey “International Civic and Citizenship Education Study (International Civic and Citizenship Education Study (ICCS)),” which is produced by the “International Association for the Evaluation of Educational Achievement (International Association for the Evaluation of Educational Achievement (IEA))”. (At its inception, the survey was named “Civic Education Study (Civic Education Study (CIVED)).) Data are gathered from 75,000 students in their eighth year of schooling in more than 3,000 schools from 24 European countries.<sup>63</sup>

Of the three waves available for this survey, administered respectively in 1999, 2009, and 2016, we used the 2009 wave.<sup>64</sup>

PISA and ICCS datasets are publicly available for all the waves and for both indicators upon request to the respective institutions. Because of datasets complexity, we report values of the indicators without breakdowns. Table 3.42 reports the average scores obtained by Luxembourg for both indicators. Figures provide insights when compared to scores obtained by other surveyed countries. As noted above, reading skills in Luxembourg are below OECD averages. Civic skills are also below average.<sup>65</sup>

<sup>63</sup>See <http://www.iea.nl/our-studies>.

<sup>64</sup>Figures were retrieved [http://www.iea.nl/fileadmin/user\\_upload/Publications/Electronic\\_versions/ICCS\\_2009\\_European\\_Report.pdf](http://www.iea.nl/fileadmin/user_upload/Publications/Electronic_versions/ICCS_2009_European_Report.pdf), page 48, Table 3.3 Sturman et al. (2010)

<sup>65</sup>For 2009, the mean civic skills score among the European participant countries, from the ICCS survey, is 514, with the maximum value being 576 (i.e. Finland) and the minimum value being 453 (i.e. Cyprus).

**Table 3.42:** Reading skills and civic skills.

|             | Reading<br>skills<br>Score | Civic<br>skills<br>Score |
|-------------|----------------------------|--------------------------|
| <b>Year</b> |                            |                          |
| 2009        | 472                        | 473                      |
| 2010        | -                          | -                        |
| 2011        | -                          | -                        |
| 2012        | 488                        | -                        |
| 2013        | -                          | -                        |
| 2014        | -                          | -                        |
| 2015        | 481                        | -                        |
| <b>Mean</b> | 480                        | 473                      |

Source: PISA and ICCS reports, own elaboration.

## 3.7 Domain VII: Social Relationships

There are four measures in the “Social relationships” domain: social network support, membership in associations, time spent volunteering and frequency of social contacts.

Comparable international data are available for all but one of these measures. The main source of information on social relations is the EU-SILC survey. Time spent volunteering comes from the TUS and membership in associations from the EVS. Information on the evolution over time of these indicators, however, is limited. The only indicator for which this information is available is the frequency of social contacts.

Overall, and as shown in Table 3.43, the state of social relationship in Luxembourg is comparable to other European countries.

*Why does this domain matter?* Positive social relationships contribute to societal and individual well-being: “Beyond the intrinsic pleasure that people derive from spending time with others, social connections have positive spill-over effects for individual and societal well-being. People with extensive and supportive networks have better health, tend to live longer, and are more likely to be employed” (OECD, 2011).

*Why do these indicators matter?* This domain contains a rich set of indicators to capture people’s social networks and various forms of social support. Positive close relationships are known to be associated to higher well-being and more favourable individual outcomes. Associations’ activities and volunteering contribute to social cohesion. Indicators in this domain are also often used in studies of social capital, regarded by social scientists as a crucial contributing factor to sustainable economic growth.

### 3.7.1 (42.) Social network support

Social network support is measured by the following sub-indicators: having anyone to discuss personal matters; possibility to ask for help; trust in others. The indicators provide a measure of the quality of family and other forms of close relationships of people living

**Table 3.43:** Domain 7, social relationships.

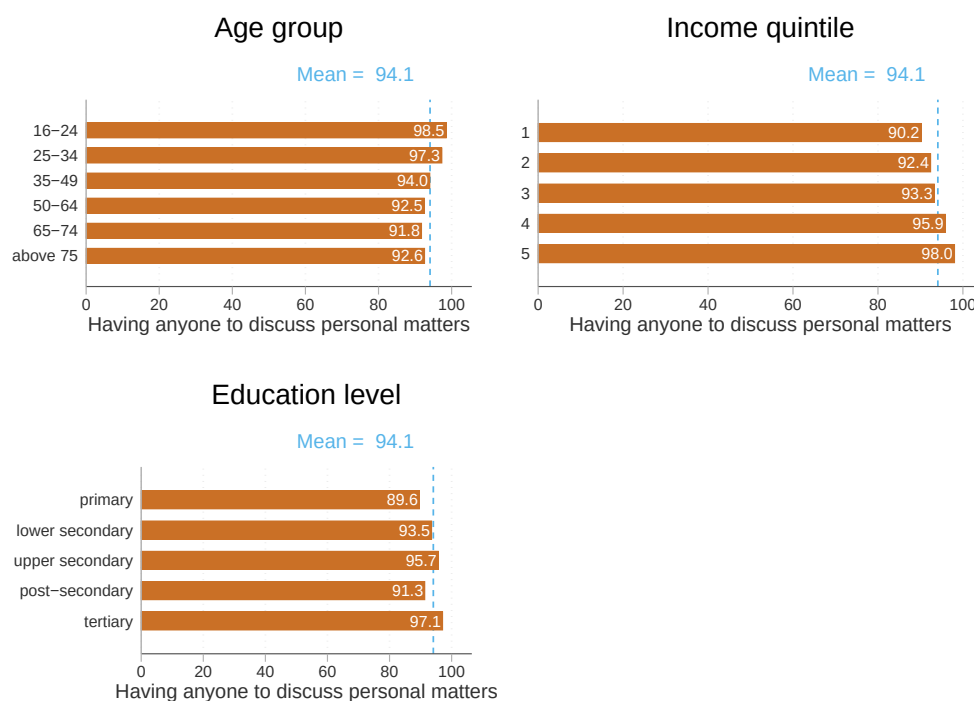
| N      | Indicators                                                                   | Description                                                                                                          | Cross country | Change |
|--------|------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|---------------|--------|
| 42.a   | Having anyone to discuss with personal matters                               | 94.1% of Luxembourg residents declares to have someone with whom they can discuss personal matters.                  | ● 2013        | NA'    |
| 42.b   | Possibility to ask for help                                                  | 84.3% of Luxembourg residents declares to have someone to whom they can ask for help when in need.                   | ● 2013        | NA'    |
| 42.c   | Trust in others                                                              | 53% of Luxembourg residents declare to have a high trust in others.                                                  | ● 2013        | NA'    |
| 43     | Membership in social, cultural, sport associations                           | 38.8% of Luxembourg residents are member of a social, cultural, and/or sports associations.                          | ● 2008        | NA'    |
| 44     | Time spent volunteering                                                      | On average, Luxembourg residents spend a total of 137 minutes volunteering per week.                                 | NA*           | NA'    |
| 45     | Frequency of social contacts                                                 | The share of adults getting together with friends at least once a month increased from 86% in 2009 to 88.5% in 2015. | ● 2014        | ↗      |
| Legend |                                                                              |                                                                                                                      |               |        |
| ●      | Luxembourg score is in the top 25% among Western European countries.         |                                                                                                                      |               |        |
| ●      | Luxembourg score is in line with the Western Europe average.                 |                                                                                                                      |               |        |
| ●      | Luxembourg score belongs to the bottom 25% among Western European countries. |                                                                                                                      |               |        |
| ↗      | Indicates an increase over time.                                             |                                                                                                                      |               |        |
| ↔      | Indicates that the indicator did not change.                                 |                                                                                                                      |               |        |
| ↘      | Indicates a decrease over time.                                              |                                                                                                                      |               |        |
| NA'    | Time series is not available.                                                |                                                                                                                      |               |        |
| NA*    | Data sourced from data producer, and thus not internationally comparable.    |                                                                                                                      |               |        |
| NA**   | Data sourced from administrative records.                                    |                                                                                                                      |               |        |

in Luxembourg. They are obtained from the EU-SILC rotating module on well-being; as a result, they are available for the year 2013. The first two indicators increase with respect to income and educational level, while they decrease with age. In contrast, it is not possible to identify a clear pattern in the variation of trust across population groups.

#### (42.a) Having anyone to discuss with personal matters

This indicator is measured by the percentage of people who declare to have somebody to discuss personal matters. 94% of Luxembourg residents declare to have someone to confide in.<sup>66</sup>

**Figure 3.63:** Share of adults having anyone to discuss with personal matters, by various breakdowns.



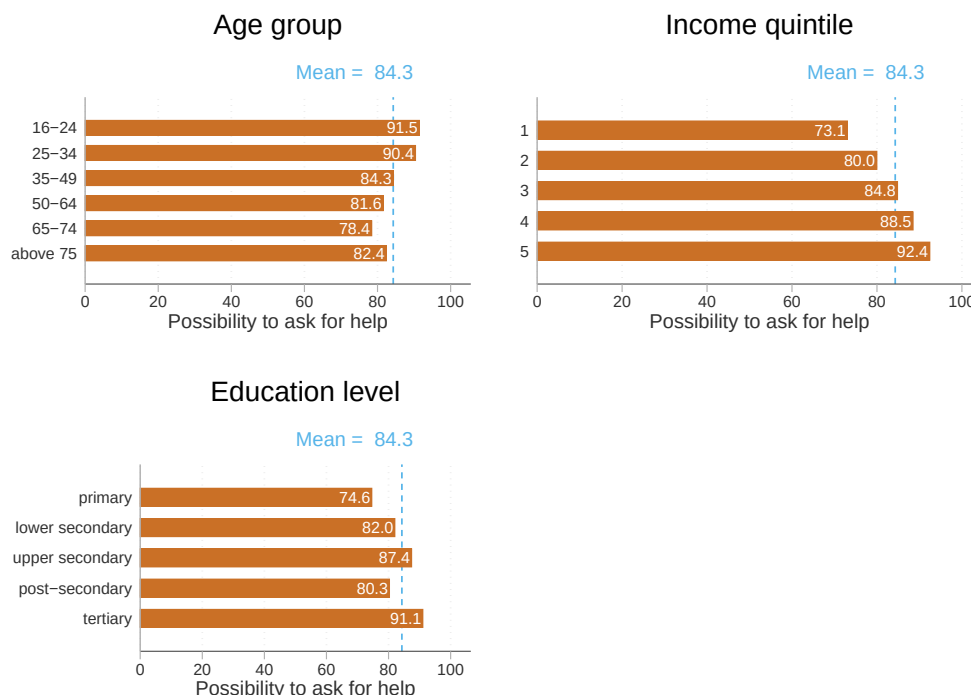
**Source:** EU-SILC survey data, own elaboration.

<sup>66</sup>Variable PW170 “Personal matters (anyone to discuss with).”

**(42.b) Possibility to ask for help**

Nearly 85% of Luxembourg residents declares to have someone who can provide help and support when in need.<sup>67</sup>

**Figure 3.64:** Share of adults having possibility to ask for help, by various breakdowns.



**Source:** EU-SILC survey data, own elaboration.

**(42.c) Trust in others**

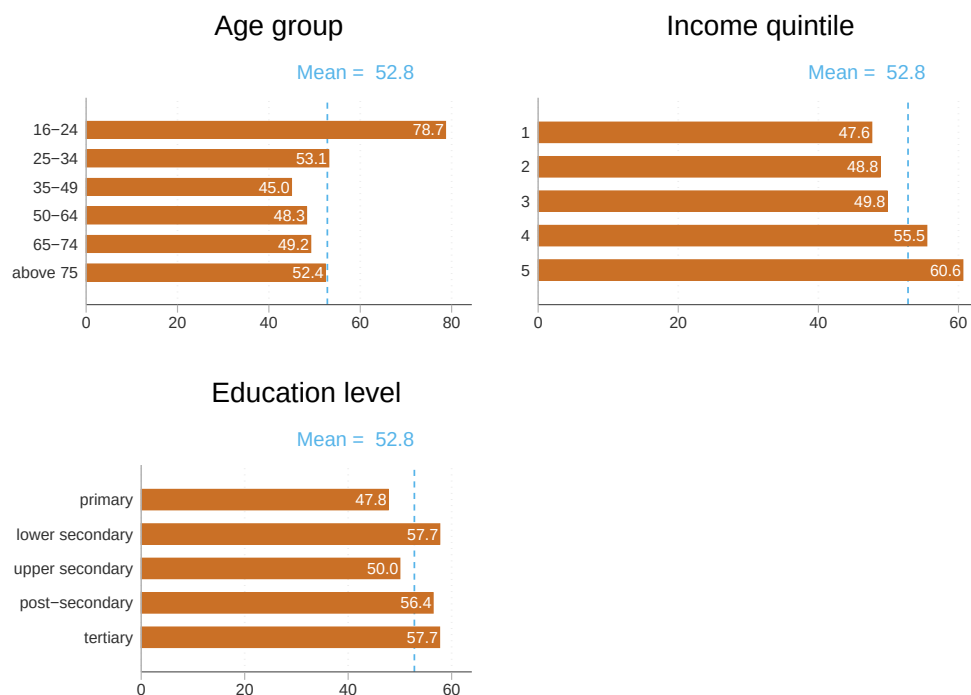
Trust in others is measured by the share of people reporting a level of trust higher than the median value. The median trust in Luxembourg is 6. Nearly 53% of residents declare a value greater than the median. (Survey respondents are asked to report their level of trust on a scale from 0 (no trust) to 10 (complete trust).) Figure 3.65 reports trust variations by breakdowns. One observes that people between 16 and 24 years of age report higher level of trust in others. Trust in others seems to increase with respect to income and education.

**3.7.2 (43.) Membership in social, cultural, sports associations**

This indicator gives the share of adult population (over 16) declaring to be members of social, cultural, and sports associations. Data are sourced from the 2008 wave of the European Value Study (EVS). (As the EVS is intended to survey long-run trends on people's attitudes and behaviours trends, we have treated the information collected in 2008 as a proxy for 2009.)<sup>68</sup>

<sup>67</sup>Variable PW180 "Help from others".

<sup>68</sup>The indicator is compiled from several variables, namely those variables that identify the respondents' membership in associations, including political associations. This choice was made because it is difficult

**Figure 3.65:** Share of people with high trust in others, by various breakdowns.

**Source:** EU-SILC survey data, own elaboration.

Table 3.44 provides the distribution of the indicator by gender, age, education level, and income tercile. (This is because the dataset provides information on income groups, which are more suitably divided into terciles.) One can see that nearly 40% of Luxembourg residents are members of social, cultural, and (or) sports associations. The indicator, however, presents striking differences across population groups. Men are more engaged (45.2%) than women in associations. Membership of associations decreases with respect to age, and increases with respect to education and income.

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to distinguish between political and civic associations. Data are freely available for download from the EVS' website. The variables used refer to membership of: welfare organisation, religious organisation, cultural activities, trade unions, political parties or groups, local community action, third world-development or human rights groups, environmental organizations, professional associations, youth work, sports and recreation associations, women's groups, peace movements, voluntary health organisations, other groups.

**Table 3.44:** Membership in social, cultural and sport associations, by various breakdowns.

|                        | Mean<br>% |
|------------------------|-----------|
| <b>Gender</b>          |           |
| Male                   | 45.2      |
| Female                 | 32.8      |
| <b>Age category</b>    |           |
| 16-24                  | 51.3      |
| 25-34                  | 43.6      |
| 35-49                  | 40.2      |
| 50-64                  | 38.3      |
| 65-74                  | 28.5      |
| above 75               | 21.2      |
| <b>Education level</b> |           |
| Lower sec.             | 29.0      |
| Upper sec.             | 43.0      |
| Third lev.             | 47.4      |
| <b>Income tercile</b>  |           |
| 1                      | 29.9      |
| 2                      | 39.0      |
| 3                      | 48.1      |
| <b>Mean</b>            | 38.8      |

**Source:** EVS survey data, own elaboration.

### 3.7.3 (44.) Time spent volunteering

This indicator provides information on how much time people devote to volunteering activities. The data is sourced from the TUS, a survey on time's use conducted by STATEC in 2014. The indicator is computed by the average time (in minutes) spent on various volunteering activities.<sup>69</sup> (Note that the data refers only to the people that declare to volunteer.)

Table 3.45 reports minutes spent volunteering over, respectively, the weekdays and the weekends, and lastly over the whole week. Breakdown are available by age, gender, nationality, education level, marital status, and income quintile. For example, the first row in the last column tells us that under 16 devote on average 106 minutes per week to volunteering activities. On average, Luxembourg residents spend slightly more than 2 hours per week volunteering. This figure is higher for weekdays and lower for weekends.<sup>70</sup> The breakdowns provide information on how this activities are distributed over population's characteristics. Single people volunteer more than married or no-longer married individuals. People with lower incomes, Luxembourg and non-EU country nationals also volunteer more. Data are also suggestive of a U-shaped relation of time spent volunteering with respect to age.

<sup>69</sup> Activities are coded as 411-413, 415, 419, 421-427, 429, 431-435. Activity 414 on time spent volunteering within a political domain is missing.

<sup>70</sup> This result is due to non-exactly overlapping populations.

**Table 3.45:** Time spent volunteering, by various breakdowns, and by weekday, weekend, week.

|                        | Day                |                    |                 |
|------------------------|--------------------|--------------------|-----------------|
|                        | Weekday<br>Minutes | Weekend<br>Minutes | Week<br>Minutes |
| <b>Age category</b>    |                    |                    |                 |
| below 16               | 99.66              | 110.18             | 106.81          |
| 16-24                  | 123.79             | 186.16             | 151.96          |
| 25-34                  | 130.69             | 136.57             | 133.55          |
| 35-49                  | 112.53             | 76.11              | 97.18           |
| 50-64                  | 136.07             | 110.79             | 128.67          |
| 65-74                  | 182.18             | 139.94             | 172.36          |
| <b>Gender</b>          |                    |                    |                 |
| Male                   | 140.47             | 104.26             | 126.89          |
| Female                 | 134.58             | 119.17             | 129.08          |
| <b>Nationality</b>     |                    |                    |                 |
| resid. country         | 147.37             | 119.05             | 138.54          |
| euro. country          | 119.05             | 95.71              | 108.85          |
| other country          | 120.42             | 139.92             | 129.30          |
| <b>Education level</b> |                    |                    |                 |
| Lower sec.             | 152.37             | 124.10             | 143.85          |
| Upper sec.             | 128.43             | 132.51             | 129.94          |
| Third lev.             | 131.21             | 90.31              | 116.02          |
| <b>Marital status</b>  |                    |                    |                 |
| Single                 | 141.56             | 147.24             | 144.09          |
| Married - PACS         | 133.70             | 99.12              | 121.62          |
| No longer married      | 143.42             | 85.25              | 126.32          |
| <b>Income quintile</b> |                    |                    |                 |
| 1                      | 183.54             | 125.70             | 166.51          |
| 2                      | 167.44             | 107.70             | 145.88          |
| 3                      | 86.57              | 119.78             | 97.85           |
| 4                      | 136.90             | 100.71             | 119.82          |
| 5                      | 114.31             | 110.03             | 112.66          |
| <b>Mean</b>            | 137.17             | 112.31             | 128.10          |

**Source:** TUS data, own elaboration.

### 3.7.4 (45). Frequency of social contacts

The frequency of social contacts is measured by the share of residents getting together with friends or family for a drink or meal at least once per month. This indicator is computed from EU-SILC data and refers to the years: 2009, 2013, 2014 and 2015.<sup>71</sup> On average, nearly 89% of people living in Luxembourg report to be able to get together with friends/family at least once per month.

Table 3.46 reports, respectively, the overall evolution of the share of adults getting together with friends at least once per month, the share's evolution by income quintile, education level and household type. One can see that, overall, social contacts have slightly increased over the period. When examining the distributions, one observes that the frequency of social contracts is increasing with respect to income and education.

<sup>71</sup> Computations are based on the variable PD050, which codes answers to the question: "Get-together with friends/family (relatives) for a drink/meal at least once a month."

Noticeably, single parents report lower frequencies of social contacts compared to other households.

**Table 3.46:** Frequency of social contacts by various breakdowns.

|                        | 2009 | 2013 | Year<br>2014 | 2015 | Mean |
|------------------------|------|------|--------------|------|------|
|                        | %    | %    | %            |      |      |
| <b>Income quintile</b> |      |      |              |      |      |
| 1                      | 67.4 | 75.4 | 75.4         | 72.3 | 72.7 |
| 2                      | 83.3 | 87.1 | 86.3         | 86.6 | 85.9 |
| 3                      | 89.0 | 90.7 | 92.5         | 91.2 | 90.9 |
| 4                      | 93.9 | 94.7 | 95.2         | 94.2 | 94.5 |
| 5                      | 96.9 | 97.5 | 96.9         | 96.5 | 96.9 |
| <b>Education level</b> |      |      |              |      |      |
| Lower sec.             | 80.0 | 84.0 | 83.0         | 81.6 | 82.2 |
| Upper sec.             | 90.6 | 92.2 | 93.4         | 92.3 | 92.2 |
| Third lev.             | 94.5 | 95.9 | 95.3         | 94.4 | 95.0 |
| <b>Household type</b>  |      |      |              |      |      |
| 1 pers. hhd            | 85.9 | 89.0 | 90.0         | 87.3 | 88.1 |
| 2 ads, 0 ch.           | 89.3 | 90.1 | 89.1         | 90.0 | 89.6 |
| sing. par. hhd         | 76.2 | 81.9 | 81.2         | 83.7 | 81.1 |
| 2 ads, 1+ ch.          | 86.9 | 89.9 | 91.1         | 88.7 | 89.1 |
| oth. hhds, ch.         | 85.0 | 90.4 | 89.8         | 88.3 | 88.5 |
| <b>Mean</b>            | 86.6 | 89.6 | 89.7         | 88.5 | 88.6 |

**Source:** EU-SILC survey data, own elaboration.

### 3.8 Domain VIII: Governance and civic engagement

*Why does this domain matter?* Efficacy of political action, the transparency of the decision-making process, the perception that institutions and people working for public institutions are reliable and trustworthy, along with the possibility to express people's political voice and actively contribute to the functioning of the society contribute significantly to quality of life (MacCulloch, 2017). Additionally, civic engagement may also contribute to people's sense of belonging to a community, to build trust in others, and to a feeling of social inclusion. At individual level, political participation and civic engagement contribute to people's sense of control over their lives and to personal effectiveness (Krause and Shaw, 2000; Newton et al., 2011).

*Why do these indicators matter?* Voter turnout, and membership in political and civic associations are direct measures of political and civic engagement. However, as voting is mandatory in Luxembourg, we do not expect significant information on citizens' participation to political life. On the other hand, people's participation in political and civic organisations provide valuable information on people's actual involvement in civic society. Political and civic participation are proxies of people's sense of belonging to a community, but they also reflect people's ability and willingness to contribute to the common good. Hence, they also provide information on social cohesion, and on the existence of informal social safety nets. The more is people's participation in political and civic associations, the more the social fabric of a community is robust to shocks. To actively participate to the political and social life of a country, it is pivotal to know the main languages used in it. This is why we included an indicator on the knowledge of languages used in Luxembourg. The existence of formal practices for consultation on rule-making provides a wide view on the quality of governance and its distance from the citizens. This indicator informs about the availability of open and transparent consultation procedures to inform policy-making. This is important, on one side, for the accountability of the political action and, on the other, for the involvement of the civil society in the decision-making process. The indicator on confidence in political institutions is a measure of the quality of political action as subjectively perceived by the residents. Several studies document that confidence in institutions affects a variety of economic and social phenomena, such as people's willingness to pay taxes, or their willingness to start a new company. Moreover, the reliability of a government and of its actions are important pre-conditions to attract international investments, and to create a favourable environment for growth. A decrease in the degree of people's confidence in political institutions raises concerns for the correct functioning of a democratic system. Finally, the indicator on the feeling of discrimination reflects the political and social involvement of particular groups of people, based on their different demographic characteristics. It goes without saying that the lower the discrimination the more the social cohesion and the feeling of social solidarity in a country. Moreover, social integration positively affects well-being, it reduces the reasons for violence, and it increases everybody's chances to participate in the labour market, with positive spillovers for the economy.

Table 3.47 summarises the results from the six indicators that compose the domain on governance and civic engagement. Wherever possible, it compares Luxembourg's scores over time and across countries.

**Table 3.47:** Domain 8, governance and civic engagement.

| N      | Indicators                                                                   | Description                                                                                                                                                                                                                                                                                 | Cross country | Change |
|--------|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|
| 46     | Voter turnout                                                                | The voter turnout is 91% on average.                                                                                                                                                                                                                                                        | NA***         | ↔      |
| 47     | Consultation on rule making                                                  | The score about consultation on rule-making is 6. This value is meaningful if compared to that of other countries. In OECD countries, this score ranges from a maximum of 11.5 to a minimum of 2. Luxembourg score is close to the average of Western European countries.                   | ● 2015        | ↔      |
| 48     | Membership in political and civic associations                               | 53% of Luxembourg residents belong to political and/or civic associations.                                                                                                                                                                                                                  | ● 2008        | NA'    |
| 49     | Knowledge of languages                                                       | On average, Luxembourg residents speak two languages, independently from their citizenship; most Luxembourg citizens speak Luxembourgian, while the most frequently spoken language among immigrants is French.                                                                             | NA*           | NA'    |
| 50     | Confidence in institutions                                                   | This indicator declined over time: in 2009, about 75% of the residents declared to have confidence in Luxembourg institutions, while in 2015 this percentage amounted to 62%.                                                                                                               | ● 2015        | ↘      |
| 51     | Feeling of discrimination                                                    | Most types of perceived discriminatory treatments decreased over time, but there are two important exceptions. The percentage of people perceiving nepotism increased by 6% from 2009 to 2014, while the percentage of people perceiving sexual orientation discrimination increased by 2%. | NA*           | ↔      |
| Legend |                                                                              |                                                                                                                                                                                                                                                                                             |               |        |
| ●      | Luxembourg score is in the top 25% among Western European countries.         |                                                                                                                                                                                                                                                                                             |               |        |
| ●      | Luxembourg score is in line with the Western Europe average.                 |                                                                                                                                                                                                                                                                                             |               |        |
| ●      | Luxembourg score belongs to the bottom 25% among Western European countries. |                                                                                                                                                                                                                                                                                             |               |        |
| ↗      | Indicates an increase over time.                                             |                                                                                                                                                                                                                                                                                             |               |        |
| ↔      | Indicates that the indicator did not change.                                 |                                                                                                                                                                                                                                                                                             |               |        |
| ↘      | Indicates a decrease over time.                                              |                                                                                                                                                                                                                                                                                             |               |        |
| NA'    | Time series is not available.                                                |                                                                                                                                                                                                                                                                                             |               |        |
| NA*    | Data sourced from data producer, and thus not internationally comparable.    |                                                                                                                                                                                                                                                                                             |               |        |
| NA**   | Data sourced from administrative records.                                    |                                                                                                                                                                                                                                                                                             |               |        |
| NA***  | Voting is mandatory in Luxembourg, thus voter turnout is not comparable.     |                                                                                                                                                                                                                                                                                             |               |        |

**3.8.1 (46.-47.) Voter turnout and Consultation on rule-making**

In this subsection we present figures about two indicators:

**46 *Voter turnout***

This indicator measures the percentage of people having right to vote and who actually voted. The source of these data is the “Institute for Democracy and Electoral Assistance (Institute for Democracy and Electoral Assistance (IDEA))”, which is the same source used by Eurostat to compile this statistics.<sup>72</sup> Here we consider only voter turnout for national elections, in 2009 and 2013, while neglecting the turnout for the last two EU elections that took place in 2009 and 2014. This is due to comparative reasons: if we included information on both type of elections (i.e. national and EU), the voter turnout for 2009 would be an average of the turnout for national and EU elections, while the turnout for 2013 would refer only to national elections and turnout for 2014 would refer only to EU ones. This indicator is available shortly after each election. On average voter turnout in Luxembourg is 91%. Unfortunately, this figure cannot be compared across countries because voting is mandatory in Luxembourg.

**47 *Consultation on rule-making***

This indicator is obtained from the OECD.<sup>73</sup> As explained in the “Better Life Index (Better Life Index (BLI))” website, this “indicator is a weighted average of yes/no answers to various questions on the existence of law consultation by citizens, of formal procedures enabling general public to impact regulation and governmental actions. The indicator describes the extent to which formal consultation processes are built in at key stages of the design of regulatory proposals, and what mechanisms exist for the outcome of that consultation to influence the preparation of draft primary laws and subordinate regulations. This indicator has been computed based on responses to the OECD’s survey of regulatory management systems, where respondents were government officials in OECD countries. The indicator is based on questions about the existence of formal procedures enabling general public, business and civil society organisations to impact regulation and governmental actions, and on whether citizens’ views on such consultation procedures are made public.”<sup>74</sup>

The indicator was introduced in 2013 and it has been updated every year. However, the time-series ends in 2016 when the indicator about consultation on rule-making has been replaced by the indicator “Stakeholder engagement for developing regulations”.<sup>75</sup> Future updates of this report will have to keep this aspect into account. The score about consultation on rule-making in Luxembourg is 6 in all the three waves. As this indicator is sourced from the average answers to a battery of questions on the existence of specific procedures, its interpretation can be better evaluated in comparison to other Western European countries. The index in Europe varies between a minimum of 2 and a maximum of 11.5. Luxembourg’s score is close to the average of other countries.

<sup>72</sup><http://www.idea.int/data-tools/country-view/176/40>

<sup>73</sup><http://stats.oecd.org/Index.aspx?DataSetCode=BLI>

<sup>74</sup>[http://stats.oecd.org/OECDStat\\_Metadata/ShowMetadata.ashx?Dataset=BLI2015&Lang=en&Coords=\[INDICATOR\].\[CG\\_TRASG\]](http://stats.oecd.org/OECDStat_Metadata/ShowMetadata.ashx?Dataset=BLI2015&Lang=en&Coords=[INDICATOR].[CG_TRASG])

<sup>75</sup>[http://stats.oecd.org/OECDStat\\_Metadata/ShowMetadata.ashx?Dataset=BLI&Lang=en&Coords=\[INDICATOR\].\[CG\\_SENG\]](http://stats.oecd.org/OECDStat_Metadata/ShowMetadata.ashx?Dataset=BLI&Lang=en&Coords=[INDICATOR].[CG_SENG])

Data for these two indicators are publicly available without application. Table 3.48 summarises the available figures for both indicators.

**Table 3.48:** Voter turnout and consultation rule making.

|             | <b>Voter<br/>Turnout<br/>%</b> | <b>Cons. rule<br/>making<br/>%</b> |
|-------------|--------------------------------|------------------------------------|
| <b>Year</b> |                                |                                    |
| 2009        | 90.9                           | -                                  |
| 2010        | -                              | -                                  |
| 2011        | -                              | -                                  |
| 2012        | -                              | -                                  |
| 2013        | 91.2                           | 6.0                                |
| 2014        | -                              | 6.0                                |
| 2015        | -                              | 6.0                                |
| <b>Mean</b> | 91.0                           | 6.0                                |

**Source:** IDEA and OECD reports, own elaboration.

### 3.8.2 (48.) Membership in political and civic associations

We compute the percentage of people declaring to be member of a political and/or a civic association using data from the EVS. At the moment of the analysis, only the 1999 and 2008 waves were available for Luxembourg. Assuming that this indicator did not change significantly between 2008 and 2009, we use the data from the 2008 wave. EVS data are freely available online.

The EVS questionnaire includes a battery of questions concerning people's participation in various groups and associations.<sup>76</sup> We compute the share of respondents participating in political and civic associations using information from the respondents who declared to belong at least to one of the mentioned groups or associations. Table 3.49 reports the results by various breakdown. Differently from other indicators, we computed the share of political and civic participation by income tercile rather than quintile because the EVS does not provide precise information on respondents' income.

Nearly one out of two residents in Luxembourg declared to be member of at least one political or civic association. Among men, 57% of respondents declares to be part of a political or civic associations. Among women this percentage amounts to 48.6%. On average, young and rich residents are more involved than elderly or poorer ones. The breakdown by education shows that nearly 58% of people with upper secondary education is member of a political or civic association. Unfortunately, we do not have time series available for this indicator. Hopefully, the availability of a new wave of the EVS by 2019 will allow us to shed some light on the evolution of this indicator over time. The share of

<sup>76</sup>These are the variables from v10 to v24. We excluded the variables v12 and v20 because they are about participation in groups for cultural activities, sports and recreation associations.

**Table 3.49:** Membership in political and civic associations.

|                        | Mean<br>% |
|------------------------|-----------|
| <b>Gender</b>          |           |
| Male                   | 57.1      |
| Female                 | 48.6      |
| <b>Age category</b>    |           |
| 16-24                  | 60.7      |
| 25-34                  | 54.9      |
| 35-49                  | 51.6      |
| 50-64                  | 55.2      |
| 65-74                  | 47.8      |
| above 75               | 41.7      |
| <b>Education level</b> |           |
| Lower sec.             | 46.0      |
| Upper sec.             | 57.8      |
| Third lev.             | 55.3      |
| <b>Income tercile</b>  |           |
| 1                      | 47.0      |
| 2                      | 55.6      |
| 3                      | 56.4      |
| <b>Mean</b>            | 52.8      |

**Source:** EVS data, own elaboration.

members of political and civic associations in Luxembourg is comparable with the average share of Western European countries.

### 3.8.3 (49.) Knowledge of Languages

Luxembourg is a multicultural country with many traditions and where people speak many languages. The ability to communicate effectively is an important mean for social integration and to actively participate in the social life of the country. The indicator on knowledge of language seeks to provide a snapshot of the languages spoken in Luxembourg. It provides the average number of languages spoken in Luxembourg by citizenship (i.e. Luxembourgian, Belgian, British, Dutch, French, German, Italian, Montenegrin, Portuguese, or Spanish), as well as the share of people speaking other languages by citizenship (i.e. Luxembourgian, German, French, Portuguese, Italian, English, and other languages).

This statistics is produced by STATEC and the table is equivalent to the one published in the STATEC technical report from 2013. Data are sourced from the 2011 census.<sup>77</sup>

Table 3.50 shows the share of people knowing various languages and the disaggregation by citizenship. For instance, 96% of Luxembourgers declare to know Luxembourgian, 47% knows French, and 35% knows German. Among immigrants, the majority speaks French (69%), 41% speaks Portuguese, and 32% Luxembourgian. Nearly one out of five foreigners speaks English or German. If we consider the knowledge of language by nationality, we learn that nearly one out of two Germans, Montenegrins and Dutch residents speak Luxembourgian, followed by Italians (38%), Portuguese (35%), Belgian (30%), French (25%), Spanish (22%), and British (18%).

**Table 3.50:** Knowledge of different languages.

|                    | Language  |            |             |              |            |            |            | Mean<br>N |
|--------------------|-----------|------------|-------------|--------------|------------|------------|------------|-----------|
|                    | Lux.<br>% | Germ.<br>% | French<br>% | Portug.<br>% | Ital.<br>% | Engl.<br>% | Other<br>% |           |
| <b>Citizenship</b> |           |            |             |              |            |            |            |           |
| Luxembourgers      | 96        | 35         | 47          | 6            | 4          | 18         | 6          | 2         |
| Germans            | 50        | 88         | 41          | 2            | 2          | 36         | 10         | 2         |
| Belgians           | 30        | 21         | 92          | 2            | 3          | 33         | 20         | 2         |
| British            | 18        | 20         | 50          | 1            | 4          | 98         | 10         | 2         |
| Spanish            | 22        | 17         | 77          | 11           | 10         | 44         | 84         | 3         |
| French             | 25        | 18         | 98          | 3            | 5          | 33         | 8          | 2         |
| Italian            | 38        | 19         | 73          | 6            | 84         | 25         | 6          | 3         |
| Montenegrin        | 49        | 36         | 50          | 2            | 1          | 6          | 87         | 2         |
| Dutch              | 51        | 49         | 47          | 3            | 3          | 48         | 78         | 3         |
| Portuguese         | 35        | 17         | 68          | 97           | 2          | 8          | 3          | 2         |
| Others             | 24        | 25         | 54          | 8            | 3          | 44         | 68         | 2         |
| Foreigners         | 32        | 24         | 69          | 41           | 10         | 26         | 22         | 2         |

**Source:** STATEC census data, own elaboration.

<sup>77</sup>See <http://www.statistiques.public.lu/fr/publications/series/rp2011/2013/13-13-langues/index.html> Fehlen et al. (2013).

### 3.8.4 (50.) Confidence in Institutions

Figures on confidence in institutions are computed using Eurobarometer data. This dataset is available yearly, and it is freely accessible online from the “German Social Science Infrastructure Services (German Social Science Infrastructure Services (GESIS)).”<sup>78</sup>

The indicator is based on the average score of two dichotomous indicators: i) confidence in the government, and ii) confidence in the Parliament. Both indicators take value 1 if the respondent “tends to trust” these institutions; 0 otherwise. Hence, this indicator is based on the average shares of people declaring to trust the government and the parliament in Luxembourg. Table 3.51 displays the aggregate results, their distribution by various breakdowns, and the average score by row and column.

**Table 3.51:** Confidence in institutions (average trust in government and in parliament), by different breakdowns.

|                           | Year  |       |       |       |       |       |       | Mean  |
|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
|                           | 2009  | 2010  | 2011  | 2012  | 2013  | 2014  | 2015  |       |
|                           | %     | %     | %     | %     | %     | %     | %     | %     |
| <b>Age category</b>       |       |       |       |       |       |       |       |       |
| below 16                  | 82.61 | 37.50 | 85.71 | 68.75 | 87.50 | 66.67 | 82.35 | 77.22 |
| 16-24                     | 72.59 | 64.29 | 71.63 | 70.76 | 52.63 | 56.69 | 62.73 | 65.95 |
| 25-34                     | 72.09 | 66.56 | 63.04 | 61.21 | 60.36 | 58.93 | 57.14 | 63.50 |
| 35-49                     | 70.36 | 67.62 | 73.97 | 57.14 | 56.51 | 51.28 | 66.41 | 64.20 |
| 50-64                     | 76.49 | 64.74 | 70.56 | 58.63 | 54.62 | 54.05 | 57.87 | 63.66 |
| 65-74                     | 83.46 | 73.15 | 75.16 | 65.71 | 54.82 | 61.84 | 63.19 | 69.83 |
| above 75                  | 84.36 | 80.15 | 86.26 | 68.09 | 62.86 | 59.35 | 63.41 | 72.66 |
| <b>Occupation</b>         |       |       |       |       |       |       |       |       |
| Self-employed             | 73.21 | 60.34 | 73.33 | 62.93 | 56.82 | 59.57 | 66.67 | 65.30 |
| Manager                   | 78.07 | 75.91 | 78.39 | 62.20 | 58.65 | 64.56 | 73.77 | 69.31 |
| Other white collar        | 75.34 | 60.54 | 63.13 | 55.68 | 53.44 | 46.04 | 68.28 | 60.42 |
| Manual worker             | 72.33 | 66.61 | 73.62 | 56.81 | 59.56 | 46.75 | 55.06 | 62.67 |
| House person              | 76.31 | 69.16 | 73.44 | 60.22 | 65.91 | 50.00 | 51.11 | 66.59 |
| Unemployed                | 53.47 | 59.84 | 76.47 | 54.67 | 53.57 | 75.00 | 50.89 | 59.70 |
| Retired                   | 78.93 | 73.00 | 72.97 | 63.29 | 57.32 | 58.99 | 60.84 | 68.12 |
| Student                   | 74.76 | 60.92 | 77.13 | 75.94 | 56.00 | 58.68 | 68.75 | 69.57 |
| <b>ILO working status</b> |       |       |       |       |       |       |       |       |
| Employed                  | 74.58 | 66.62 | 71.29 | 58.57 | 56.40 | 52.94 | 64.43 | 64.04 |
| Unemployed                | 53.47 | 59.84 | 76.47 | 54.67 | 53.57 | 75.00 | 50.89 | 59.70 |
| Inactive                  | 77.46 | 70.60 | 73.73 | 65.07 | 58.24 | 57.64 | 60.64 | 68.07 |
| <b>Gender</b>             |       |       |       |       |       |       |       |       |
| Man                       | 76.63 | 69.59 | 71.87 | 60.03 | 54.11 | 57.04 | 65.66 | 66.36 |
| Woman                     | 74.18 | 66.91 | 73.22 | 62.71 | 58.90 | 54.52 | 59.21 | 65.05 |
| <b>Mean</b>               | 75.31 | 68.18 | 72.53 | 61.41 | 56.73 | 55.74 | 62.06 | 65.67 |

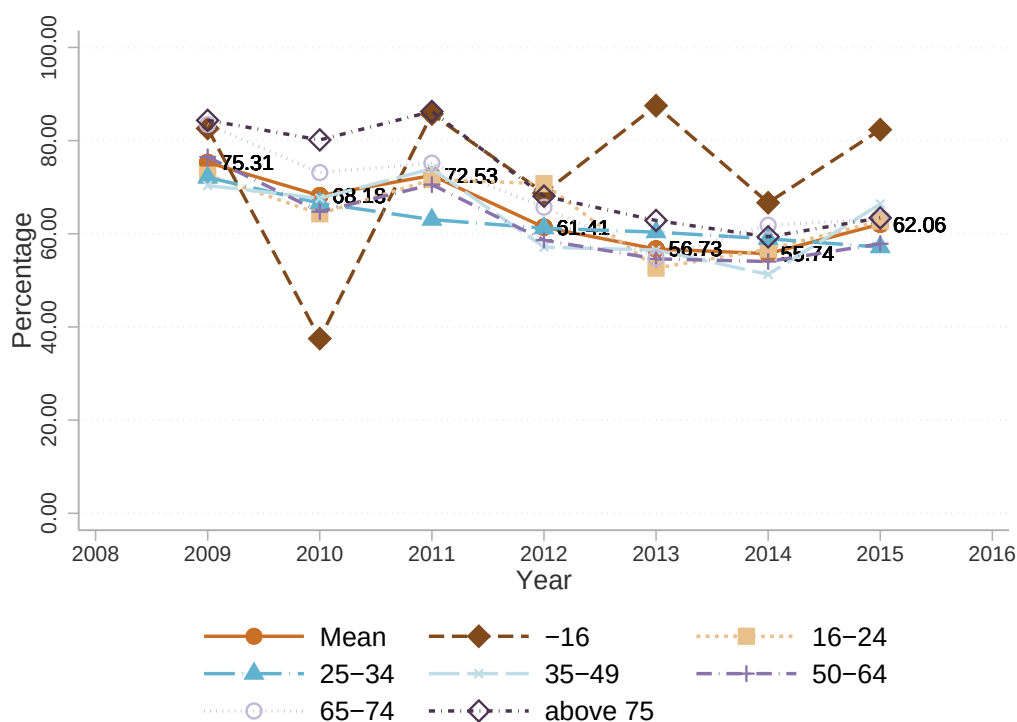
**Source:** Eurobarometer survey data, own elaboration.

<sup>78</sup><http://www.gesis.org/eurobarometer-data-service/search-data-access/data-access>

The share of people declaring to have confidence in Luxembourgian institutions declined over time, from about 75% in 2009 to 62% in 2015. Figures 3.66 to 3.69 show the changes of average confidence in institutions over time by age, occupation, working status, and gender.

The strongest loss of confidence took place among people aged 65 years or more. In 2009 nearly 83% of respondents in this age group declared to trust the institutions in Luxembourg. This share amounted to about 63% in 2015, i.e. a loss of nearly 20 percentage points. Figure 3.66 suggests the existence of a U-shaped relationship between age and confidence, with the youngest and oldest people generally being more confident in institutions, on average.

On average 60% of unemployed people declare to have confidence in institutions, whereas the share among employed people is 64%. Interestingly, while the confidence among unemployed people declined by 3 percentage points between 2009 and 2015, it is among the employed ones that it declined the most: in 2009 74.6% of employed people had confidence in Luxembourgian institutions. In 2015 this share was 64.5% (see also figure 3.67). This decline, however, holds for virtually every breakdown we considered: age, occupation, working status, and gender. For instance, figure 3.68 shows the changes of confidence in institutions by working status. Figure suggests that, on average, managers, students and retired people tend to declare higher confidence in institutions than others. Finally, available figures suggest a slight difference in confidence between men and women. Figure 3.69 informs that between 2009 and 2015 men's confidence in institutions declined by nearly 10 percentage points (from 76.6% to 65.6%); women's confidence declined by nearly 16 percentage points, from 74.2% to 59.2%. Despite this decline, compared to other countries, Luxembourg ranks above the European average. In other words, although confidence in Luxembourgian institutions declines, other European countries face a deeper political crisis than Luxembourg.

**Figure 3.66:** Confidence in institutions by age.

Source: Eurobarometer survey data, own elaboration.

### 3.8.5 (51.) Feeling of discrimination

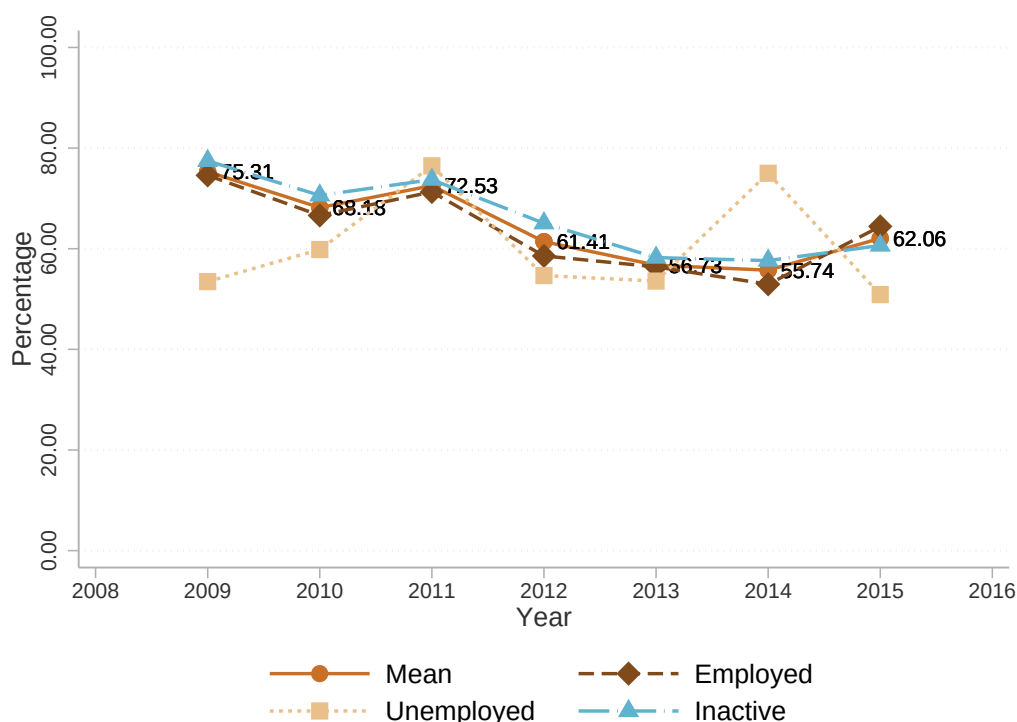
This indicator is based on data collected by the Taylor Nelson Sofres - Institut Luxembourgeois de Sondages et d'Études d'Opinion (TNS Ilres)<sup>79</sup> for the "Centre pour l'égalité de traitement (CET)" in Luxembourg.<sup>80</sup> Between 2009 and 2015, TNS Ilres produced three surveys on the issue of discrimination in Luxembourg. Surveys were administered in 2009, 2011, and 2014. The questionnaires asked people, among other issues, about their perceived discrimination in various domains. In particular, the surveys allowed to check the perceived existence of discrimination based on nationality, race and ethnicity, as well as on gender, social status, language, religion, disability, etc. Moreover, the surveys investigate nepotism. The data can be obtained directly from the Centre pour l'égalité de traitement (CET) website. Table 3.52 provides a detailed list of forms of discrimination along with the share of respondents who declared that a given kind of discrimination existed.<sup>81</sup> Unfortunately, surveys on discrimination are not conducted on a regular basis in Luxembourg. Hence, it is difficult to establish whether this indicator can be updated in the future.

The indicator shows an improvement of nearly five percentage points between 2009 and 2015. Feeling of discrimination, as measured by a large battery of forms of discriminations (age, gender, religious, ethnic, etc.), reduced substantially over time. For instance, the

<sup>79</sup><https://www.tns-ilres.com/>

<sup>80</sup><http://cet.lu/fr/>

<sup>81</sup><http://cet.lu/wp-content/uploads/2015/07/TNS-ILRES-version-impression.pdf>

**Figure 3.67:** Confidence in institutions by occupation.

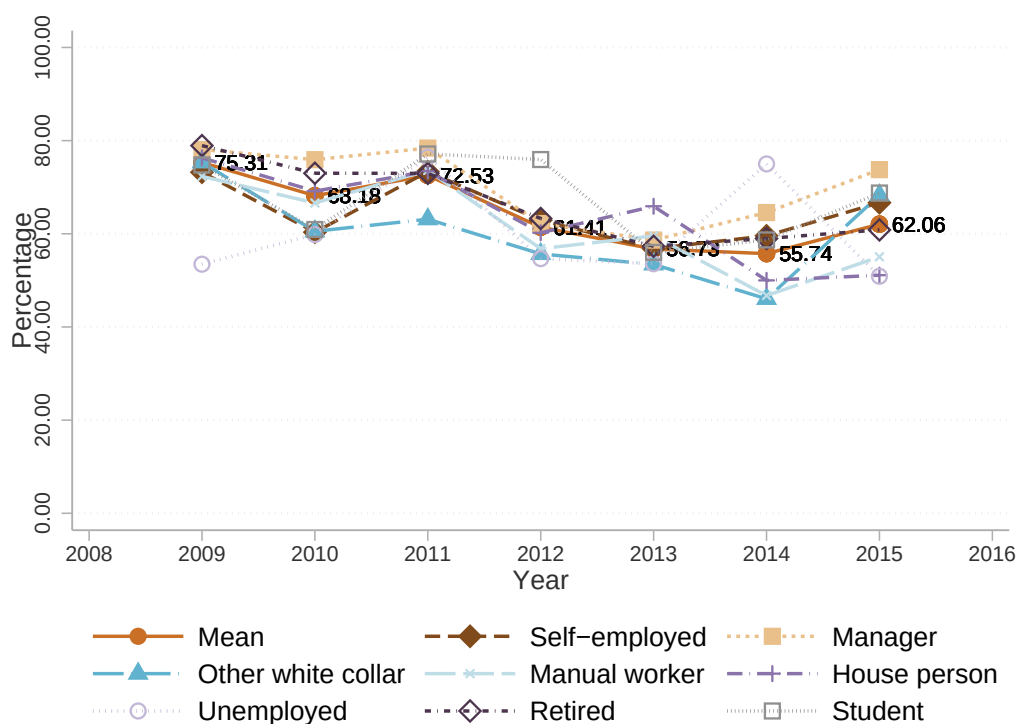
**Source:** Eurobarometer survey data, own elaboration.

**Table 3.52:** Percentage of respondents perceiving various kind of discrimination.

|                        | Years |      |      |
|------------------------|-------|------|------|
|                        | 2009  | 2011 | 2014 |
| Nationality (%)        | 32.0  | 25.0 | 24.0 |
| Race/Ethnicity (%)     | 38.0  | 37.0 | 20.0 |
| Sex (%)                | 28.0  | 24.0 | 15.0 |
| Social status (%)      | 16.0  | 12.0 | 10.0 |
| Nepotism (%)           | 4.0   | 9.0  | 10.0 |
| Type of language (%)   | 12.0  | 5.0  | 8.0  |
| Religious (%)          | 8.0   | 10.0 | 7.0  |
| Disability (%)         | 7.0   | 9.0  | 6.0  |
| Appearance (%)         | 10.0  | 11.0 | 6.0  |
| Sexual orientation (%) | 3.0   | 4.0  | 5.0  |
| Age (%)                | 6.0   | 5.0  | 4.0  |

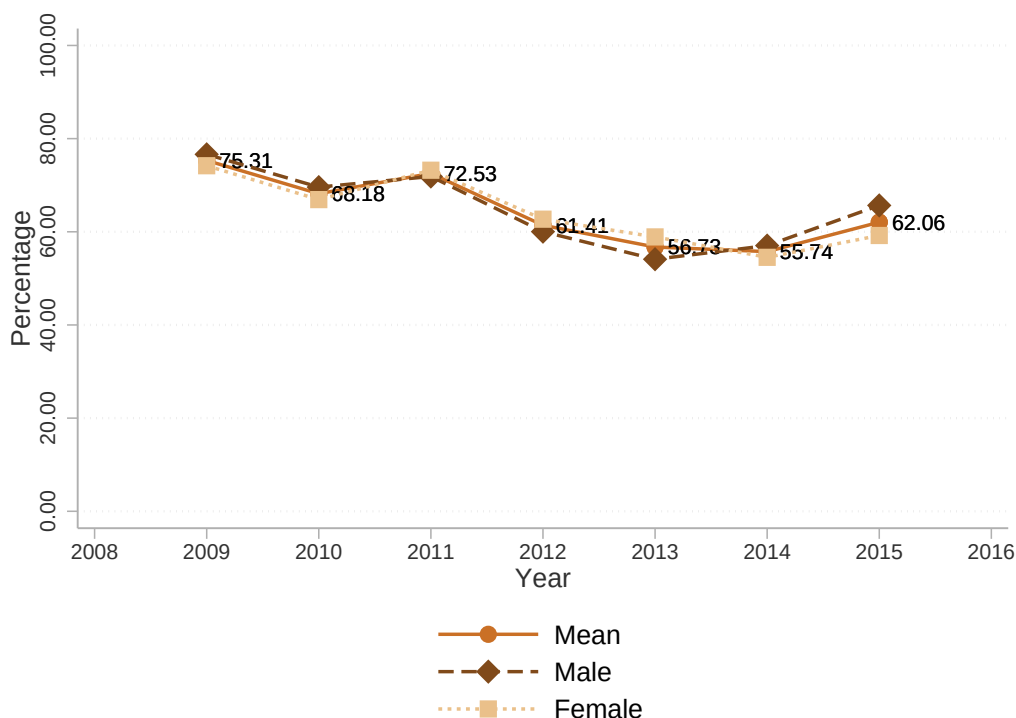
**Source:** CET report, own elaboration.

perception of race or ethnic related discrimination decreased from 38% in 2009 to 20% in 2015; the perception of sexual discrimination went from 28% to 15% in the same period. Only two of the eleven considered forms of discrimination signal an increase over time: the share of people perceiving discrimination due to nepotism increased by 6% between

**Figure 3.68:** Confidence in institutions by working status.

**Source:** Eurobarometer survey data, own elaboration.

2009 (4%) and 2014 (10%); the share of people perceiving discrimination related to sexual orientation increased by 2%, reaching 5% in 2014.

**Figure 3.69:** Confidence in institutions by gender.

**Source:** Eurobarometer survey data, own elaboration.

### 3.9 Domain IX: Environment

This domain is composed by nine indicators. The indicators are measures of water, air, and noise pollution, car and land use, environmental disease burden, and also capture sustainability actions.

Table 3.53 overviews the indicators, gives international comparisons and describes their time series evolution. One can see that Luxembourg performs poorly compared to other Western countries in three out of seven indicators. Overall, data show that the quality of the environment worsened over the period, with a dramatic sharp decline in water quality and a worsening of air quality. In contrast, the use of renewables and rates of recycling rates have improved.

*Why does this domain matter?* Opinion polls, communication media, and interest groups' actions show that European Union's residents strongly support environmental protection policies. This support relates to the general perceptions that environmental conditions greatly affect people's well-being. There is increasing evidence that poor environmental conditions (e.g. noise, presence of pollutants and hazardous substances in water and air) are directly linked to worsening health outcomes. Conversely, exposure to natural beauty and availability of green spaces are linked to higher well-being and improved health. Sustainability has also become a prominent concept in policy making. Ultimately, environmental degradation and resources' depletion can harm economic growth

**Table 3.53:** Domain 9, environment.

| N      | Indicators                                                                   | Description                                                                                     | Cross country | Change |
|--------|------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|---------------|--------|
| 52     | Air pollution                                                                | The percentage of urban population exposed to air pollution has increased by 7% since 2009.     | ● 2014        | ↗      |
| 53     | Water pollution                                                              | The percentage of bodies in very good to moderate conditions has drastically reduced to 2%.     | NA*           | ↘      |
| 54     | Noise                                                                        | The percentage of population affected by noise is about 20% at the end of the period.           | ● 2015        | ↔      |
| 55     | Recycling rate                                                               | The percentage of the municipal total waste that is recycled increased by 2% since 2009.        | ● 2015        | ↗      |
| 56     | Use of renewable energies                                                    | The share of renewable energy out of gross final energy consumption increased by 2% since 2009. | ● 2015        | ↗      |
| 57     | Car use                                                                      | The share of passengers travelling by car has remained constant and is about 83-4%.             | ● 2014        | ↔      |
| 58     | Land use                                                                     | Land use has remained constant at about 86-7%                                                   | NA*           | ↔      |
| 59     | Organic farming                                                              | Organic farming has slightly increased between 2009 and 2015.                                   | ● 2015        | ↗      |
| 60     | Environmental disease burden                                                 | In 2012 the share of deaths due to environmental conditions amounted to 11%.                    | ● 2012        | NA'    |
| Legend |                                                                              |                                                                                                 |               |        |
| ●      | Luxembourg score is in the top 25% among Western European countries.         |                                                                                                 |               |        |
| ●      | Luxembourg score is in line with the Western Europe average.                 |                                                                                                 |               |        |
| ●      | Luxembourg score belongs to the bottom 25% among Western European countries. |                                                                                                 |               |        |
| ↗      | Indicates an increase over time.                                             |                                                                                                 |               |        |
| ↔      | Indicates that the indicator did not change.                                 |                                                                                                 |               |        |
| ↘      | Indicates a decrease over time.                                              |                                                                                                 |               |        |
| NA'    | Time series is not available.                                                |                                                                                                 |               |        |
| NA*    | Data sourced from data producer, and thus not internationally comparable.    |                                                                                                 |               |        |
| NA**   | Data sourced from administrative records.                                    |                                                                                                 |               |        |

and development.

*Why do these indicators matter?* Environmental quality is widely regarded as a determinant of well-being, health, and also of economic outcomes. The concept has many dimensions. Air, water, and noise pollution are widely used indicators of environmental degradation; moreover, direct evidence links these indicators to health outcomes. The environmental disease burden is a direct measure of how environmental degradation affects people's health. Recycling rates and use of renewable energy measure countries' sustainability efforts, and are part of the EU circular economy monitoring framework. The use of motor vehicles, linked to air pollution, is relevant to Luxembourg in light of the country's socio-economic and labour market characteristics, characterized by a large number of daily commuters. The use of land can be thought as a proxy for the availability of green spaces, which impacts people well-being, and also affects pollution levels. Organic farming mitigates water pollution and contributes to the overall environmental quality.

### 3.9.1 (52.-60.) Environmental indicators

This section presents the various indicators in greater detail.

#### 52 Air pollution

This indicator gives the percentage of the urban population exposed to air pollution. The latter is measured by the concentration of PM10, i.e. atmospheric particles with a diameter between 2.6 and 10 micrometers. This indicator is available at yearly frequency, and the last available observation is for the year 2014. Data are sourced from the European Environment Agency (European Environment Agency (EEA)) and released by Eurostat.<sup>82</sup> One observes a worsening of air quality over the period 2009-2014.

#### 53 Water pollution

This indicator gives the percentage of water bodies in very good, good or moderate conditions, according to their hydromorphological characteristics. The hydromorphological status accounts for both the ecological and chemical conditions of the waters. Data are collected by STATEC from the "*Administration de la Gestion de l'Eau*" and are available on STATEC'S website.<sup>83</sup> Available data, which refer to the years 2009 and 2015, indicates a dramatic fall in water quality, from 83% to only 2% of water bodies that have at least moderate quality.

#### 54 Noise

This indicator gives the proportion of the population who declares to be affected by noise, either produced by neighbours or coming from outside the dwelling. It is released by Eurostat and available for the entire period from 2009 to 2015. The percentage of population affected by noise was about 20% at the beginning of the period. After an improvement recorded in 2010 and 2011, the indicator worsens again and increases to 20% in 2015.<sup>84</sup>

<sup>82</sup>Data have been retrieved from Eurostat's online database: <http://ec.europa.eu/eurostat/en/web/products-datasets/-/TSDPH370>.

<sup>83</sup>Data have been retrieved from [http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=12714&IF\\_Language=eng&MainTheme=1&FldrName=3&RFPPath=66](http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=12714&IF_Language=eng&MainTheme=1&FldrName=3&RFPPath=66). Further methodological information can be found at <http://www.statistiques.public.lu/en/methodology/definitions/H/hydromorphologie/index.html>.

<sup>84</sup><http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&plugin=1&language=>

**55 Recycling rate**

This indicator provides the percentage of the municipal total waste (in kilograms per head) which is recycled in different forms. It is available at yearly frequency, and was obtained from Eurostat's measures of recycling and waste from the European waste management statistics.<sup>85</sup>

**56 Use of renewable energies**

This indicator provides the share of renewable energy on gross final energy consumption. It is sourced from Eurostat and available at yearly frequency.<sup>86</sup>

**57 Car use**

Car use measures the share of passengers per kilometer (passengers per kilometer (pkm)) travelling by car, out of the total amount of passengers travelling by different means of transports - i.e. cars, buses and coaches, and trains. This is regardless of the nationality of the vehicle. The data, available at yearly frequency for the period 2009-2014, are compiled by Eurostat. (They are collected through the Eurostat/ITF/UNECE Common Questionnaire on Transport Statistics, which is administered on a voluntary basis.)<sup>87</sup> This indicator remained stable over the period.

**58 Land use**

This indicator gives the percentage of land on the total that is neither a built-up area nor an area covered with roads or railways; thus, this land is either an agricultural/wooded area or a watercourse/sheet of water. The indicator is based on data sourced from the *Administration du Cadastre et de la Topographie* (Administration du Cadastre et de la Topographie (ACT)), covers the entire period under study, and is updated each year. Data can be retrieved from the statistical portal of Luxembourg.<sup>88</sup> One can see that land use has remained stable over the period.

**59 Organic farming**

This indicator is defined as the share of total Utilised Agricultural Area (Utilised Agricultural Area (UAA)) devoted to organic farming (existing organically-farmed areas and areas in process of conversion). One observes a slight increase over the period. Luxembourg, however, has a low percentage of organic farming compared to other European countries. Data are based on the Eurostat publication *Agriculture, forestry and fishery statistics*.<sup>89</sup>

**60 Environmental disease burden**

This indicator provides the percentage of deaths that can be attributed to environ-

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en&pcode=tsdph390

<sup>85</sup><http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tsdpc240&plugin=1>; see data on both "Material Recycling," which is divided by "Waste generated" for any given year.

<sup>86</sup>[http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=t2020\\_31&plugin=1](http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=t2020_31&plugin=1).

<sup>87</sup>The data have been retrieved from the following url:<http://ec.europa.eu/eurostat/tgm/refreshTableAction.do;jsessionid=Q77oSAe02mfQFGbG9mRML-hZW-3Q9z9zfU1fu4gln8IK8H1MVC4F!-1231101743?tab=table&plugin=1&pcode=tsdtr210&language=en>. To observe the data at this link, one should click on "vehicle" and choose "Passenger cars."

<sup>88</sup>[http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=12695&IF\\_Language=eng&MainTheme=1&FldrName=1](http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=12695&IF_Language=eng&MainTheme=1&FldrName=1)

<sup>89</sup>See <http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tsdpc440&plugin=1>.

mental conditions, and in turn, could be avoided by improving such conditions. This indicator is constructed from WHO data, and is only available for the year 2012.<sup>90</sup> When compared to all surveyed countries, Luxembourg has one of the lowest environmental disease burden. Its datum is in line with European averages.

**Table 3.54:** Air pollution, Water pollution, Noise, Recycling rate, Renewable energies, Car use, Land usage, Organic farming, Environmental disease burden.

|             | <b>Air.<br/>poll.</b> | <b>Noise</b> | <b>Rec.<br/>rate</b> | <b>Renew.<br/>ener.</b> | <b>Car<br/>use</b> | <b>Land<br/>use</b> | <b>Org.<br/>farm</b> | <b>Wat.<br/>poll.</b> | <b>Env.<br/>dis.<br/>burd.</b> |
|-------------|-----------------------|--------------|----------------------|-------------------------|--------------------|---------------------|----------------------|-----------------------|--------------------------------|
|             | %                     | %            | %                    | %                       | %                  | %                   | %                    | %                     | %                              |
| <b>Year</b> |                       |              |                      |                         |                    |                     |                      |                       |                                |
| 2009        | 14.20                 | 21.20        | 26.36                | 2.90                    | 84.30              | 86.50               | 2.70                 | 83.00                 | -                              |
| 2010        | 17.00                 | 16.70        | 26.95                | 2.90                    | 83.50              | 86.30               | 2.80                 | -                     | -                              |
| 2011        | 18.20                 | 14.60        | 28.23                | 2.90                    | 83.10              | 86.10               | 2.80                 | -                     | -                              |
| 2012        | 17.80                 | 17.00        | 27.91                | 3.10                    | 83.00              | 86.10               | 3.14                 | -                     | 11                             |
| 2013        | 20.80                 | 18.50        | 28.25                | 3.50                    | 82.90              | 86.00               | 3.39                 | -                     | -                              |
| 2014        | 20.70                 | 19.10        | 28.43                | 4.50                    | 83.60              | 85.90               | 3.43                 | -                     | -                              |
| 2015        | -                     | 20.10        | 28.48                | 5.00                    | -                  | 85.90               | 3.21                 | 2.00                  | -                              |

**Source:** EEA census data, Administration de la Gestion de l'Eau census data, Eurostat database, Administration du Cadastre et de la Topographie census, WHO database, own elaboration.

Although most of the environmentally related indicators are quite stable over the considered five years, we observe a deterioration of both air and water quality, with an increase in their pollution. The environmental disease burden, that is, the percentage of deaths that are attributable to the conditions of the environment and could be avoided by improving such conditions, does not provide much information by itself.

<sup>90</sup>Death attributable to the environment are available at the following url.: <http://apps.who.int/gho/data/node.main.162?lang=en>.

### 3.10 Domain X: Personal security

This domain focuses on a dimension of personal security, namely personal safety, which concerns both people's vulnerability to threats and their feeling of safety. Thus, personal security is monitored by an objective indicator (i.e., offence rate) and a subjective indicator (i.e., feeling of safety when walking alone at night).

Table 3.55 shows that the crime rate has increased over the period 2009-2015. This figure, however, cannot be compared to records from other countries. Moreover, Luxembourg appears in the bottom quartile of the feeling of safety distribution among Western European countries.

*Why do this domain and these indicators matter?* Crime and violence have long-term consequences on well-being and mental and physical health of victims and non-victims. In addition, crime negatively affects societies' cohesion, and human and individual freedom. The feeling of safety has a wide impact on quality of life.

#### 3.10.1 (61.) Offence rate

The offence rate indicator has been constructed by combining the information on number of offences with STATEC'S population estimates. Data on the number of offences is sourced from Luxembourg Police's records, and is available at yearly frequency.<sup>91</sup> (Note that the population at the end of year  $t - 1$  is used to compute offence rate in year  $t$ .)

This indicator provides a measure of the change in crime levels over time. One can see that the offence rate has increased substantially over the period, although the last year in the sample shows a decrease by 10% compared to the previous year.

Measures of crime are usually available via official police records or victimisation surveys. One should note, however, that such measures are well-known to suffer from the following limitations: 1) data are only a proxy of the real incidence of illegal activities; 2) (certain types of) crimes might be under-reported or over-reported. Resorting to Police records has the advantage that information is more reliable compared to surveys. Data, however, is not comparable across countries. In addition, this indicator does not include information on types of crime.

#### 3.10.2 (62.) Feeling of safety: walking lonely at night

The feeling of safety is measured by the share of adults who feel at least fairly physically safe while walking alone at night, and is sourced from EU-SILC's rotating module on well-being administered in 2013.<sup>92</sup> Figure 3.70 shows the distribution of the indicator by income quintile, occupation, living area (i.e., densely, intermediately, and thinly populated area), and nationality. The graph suggests that people with higher income and those leaving in densely populated area tend to feel safer. Another noticeable figure is that Luxembourg citizens feel less safe on average than citizens from any other country, either within EU or outside it.

<sup>91</sup>Data have been retrieved from the Luxembourg Police's website: <https://police.public.lu/fr/publications/2014/presentation-chiffres-delinquance-2013.html>, for the period 2009-2013, and <https://police.public.lu/fr/publications/2016/presentation-chiffres-delinquance-2015.html>, for the period 2011-2015. For population data one can see [http://www.statistiques.public.lu/stat/TableView/tableView.aspx?ReportId=12856&IF\\_Language=eng&MainTheme=2&FldrName=1](http://www.statistiques.public.lu/stat/TableView/tableView.aspx?ReportId=12856&IF_Language=eng&MainTheme=2&FldrName=1)

<sup>92</sup>The variable code is PW220.

**Table 3.55:** Domain 10, personal security.

| N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Indicators                                | Description                                                                                             | Cross country | Change |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------|--------|
| 61                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Offence rate                              | The number of offence per 100,000 people increased by about 10.5% from 2009 to 2015.                    | NA*           | ↗      |
| 62                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Feeling of safety: walking alone at night | In 2013, 71.4% of adults declared to feel at least fairly physically safe while walking alone at night. | ● 2013        | NA'    |
| <b>Legend</b><br> Luxembourg score is in the top 25% among Western European countries.<br> Luxembourg score is in line with the Western Europe average.<br> Luxembourg score belongs to the bottom 25% among Western European countries.<br> Indicates an increase over time.<br> Indicates that the indicator did not change.<br> Indicates a decrease over time.<br>NA' Time series is not available.<br>NA* Data sourced from data producer, and thus not internationally comparable.<br>NA** Data sourced from administrative records. |                                           |                                                                                                         |               |        |

**Table 3.56:** Offence rate per 100,000 people.

|             | Mean<br>N |
|-------------|-----------|
| <b>Year</b> |           |
| 2009        | 6483      |
| 2010        | 6081      |
| 2011        | 6975      |
| 2012        | 7171      |
| 2013        | 7440      |
| 2014        | 7839      |
| 2015        | 7168      |
| <b>Mean</b> | 6830      |

**Source:** Police register data, own elaboration.

**Figure 3.70:** Share of adults feeling safe when walking alone in their area after dark.

**Source:** EU-SILC survey data, own elaboration.

### 3.11 Domain XI: Subjective well-being

People's subjective well-being is measured by life satisfaction. Table 3.57 shows that, overall, life satisfaction in Luxembourg is comparable to other EU countries, and that trends of life satisfaction are stable over the period 2009-2015.

*Why does Subjective well-being matter?* Subjective well-being is regarded by researchers as a direct measure of people's quality of life. It is an overall measure of how people feel about their lives, reflecting their personal happiness, their health, their family life, their economic situation, the quality and quantity of their network of social relationships etc. This data is relatively easy to collect, widely available, and represents a reliable source of information (Blanchflower and Oswald, 2004). As a result, subjective well-being has been increasingly used in various fields of studies: in economics to analyze the impact of issues such as poverty, inequality, unemployment and inflation on people's welfare (Di Tella and MacCulloch, 2008; Alesina et al., 2004; Diener et al., 2009; Clark et al., 2012, 2013); in sociology and politics to study aging, gender issues, marital and employment status, as well as the quality of political institutions (Frey and Stutzer, 2000; Powdthavee, 2007; Stutzer and Frey, 2012). An extensive literature, involving various disciplines and scientific domains, supports the reliability of this information. Subjective well-being correlates with objective measures of well-being such as the heart rate, blood pressure, frequency of Duchenne smiles and neurological tests of brain activity (Blanchflower and Oswald, 2004; Van Reekum et al., 2007). Moreover, different proxies of subjective well-being correlate strongly with each other (Schwarz and Strack, 1999; Wanous and Hudy, 2001; Schimmack et al., 2010) and with the judgements about the respondent's well-being provided by friends, relatives or clinical experts (Schneider and Schimmack, 2009; Kahneman and Krueger, 2006; Layard, 2005).

#### 3.11.1 (63.) Life satisfaction

Social scientists regard subjective well-being as a latent concept related to at least three different aspects of people's life: happiness, life satisfaction, and personality. Among those, life satisfaction gives an overall assessment of people's lives. We use data on life satisfaction from the Eurobarometer, a survey of the European commission, which is administered at least twice a year. During the survey, respondents are asked to answer the following question: "On the whole are you very satisfied, fairly satisfied, not very satisfied or not at all satisfied with the life you lead?".<sup>93</sup> (EU-SILC is a possible alternative source of information for life satisfaction data; at present, however, the coverage is limited to the year 2013.)

Table 3.58 shows the evolution over time of the share of people that declare to be satisfied with their life. The share is computed based on the number of residents who reported a level of satisfaction with their life higher than the median one. One observes that the figure changes only slightly over time, with a slight decrease in the years 2011-2013 followed by an increase in the last two years in the sample. The time series indicates that life satisfaction fluctuated around the level of 2009 when 42% of the respondents were satisfied with their life. Six years later the share of satisfied people amounted to 41%. Table 3.59 presents the share of people satisfied with their life by occupation, working status, and

<sup>93</sup>The answers to the question on life satisfaction are coded in variable v90r.

**Table 3.57:** Domain 11, subjective well-being.

| N             | Indicators                                                                   | Description                                                                                    | Cross country | Change |
|---------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|---------------|--------|
| 63            | Life satisfaction                                                            | Life satisfaction received an average score of about 3 points out of 4 over the entire period. | ● 2015        | ↔      |
| <b>Legend</b> |                                                                              |                                                                                                |               |        |
| ●             | Luxembourg score is in the top 25% among Western European countries.         |                                                                                                |               |        |
| ●             | Luxembourg score is in line with the Western Europe average.                 |                                                                                                |               |        |
| ●             | Luxembourg score belongs to the bottom 25% among Western European countries. |                                                                                                |               |        |
| ↗             | Indicates an increase over time.                                             |                                                                                                |               |        |
| ↔             | Indicates that the indicator did not change.                                 |                                                                                                |               |        |
| ↘             | Indicates a decrease over time.                                              |                                                                                                |               |        |
| NA'           | Time series is not available.                                                |                                                                                                |               |        |
| NA*           | Data sourced from data producer, and thus not internationally comparable.    |                                                                                                |               |        |
| NA**          | Data sourced from administrative records.                                    |                                                                                                |               |        |

age. Figures confirm some stylised facts about people's well-being: younger residents are on average more satisfied with their life than elderly people; for each year in the LIW we observe a U-shaped relationship between age and well-being; unemployed people are on average dissatisfied with their life: on average only one out of five declared to be satisfied with their life. Moreover, this share sensibly declined over time (from 28% to 13%) thus suggesting that over time unemployed people have reported higher life dissatisfaction

**Table 3.58:** Share of residents highly satisfied with their life from 2009 to 2015.

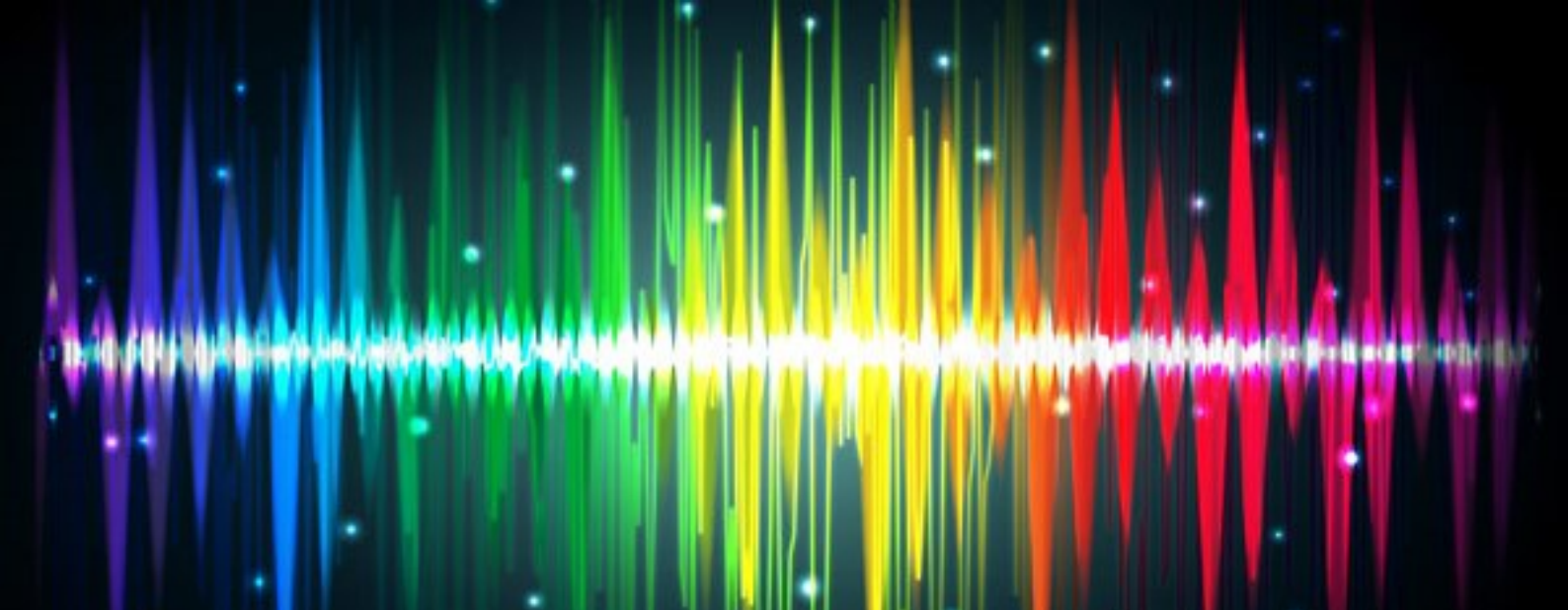
| Year        | percent |
|-------------|---------|
| 2009        | 42.2    |
| 2010        | 43.5    |
| 2011        | 41.8    |
| 2012        | 38.4    |
| 2013        | 38.1    |
| 2014        | 39.9    |
| 2015        | 41.1    |
| <b>Mean</b> | 40.7    |

**Source:** Eurobarometer survey data, own elaboration.

**Table 3.59:** Share of highly satisfied residents, by various breakdowns.

|                           | year |      |      |      |      |      |      |      |
|---------------------------|------|------|------|------|------|------|------|------|
|                           | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Mean |
|                           | %    | %    | %    | %    | %    | %    | %    | %    |
| <b>Age category</b>       |      |      |      |      |      |      |      |      |
| -16                       | 79.4 | 50.0 | 58.8 | 51.7 | 55.0 | 58.6 | 48.1 | 58.8 |
| 16-24                     | 37.3 | 40.6 | 42.6 | 38.3 | 37.4 | 41.6 | 51.7 | 40.8 |
| 25-34                     | 45.0 | 39.1 | 37.5 | 37.5 | 35.2 | 41.8 | 29.2 | 38.6 |
| 35-49                     | 39.7 | 39.0 | 40.2 | 34.9 | 34.1 | 37.3 | 36.3 | 37.5 |
| 50-64                     | 38.9 | 45.2 | 43.2 | 33.7 | 39.5 | 40.5 | 38.5 | 40.0 |
| 65-74                     | 52.3 | 55.9 | 41.1 | 49.6 | 37.6 | 40.2 | 51.0 | 46.2 |
| above 75                  | 48.1 | 47.6 | 52.0 | 51.1 | 50.0 | 40.1 | 52.2 | 47.6 |
| <b>Occupation</b>         |      |      |      |      |      |      |      |      |
| Self-employed             | 54.2 | 46.5 | 40.2 | 41.6 | 48.1 | 44.7 | 44.8 | 45.8 |
| Manager                   | 52.3 | 54.1 | 52.2 | 38.7 | 43.0 | 49.7 | 58.1 | 49.4 |
| Other white collar        | 44.1 | 42.2 | 41.6 | 39.1 | 31.8 | 30.1 | 27.4 | 36.5 |
| Manual worker             | 31.1 | 33.2 | 33.2 | 28.0 | 35.8 | 38.1 | 28.8 | 33.1 |
| House person              | 47.5 | 40.9 | 42.8 | 40.4 | 39.8 | 50.4 | 38.1 | 43.9 |
| Unemployed                | 27.6 | 15.0 | 15.0 | 21.7 | 13.5 | 16.6 | 13.0 | 17.9 |
| Retired                   | 42.5 | 51.4 | 47.5 | 44.8 | 40.6 | 37.9 | 46.8 | 43.9 |
| Student                   | 43.5 | 44.1 | 43.7 | 44.1 | 42.4 | 51.6 | 56.4 | 46.6 |
| <b>ILO working status</b> |      |      |      |      |      |      |      |      |
| Employed                  | 41.4 | 42.0 | 40.0 | 35.3 | 37.6 | 39.6 | 38.0 | 39.3 |
| Unemployed                | 27.6 | 15.0 | 15.0 | 21.7 | 13.5 | 16.6 | 13.0 | 17.9 |
| Inactive                  | 44.0 | 47.7 | 45.9 | 43.9 | 40.7 | 42.4 | 47.2 | 44.4 |
| <b>Mean</b>               | 42.2 | 43.5 | 41.8 | 38.4 | 38.1 | 39.9 | 41.1 | 40.7 |

**Source:** Eurobarometer survey data, own elaboration.



## 4. The report: frequency of updates

This chapter overviews features of the data used to compile quality of life indicators for Luxembourg, focusing on the availability of time series and cross-country observations – as these provide the reference points needed to interpret the information content of the indicators presented in the previous chapter. On this basis, the chapter continues to discuss the timing of future updates of this report.

Table 4.1 gives an overview of the coverage of the data of the PIBien-être database. The table lists the 63 indicators presented in Chapter 3. The table's rows report the following information: the domain the indicator belongs to, the indicator's name, the breakdowns used to analyse the distribution of the indicator across the population, the source of the raw data, the time period for which observations are available. Finally, the last column tells whether the variable has been included in the Luxembourg Index of Well-being (LIW), a composite indicator of quality of life that will be described in the next chapter.

To illustrate how to read the table, the following describes the first two indicators in the report:

1. **GNI.** The first indicator of the domain “Income and wealth” is *Gross National Income (GNI) per capita*. The dash in the second column indicates that the distribution of GNI is not available in the database (this is because information on the distribution of income is provided by alternative indicators). The fourth and fifth column tell, respectively, that raw data are sourced from National Accounts, and that the indicator is available yearly since 2009.<sup>1</sup> Lastly, the sixth column informs that the indicator is included in the LIW.
2. **Total household wealth.** The second indicator in the “Income and wealth” domain is *Total household wealth*. The third column of the table shows that information on

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<sup>1</sup>National Accounts are produced by STATEC, but have been retrieved from the harmonised database published by Eurostat. Clearly the GNI is available for a longer time span, but for the purpose of the PIBien-être report we considered only the observations since 2009.

the distribution of the indicator is available by income groups (quintiles).<sup>2</sup> This indicator is compiled using Household Finance and Consumption Survey (HFCS) data. The survey was administered by the European Central Bank in the years 2010 and 2014. The indicator is included in the LIW.

Table 4.1 shows that the PIBien-être database includes information on the **distribution** of the indicators across the population. In other words, values of the indicators are computed for different sections of the resident population. These sections are identified using criteria such as people's socio-demographic or economic characteristics. These are as follows:

- Socio-demographics: age, gender, nationality, educational level, marital status;
- Economic: income quintiles.

In addition, several indicators are presented as sub-indicators. For example, *accidents at work* (indicator 17) are classified by type of accident, namely non-fatal accidents (17a) and fatal accidents (17b). *Household total consumption* (indicator 5) is given instead by the sum of consumption of marketed and non-marketed goods. This choice is dictated by the fact that the two sub-indicators are compiled using data from different sources. Consumption of non-marketed goods (indicator 5b) has been compiled from the Time Use Survey (TUS), which is available for one year only, and it allows to disaggregate consumption by age, gender, nationality, educational level, marital status and income quintiles. In contrast, data on consumption of marketed good (indicator 5a) comes from the Household Budget Survey (HBS) and are available for the entire period analysed (2009–2015), but the distribution is computed only for income levels.

Table 4.2 complements the information in Table 4.1 by addressing issues of data quality. For each indicator/source of data it gives the frequency of the observations, whether the data is internationally comparable, and whether possible alternative sources exist. The cross-country comparability of the indicators is relevant to the interpretation of the data, and to evaluate the international position of Luxembourg. Data sourced from international institutions, and surveys conducted within the European Statistical framework, usually allow such cross-country comparisons. As an example, Eurostat provides harmonised data which are comparable across EU countries.

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<sup>2</sup>In broad terms, it is possible to compute average household wealth for sub-groups of population defined by income levels. Thus, the average wealth by income quintile provides information on the distribution of wealth across the population.

In summary, Table 4.1 and 4.2 highlight important features of the data used in the PIBien-être project. These features posed several methodological challenges, which are discussed in other chapters of this report, and are linked to the following characteristics of the database. A first feature is the heterogeneity of the data sources. A second characteristic of the PIBien-être project is the presence of both objective and subjective aspects of quality of life. A third important characteristic is the distributional aspect of the information. These features impact the availability of data, and, in particular, the availability of comparative observations — both across-countries and over time. As a result, they influence the ability of researchers and analysts to interpret the information conveyed by the indicators. Note that this report focuses on the time dimension, that is, the time evolution of the indicators, as the key to interpret the data. The following discusses these aspects and issues in greater detail.

**Table 4.1:** The PIBien-être indicators: domain, breakdowns, source and time coverage.

| Domain               | Indicator                                                          | Breakdown                                                                   | Data source                        | Year       | LIW |
|----------------------|--------------------------------------------------------------------|-----------------------------------------------------------------------------|------------------------------------|------------|-----|
| I. Income and Wealth | 1. Gross National Income per capita                                | –                                                                           | National accounts (Eurostat)       | 2009-2015  | Yes |
|                      | 2. Total household wealth                                          | Income quintiles                                                            | HFCS                               | 2010, 2014 | Yes |
|                      | 3. Net adjusted available household income                         | Income quintiles                                                            | EU-SILC                            | 2009-2015  | Yes |
|                      | 4. Real yearly growth rate of various measures of household income | Income quintiles                                                            | EU-SILC                            | 2009-2015  | No  |
|                      | 5. Household total consumption                                     |                                                                             |                                    |            |     |
|                      | 5.a Household total consumption, marketed goods                    | Income groups                                                               | HBS                                | 2009-2014  | No  |
|                      | 5.b Household total consumption, non-marketed goods                | Age, Gender, Nationality, Education level, Marital status, Income quintiles | TUS                                | 2014       | No  |
|                      | 6. Gini index                                                      | –                                                                           | EU-SILC                            | 2009-2015  | Yes |
|                      | 7. Inter-quintile ratio and inter-decile ratio                     | –                                                                           | EU-SILC                            | 2009-2015  | Yes |
|                      | 8. Men-women wage gap                                              | –                                                                           | EU-SILC                            | 2010-2015  | Yes |
|                      | 9. Risk of poverty                                                 |                                                                             |                                    |            |     |
|                      | 9.a Risk of poverty before social transfers                        | Gender, Age, Household type, Occupation, Nationality                        | EU-SILC                            | 2009-2015  | No  |
|                      | 9.b Risk of poverty after social transfers                         | Gender, Age, Household type, Occupation, Nationality                        | EU-SILC                            | 2009-2015  | Yes |
|                      | 10. People in situation of severe material deprivation             | –                                                                           | EU-SILC                            | 2009-2015  | Yes |
|                      | 11. People unable to make ends meet                                | Income quintiles                                                            | EU-SILC                            | 2009-2015  | Yes |
| II. Occupation       | 12. Employment rate                                                | Age, Gender                                                                 | EU-LFS                             | 2009-2015  | Yes |
|                      | 13. Unemployment rate                                              |                                                                             |                                    |            |     |
|                      | 13.a Unemployment rate                                             | Age, Gender, Nationality, Education level                                   | EU-LFS                             | 2009-2015  | Yes |
|                      | 13.b Long-term unemployment rate, CES-CSD definition               | Age, Gender, Nationality, Education level                                   | EU-LFS                             | 2009-2015  | No  |
|                      | 13.c Long-term unemployment rate, Eurostat definition              | Age, Gender, Nationality, Education level                                   | EU-LFS                             | 2009-2015  | No  |
|                      | 14. Temporary job rate                                             | Age, Gender, Education level                                                | EU-LFS                             | 2009-2015  | Yes |
|                      | 15. Forced part-time rate                                          | Gender, Education level, Income quintiles, Marital status                   | EU-LFS                             | 2009-2015  | Yes |
|                      | 16. People living in households with low work intensity            | –                                                                           | EU-SILC                            | 2009-2015  | Yes |
|                      | 17. Accidents at work <sup>(1)</sup>                               |                                                                             |                                    |            |     |
|                      | 17.a Non-fatal accidents at work                                   | Gender                                                                      | ESAW                               | 2009-2015  | No  |
| III. Housing         | 17.b Fatal accidents at work                                       | Gender                                                                      | ESAW                               | 2009-2015  | No  |
|                      | 18. Feelings of job insecurity                                     | –                                                                           | EU-SILC                            | 2009-2015  | Yes |
|                      | 19. Number of rooms per person                                     | –                                                                           | EU-SILC                            | 2009-2015  | Yes |
|                      | 20. People living in overcrowded dwelling                          | –                                                                           | EU-SILC                            | 2009-2015  | Yes |
|                      | 21. Total housing costs as share of household income               | Tenure status, Income quintiles                                             | EU-SILC                            | 2009-2015  | Yes |
| IV. Health           | 22. New dwellings per year                                         | –                                                                           | STATEC (Enquête bâtiments achevés) | 2009-2013  | No  |
|                      | 23. New dwellings in “Wohnvorrangemeinden” per year                | –                                                                           | STATEC (Enquête bâtiments achevés) | 2009-2013  | Yes |
|                      | 24. Life expectancy <sup>(2)</sup>                                 |                                                                             |                                    |            |     |
|                      | 24.a Life expectancy, by age                                       | Age                                                                         | HFA                                | 2009-2013  | No  |
|                      | 24.b Life expectancy in good conditions, by gender                 | Gender                                                                      | EU-SDS                             | 2009-2013  | No  |
|                      | 25. Prevalence of mental problems <sup>(3)</sup>                   |                                                                             |                                    |            |     |
|                      | 25.a Prevalence of mental problems, by gender                      | Gender                                                                      | HFA                                | 2009-2013  | No  |
|                      | 25.b Prevalence of mental problems, by age                         | Age                                                                         | HFA                                | 2009-2013  | No  |
|                      | 26. Suicide rate <sup>(4)</sup>                                    |                                                                             |                                    |            |     |
|                      | 26.a Suicide rate, by gender                                       | Gender                                                                      | HFA                                | 2009-2013  | No  |
|                      | 26.b Suicide rate, by age                                          | Age                                                                         | HFA                                | 2009-2013  | No  |
|                      | 27. Death by cause                                                 | –                                                                           | HFA                                | 2009-2013  | Yes |
|                      | 28. Consumption of drugs, by type                                  | Age, Gender, Income quintile, Working status, Nationality                   | IGSS                               | 2009-2014  | Yes |

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Note: <sup>(1)</sup> The LIW contains the total accidents at work, without distinguishing between fatal and non-fatal accidents. <sup>(2)</sup> The LIW contains the life expectancy at birth. <sup>(3)</sup> The LIW contains the prevalence of mental problems, across demographic groups. <sup>(4)</sup> The LIW contains the suicide rate, across demographic groups.

|                                       |                                                                                                  |                                                                       |             |                     |     | Continued |
|---------------------------------------|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|-------------|---------------------|-----|-----------|
| Domain                                | Indicator                                                                                        | Breakdown                                                             | Data source | Year                | LIW |           |
| IV. Health                            | 29. Share of adults declaring to be in good or very good health                                  | Gender, Age, Occupation, Education level, Income quintile             | EU-SILC     | 2009-2015           | Yes |           |
|                                       | 30. Share of adults declaring to have chronic disease                                            | Gender, Age, Occupation, Education, Income quintile                   | EU-SILC     | 2009-2015           | Yes |           |
|                                       | 31. Share of adults declaring to be limited in their everyday activity because of health reasons | Gender, Age, Occupation, Education, Income quintile                   | EU-SILC     | 2009-2015           | Yes |           |
| V. Work-life balance                  | 32. Long hours rate out of employee population                                                   | –                                                                     | EU-LFS      | 2009-2015           | Yes |           |
|                                       | 33. Leisure and occupation time                                                                  | Age, Gender, Nationality, Education, Marital status, Income quintile  | TUS         | 2014                | No  |           |
|                                       | 34. Employment rate of women with children in mandatory schooling age                            | Age, Education                                                        | EU-LFS      | 2009-2015           | Yes |           |
|                                       | 35. Time spent commuting                                                                         | Age, Gender, Nationality, Education, Marital status, Income quintiles | TUS         | 2014                | No  |           |
|                                       | 36. Share of parental living in the couple                                                       | –                                                                     | CNPF        | 2009-2015           | Yes |           |
|                                       | 37. Satisfaction with work-life balance                                                          |                                                                       |             |                     |     |           |
|                                       | 37.a Satisfaction with work-life balance, employed and non-employed                              | Gender, Income quintile, Nationality, Age, Education                  | EU-SILC     | 2013                | No  |           |
|                                       | 37.b Satisfaction with work-life balance, only employed                                          | Gender, Income quintile, Nationality, Age, Education                  | EU-SILC     | 2013                | No  |           |
|                                       | 37.c Satisfaction with work-life balance, only non-employed                                      | Gender, Income quintile, Nationality, Age, Education                  | EU-SILC     | 2013                | No  |           |
| VI. Education and skills              | 38. Educational attainment                                                                       | –                                                                     | EU-LFS      | 2009-2015           | Yes |           |
|                                       | 39. Young people having left education early                                                     | –                                                                     | EU-LFS      | 2009-2015           | Yes |           |
|                                       | 40. Reading skills (at 15 years of age)                                                          | –                                                                     | PISA        | 2009, 2012, 2015    | Yes |           |
|                                       | 41. Civic skills of students (at 14 years of age)                                                | –                                                                     | ICCS        | 2009                | No  |           |
| VII. Social relationships             | 42. Social network support                                                                       |                                                                       |             |                     |     |           |
|                                       | 42.a Having anyone to discuss with personal matters                                              | Age, Income quintile, Education                                       | EU-SILC     | 2013                | No  |           |
|                                       | 42.b Possibility to ask for help                                                                 | Age, Income quintile, Education                                       | EU-SILC     | 2013                | No  |           |
|                                       | 42.c Trust in others                                                                             | Age, Income quintile, Education                                       | EU-SILC     | 2013                | No  |           |
|                                       | 43. Membership in social, cultural, sport associations                                           | Gender, Age, Education, Income tercile                                | EVS         | 2009 <sup>(1)</sup> | No  |           |
|                                       | 44. Time spent volunteering                                                                      | Age, Gender, Nationality, Education, Family status, Income quintiles  | TUS         | 2014                | No  |           |
|                                       | 45. Frequency of social contacts                                                                 | Income quintiles, Education, Household type                           | EU-SILC     | 2009, 2013-2015     | Yes |           |
| VIII. Governance and civic engagement | 46. Voter turnout                                                                                | –                                                                     | IDEA        | 2009, 2013          | Yes |           |
|                                       | 47. Consultation on rule making                                                                  | –                                                                     | OECD        | 2013                | No  |           |
|                                       | 48. Membership in political and civic associations                                               | Gender, Age, Education, Income tercile                                | EVS         | 2009 <sup>(1)</sup> | No  |           |
|                                       | 49. Knowledge of languages                                                                       | Nationality                                                           | Census      | 2011                | No  |           |

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Note: <sup>(1)</sup> We use wave 2008 and assume nothing changed during 2009.

|                                       |                                               |                                                       |                                                          |                  | Continued |
|---------------------------------------|-----------------------------------------------|-------------------------------------------------------|----------------------------------------------------------|------------------|-----------|
| Domain                                | Indicator                                     | Breakdown                                             | Data source                                              | Year             | LIW       |
| VIII. Governance and civic engagement | 50. Confidence in institutions                | Age, Occupation, Working status, Gender               | Eurobarometer                                            | 2009-2015        | Yes       |
|                                       | 51. Feeling of discrimination                 | –                                                     | CET                                                      | 2009, 2011, 2014 | Yes       |
|                                       | 52. Air pollution                             | –                                                     | Eurostat                                                 | 2009-2014        | Yes       |
|                                       | 53. Water pollution                           | –                                                     | STATEC                                                   | 2009, 2015       | No        |
|                                       | 54. Noise                                     | –                                                     | EU-SILC                                                  | 2009-2015        | Y         |
|                                       | 55. Recycling rate                            | –                                                     | Eurostat                                                 | 2009-2015        | Yes       |
| IX. Environment                       | 56. Usage of renewable energies               | –                                                     | Eurostat (National Authorities)                          | 2009-2015        | Yes       |
|                                       | 57. Car use                                   | –                                                     | Eurostat (STATEC)                                        | 2009-2014        | Yes       |
|                                       | 58. Land use                                  | –                                                     | STATEC (Administration du Cadastre et de la Topographie) | 2009-2015        | Yes       |
|                                       | 59. Organic farming                           | –                                                     | Eurostat (National Certification and Inspection bodies)  | 2009-2015        | Yes       |
|                                       | 60. Environmental disease burden              | –                                                     | WHO                                                      | 2012             | No        |
| X. Personal security                  | 61. Offence rate                              | –                                                     | Lux. Police                                              | 2009-2015        | Yes       |
|                                       | 62. Feeling of safety: walking alone at night | Income quintile, Occupation, Living area, Nationality | EU-SILC                                                  | 2013             | No        |
| XI. Subjective well-being             | 63. Life satisfaction                         | Occupation, Working status, Age                       | Eurobarometer                                            | 2009-2015        | Yes       |

## 4.1 The heterogeneity of the data sources

The data used to compile quality of life indicators is heterogeneous with respect to source, unit of analysis, frequency of observations and release calendar. This section reviews the sources of heterogeneity in the raw data.

Sources of information in this report are statistical offices, namely STATEC and EUROSTAT, and international institutions, such as the European Central Bank, the European Commission, the OECD and WHO among others. Indicators are mainly compiled from large statistical surveys conducted on individuals or households. In some cases, administrative records from the General Inspection of Social Security (IGSS), the Police and the CNPF are used. In addition, a number of indicators consist of macroeconomic aggregates produced by STATEC or Eurostat. Information on the number of dwellings and the knowledge of languages come from Census data.

The unit of observation depends on the data source. Survey and administrative records usually refer to individuals or households or by recording certain information on individuals, while aggregates refer to the overall population. Example of indicators based on surveys are household wealth and income, employment and unemployment, time spent commuting, life satisfaction etc. Certain indicators, such as consumption of drugs and parental leave shares, are based on administrative records. In certain cases, information on individuals has been provided at certain level of aggregation due to confidentiality reasons (in the latter case, the information has been aggregated directly by the institution in charge of collecting the data.) Macroeconomic aggregates, such as GNI, refer to the overall population and they are compiled according to National Accounts regulation frameworks (ESA2010).

As a result, there is a wide difference both in the frequency at which observations are available, and in the calendar of release of the datasets. Macroeconomic data is usually available at quarterly or yearly frequency, while survey data is available at various frequencies, such as monthly, quarterly, or yearly. Some surveys, however, are conducted every few years, or include rotating modules that are administered at longer frequencies. An example is the HFCS, which is conducted every four years, or the module on well-being in EU-SILC (the latter was administered in 2013, and a new collection is scheduled for

2018.) Administrative records are register data that are constantly updated. However, the information is available to researchers as "snapshots" of records taken at given points in time.

Survey data suffers the problem of **timeliness**. Indeed, this data requires complex treatments after collection, such as coding, quality checks and imputation of missing values. As a result, this data are only available to researchers and analysts with significant delays. In addition, data released by EUROSTAT undergoes further harmonisation to ensure cross-country comparability, which further delays the access to this information. The extensive use of survey data, however, also carries advantages. Namely, the information provided by surveys is very rich, and the availability of individual information allows us to compute indicators at finer levels than overall aggregates. This permits to analyse the shape of important aspects of quality of life, and how much they varies depending on socio-economic and demographic characteristics of the population.

In summary, this heterogeneity is the source of missing information in the PIBien-etre database, which limits the comparability of indicators and domains over time and across countries. Despite these problems, the availability of repeated observations over time allows us to build time-series for the majority of indicators and to analyse changes over time in the facts of interest.

#### 4.1.1 The availability of data over time

Table 4.1 and 4.2 show that, for some domains, the availability of time series is limited. Time series covering the entire period of interest (2009–2015) are available for the majority of indicators in the domains covering income, occupation, housing and the environment. Subjective well-being is also available for the whole period. In contrast, indicators in the domains work-life balance, social relationships, and governance and civic engagement are only observed once over the period of interest. The availability of time series for remaining domains is mixed.

The lack of time series information is due to several reasons. In some cases, surveys (or specific survey modules) are administered at intervals of time greater than one year. This is the case of indicators such as *household wealth*, which comes from the HFCS, or *reading skills* monitored by PISA, which is conducted every three years. The indicators on *life-work balance* are compiled from the EU-SILC rotating module on well-being, which was last administered in 2013. In other cases, up-to-date information has not been released, so that observations do not cover the full period analysed by this report. This is the case for health indicators, for which the last available observation is 2013. In a few cases, surveys are only conducted on longer and irregular intervals. Hence, information on future updates of the datasets is not available.

Observations referring to one point in time are usually sufficient to compute a statistics or indicator. A single observation, however, is of little help to interpret the result: is the value of the statistic high or low? Is it good or bad? In other words, a reference point is needed to assess the quality of life in Luxembourg. Because many indicators are specific to Luxembourg and are not available for other countries, the PIBien-être report focuses on time comparisons. In other words, the progress of Luxembourg in terms of quality of life is assessed by **analysing the evolution over time** of indicators and domains.

When time series are not complete, researchers “reconstruct” missing observations from the available data. This process is called interpolation and extrapolation, for which

techniques are available. In the simplest case, when the observation missing is placed between two subsequent observations, one can resort to linear interpolation. Whenever the interpolation is not possible because observations are only available for one year, we cannot make any conclusion on the evolution of the indicator or on the contribution of the indicator to the progress of the society. Future updates of this report should consider removing these indicators or exploring alternative sources of data.

## 4.2 Subjective and objective indicators

One interesting aspect of this project is that it integrates objective information about how people fare with figures about people's perceptions of their own conditions.

The database includes many objective indicators. Income and wealth, occupation, housing, health, education, and environment domains mainly consist of objective indicators.<sup>3</sup> Example of objective indicators are the GNI, the GINI index, the *men-women wage gap*, the unemployment rate, and the suicide rate.

Domains reporting on well-being, work-life balance, social relationship, and governance and civic engagement consist mainly of subjective indicators. Example of subjective indicators in domains such as income, occupation and health are, respectively, *feelings of job insecurity*, *people unable to make ends meet*, *share of adults declaring to be in good or very good health*. A drawback in the use of subjective indicators is that, usually, the time series availability for this data is limited. The information on people perceptions, with the exception of life satisfaction that comes from the Eurobarometer, is mainly drawn from the well-being rotating module of EU-SILC, which is administered every five years. For what concerns the data available for the PIBien-être project, figures are issued from the wave of 2013.

## 4.3 Conclusions

Chapter 2 briefly discussed international and national initiatives that are comparable in scope, method, and aims to the PIBien-être project. The various institutions and offices responsible for those initiatives have made different choices concerning the dates of release of the reports. The Better Life Index is updated yearly, along the publication of a volume that reports the main findings from the data analysis. The Canadian Index of Wellbeing has been updated only once since its inception. The initial report (2011) covers the years from 1994 to 2008, while a subsequent release (2012) updates the analysis to 2010. The Benessere Equo Solidale (BES) report is published yearly by ISTAT, while the ONS' report Measuring National Well-being is updated twice a year, by means of shorter reports and releases of digital material. The Quality of Life report by Eurostat has been published only once, in 2015. This suggests that the frequency of the reporting depends on the characteristics and complexity of the database involved, and by the resources available to the institutions in charge of the programmes.

Based on the characteristics of the indicators and data, we propose the following schedule for updating the current report:

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<sup>3</sup>One should note that some income and occupation variables are compiled using survey data, where income and other characteristics of interest are self-reported.

- a yearly or biennial report to illustrate results from the analysis of a restricted database. Such database would contain a subset of indicators, namely those available at yearly frequency;
- a report released at the arrival of data collected at longer frequencies to complement the information of reports based on higher frequencies data. The EU-SILC rotating module on well-being is an example of data collected at longer-frequency. The information contained in the rotating module is used to compile indicators in a number of domains. The next wave of data collection is scheduled for 2018, and, assuming that data will be available in 2019, a reasonable date for a full report could be late 2019 or 2020.

Future releases could explore the availability of alternative data sources. Additional datasets have been inspected, but failed to provide further information compared to the one already available in the database. For instance, we have considered the Structure of Earnings Survey (SES) (waves 2006 and 2010), the European Quality of Life Survey (EQLS) (wave 2011), and the producer version of EU-SILC data. Administrative data sourced directly from Luxembourg institutes constitute a valuable source of information. The advantages of this strategy is the possibility to exploit richer information sets, and the improvement of data availability over time, as datasets are constantly updated. Moreover, data from Luxembourg institutes would improve the chances to disaggregate indicators by subgroups. However, this solution has some drawbacks: on one hand, there are administrative costs, as – at present – collecting administrative data requires ad-hoc data applications and inter-institutional agreements; on the other hand, figures issued by Luxembourg institutes have limited international comparability and they require data harmonisation.

**Table 4.2:** PIBien-être data features: frequency, international comparability, and alternative sources.

| Indicator                                                          | Frequency  | International comparability | Alternative sources |
|--------------------------------------------------------------------|------------|-----------------------------|---------------------|
| 1. Gross National Income per capita                                | Yearly     | Yes                         | No                  |
| 2. Total household wealth                                          | Four years | Yes                         | No                  |
| 3. Net adjusted available household income                         | Yearly     | Yes                         | –                   |
| 4. Real Annual growth rate of various measures of household income | Yearly     | Yes                         | –                   |
| 5.a Household total consumption, marketed goods                    | Yearly     | No                          | Yes                 |
| 5.b Household total consumption, non-marketed goods                | Yearly     | No                          | Yes                 |
| 6. Gini index                                                      | Yearly     | Yes                         | –                   |
| 7. Inter-quintile ratio and inter-decile ratio                     | Yearly     | Yes                         | –                   |
| 8. Men-women wage gap                                              | Yearly     | Yes                         | –                   |
| 9.a Risk of poverty before social transfers                        | Yearly     | Yes                         | No                  |
| 9.b Risk of poverty after social transfers                         | Yearly     | Yes                         | No                  |
| 10. People in situation of severe material deprivation             | Yearly     | Yes                         | No                  |
| 11. People unable to make ends meet                                | Yearly     | Yes                         | No                  |
| 12. Employment rate                                                | Yearly     | Yes                         | Yes                 |
| 13.a Unemployment rate                                             | Yearly     | Yes                         | Yes                 |
| 13.b Long-term unemployment rate, CES-CSDD definition              | Yearly     | Yes                         | Yes                 |
| 13.c Long-term unemployment rate, Eurostat definition              | Yearly     | Yes                         | Yes                 |
| 14. Temporary job rate                                             | Yearly     | Yes                         | Yes                 |
| 15. Forced part-time rate                                          | Yearly     | Yes                         | Yes                 |
| 16. People living in households with low work intensity            | Yearly     | Yes                         | No                  |
| 17.a Non-fatal accidents at work                                   | Yearly     | Yes                         | Yes                 |
| 17.b Fatal accidents at work                                       | Yearly     | Yes                         | Yes                 |
| 18.a Feelings of job insecurity (subj. measure)                    | Four years | Yes                         | No                  |
| 18.b Feelings of job insecurity (obj. measure)                     | Yearly     | Yes                         | Yes                 |
| 19. Number of rooms per person                                     | Yearly     | Yes                         | No                  |
| 20. People living in overcrowded dwelling                          | Yearly     | Yes                         | No                  |
| 21. Total housing costs as share of household income               | Yearly     | Yes                         | No                  |
| 22. New dwellings per year                                         | Yearly     | No                          | No                  |
| 23. New dwellings in “Wohnvorrangemeinden” per year                | Yearly     | No                          | No                  |
| 24.a Life expectancy, by age                                       | Yearly     | Yes                         | Yes                 |
| 24.b Life expectancy in good conditions, by gender                 | Biennial   | Yes                         | Yes                 |
| 25.a Prevalence of mental problems, by gender                      | Yearly     | Yes                         | Yes                 |
| 25.b Prevalence of mental problems, by age                         | Yearly     | Yes                         | Yes                 |
| 26.a Suicide rate, by gender                                       | Yearly     | Yes                         | Yes                 |
| 26.b Suicide rate, by age                                          | Yearly     | Yes                         | Yes                 |
| 27. Death by cause                                                 | Yearly     | Yes                         | Yes                 |
| 28. Consumption of drugs, by type                                  | Yearly     | No                          | No                  |

To be continued over next page

| Continued                                                                                        |                        |                             |                     |
|--------------------------------------------------------------------------------------------------|------------------------|-----------------------------|---------------------|
| Indicator                                                                                        | Frequency              | International comparability | Alternative sources |
| 29. Share of adults declaring to be in good or very good health                                  | Yearly                 | Yes                         | No                  |
| 30. Share of adults declaring to have chronic disease                                            | Yearly                 | Yes                         | No                  |
| 31. Share of adults declaring to be limited in their everyday activity because of health reasons | Yearly                 | Yes                         | No                  |
| 32. Long hours rate out of employee population                                                   | Yearly                 | Yes                         | No                  |
| 33. Leisure and occupation time                                                                  | Yearly                 | No                          | No                  |
| 34. Employment rate of women with children in mandatory schooling age                            | Yearly                 | Yes                         | No                  |
| 35. Time spent commuting <sup>(1)</sup>                                                          | Yearly                 | No                          | No                  |
| 36. Share of parental living in the couple                                                       | Yearly                 | No                          | No                  |
| 37.a Satisfaction with work-life balance, employed and non-employed                              | Four years             | Yes                         | No                  |
| 37.b Satisfaction with work-life balance, only employed                                          | Four years             | Yes                         | No                  |
| 37.c Satisfaction with work-life balance, only non-employed                                      | Five years             | Yes                         | No                  |
| 38. Educational attainment                                                                       | Yearly                 | Yes                         | Yes                 |
| 39. Young people having left education early                                                     | Yearly                 | Yes                         | Yes                 |
| 40. Reading skills (at 15 years of age)                                                          | Three years            | Yes                         | No                  |
| 41. Civic skills of students (at 14 years of age)                                                | Non-regular production | Yes                         | No                  |
| 42.a Having anyone to discuss with personal matters                                              | Five years             | Yes                         | No                  |
| 42.b Possibility to ask for help                                                                 | Five years             | Yes                         | No                  |
| 42.c Trust in others                                                                             | Five years             | Yes                         | Yes                 |
| 43. Membership in social, cultural, sport associations                                           | Eight years            | Yes                         | Yes                 |
| 44. Time spent volunteering <sup>(1)</sup>                                                       | Yearly                 | No                          | No                  |
| 45. Frequency of social contacts                                                                 | Yearly (from 2013)     | Yes                         | No                  |
| 46. Voter turnout                                                                                | Voting frequency       | Yes                         | Yes                 |
| 47. Consultation on rule making <sup>(2)</sup>                                                   | Yearly                 | Yes                         | No                  |
| 48. Membership in political and civic associations                                               | Eight years            | Yes                         | Yes                 |
| 49. Knowledge of languages                                                                       | Non-regular production | No                          | No                  |
| To be continued over next page                                                                   |                        |                             |                     |

| Continued                                     |                        |                                  |                     |
|-----------------------------------------------|------------------------|----------------------------------|---------------------|
| Indicator                                     | Frequency              | International com-<br>parability | Alternative sources |
| 50. Confidence in institutions                | Yearly                 | Yes                              | Yes                 |
| 51. Feeling of discrimination                 | Non-regular production | No                               | No                  |
| 52. Air pollution                             | Yearly                 | Yes                              | Yes                 |
| 53. Water pollution                           | Non-regular production | No                               | No                  |
| 54. Noise                                     | Yearly                 | Yes                              | Yes                 |
| 55. Recycling rate                            | Yearly                 | Yes                              | No                  |
| 56. Usage of renewable energies               | Yearly                 | Yes                              | Yes                 |
| 57. Car use                                   | Yearly                 | Yes                              | Yes                 |
| 58. Land use                                  | Non-regular production | No                               | No                  |
| 59. Organic farming                           | Yearly                 | Yes                              | No                  |
| 60. Environmental disease burden              | Non-regular production | Yes                              | No                  |
| 61. Offence rate                              | Yearly                 | No                               | No                  |
| 62. Feeling of safety: walking alone at night | Five years             | Yes                              | No                  |
| 63. Life satisfaction                         | Non-regular production | Yes                              | Yes                 |

Note: <sup>(1)</sup> Indicators 35 and 44 have an yearly frequency but have only one year, the reason is that the TUS survey on which they are based is meant to be conducted on yearly basis but started to be conducted in Luxembourg in 2014. <sup>(2)</sup> Indicator 47 had an yearly frequency until 2013, and then it has been discontinued.



## 5. Luxembourg Index of Well-being

How can we distil the information from 63 indicators observed over several sub-groups and many years? We propose a compass to read the available figures and to identify the aspects that require in-depth analysis. Many national and international institutions that adopted dashboards of indicators face the problem of summarising large amounts of data, and it seems safe to conclude that none has found a definitive solution to this problem. From this point of view also the latest findings from the statistical literature are not conclusive (Fattore et al., 2016). Additionally, the joint CES-CSDD commission explicitly recommended to avoid using any sort of synthetic indicator. This is why we followed the example of the Canadian Statistical Office who computes an index of well-being that is directly related to the monitored indicators and domains (see section 2.2.1 on page 13). This implies that it is always possible to “decompose” the index to go back to the changes happening in its indicators. In this sense the Canadian index acts as a compass: it allows to identify the problematic areas to browse the data and select the relevant information. The index is basically a weighted average of each normalized indicator and, given its function, we label it “Luxembourg Index of Well-being” (LIW). More formally, the index is built as follows:

- First, each indicator is normalized. We invert negative indicators into positive ones. For instance, rather than taking the share of people with chronic disease, we consider the share of people free from chronic disease, i.e.  $100 - \text{Chronic disease}$ . Then we compute the growth rates of each indicator according to the formula:  $(\text{Index of Indicator}_i)_t = 100 * \frac{(\text{Indicator}_i)_t}{(\text{Indicator}_i)_{t_0}}$ , where  $t$  indicates the year of observation and  $t_0$  the initial year of observation;
- Second, for each domain we compute the average of its indexes of indicators:  $(\text{Index of Domain}_j)_t = \frac{1}{n} \sum_{i=1}^n (\text{Index of Indicator}_i)_t$ ;
- Third, we compute the LIW as the weighted average of the indexes of domains:

$$LIW_t = \frac{1}{J} \cdot \sum_j w_j \cdot (\text{Index of Domain}_j)_t$$

where  $J = 1, \dots, j$  is the numerosity of domains, and  $w_j = 1$  is the importance of each domain for quality of life. We assume that each domain in the PIBien-être project contributes to quality of life in the same way. However, we test the reliability of our findings using alternative weights, thus recognising that some domains may be regarded as more important than others for well-being. In section 5.3, we consider various sets of weights derived from the OECD Better Life Index. The web-site of the Index allows users to rank its domains from the most to the least important. This information is stored and available to researchers. We used the rankings resulting from the preferences of all the EU residents to build our weights. Moreover, we repeated our analysis using weights from Germany, France and Belgium. We also considered the weights based on preferences expressed by residents in Luxembourg. However, in this case the number of people who used the Better Life Index and chose to rank the domains is tiny and it can hardly represent all the residents of Luxembourg. As we will show in section 5.3 the results for the LIW with  $w_j = 1$  do not change significantly from those using alternative weights.

Table 5.1 presents schematically the features of the LIW, it lists the indicators analysed and it informs about the years covered. The LIW includes all the indicators for which we have a consistent time-series. This is because the LIW compares the quality of life in a given year to the quality of life of a reference year which, in our case, is the first year of observation. This choice has the great advantage of fixing a reference point against which it is possible to assess future changes. In other words, the availability of future waves of data will add to the previous series, without altering previous results. Thus, the LIW includes all the indicators monitored from 2009 onward.

To include the widest possible set of indicators, we interpolated the indicators for which we did not have a complete series.<sup>1</sup> In sum, we excluded the following indicators: voter turnout, because voting at National elections is mandatory in Luxembourg; yearly growth rates of various income measures, because we already included the levels of the same variables; water pollution for which we only had two observations in 2009 and in 2015; the number of new dwellings per year because we already included new dwellings in “Wohnvorrauggemeinden” and the two indicators correlate at 99%.

We emphasize that the LIW should be strictly regarded as a “compass” to direct the reader’s attention towards critical areas of intervention, and to identify the relevant data in our large database. Moreover, it is worth to highlight that the LIW requires figures with complete time-series, otherwise it is impossible to normalise and aggregate the indicators. This implies that variables with incomplete time-series cannot be included in the LIW. This limitation as well as the research for better ways to summarise large amount of information remain among the challenges posed by this project and that should be addressed by future research.

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<sup>1</sup>The interpolated indicators include Total household wealth, number of new dwellings, Life expectancy at birth, Prevalence of mental problems, Suicide rate, Death by cause, Consumption of drugs, Reading skills, Frequency of social contacts, Feeling of discrimination, Air pollution, and Car use (see also the last column of table 5.1).

**Table 5.1:** Composition of the Luxembourg Index of Well-being.

| Domain                          | N  | Indicators                                                                                                                      | Unit of measure                                   | Source                                              | Time-series      | Interpretation | Included in LIW | Interpolated |
|---------------------------------|----|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------|------------------|----------------|-----------------|--------------|
| Income and wealth               | 1  | GNI per capita                                                                                                                  | EUR, annual, per capita, at current market prices | EUROSTAT                                            | 2009-2015        |                | yes             | no           |
|                                 | 2  | Total household wealth                                                                                                          | Median of the distribution, EUR, annual.          | Household Finance and Consumption Survey            | 2010, 2014       |                | yes             | yes          |
|                                 | 3  | Net adjusted available household income                                                                                         | EUR (real, 100 = 2014)                            | EU-SILC                                             | 2009-2015        |                | yes             | no           |
|                                 | 4  | The yearly growth rate of the gross household income                                                                            | EUR (real, 100 = 2014)                            | EU-SILC                                             | 2009-2015        |                | no              | no           |
|                                 | 4  | The yearly growth rate of the net available household income, before social transfers, but with old-age and survivor's benefits | EUR (real, 100 = 2014)                            | EU-SILC                                             | 2009-2015        |                | no              | no           |
|                                 | 4  | The yearly growth rate of the net available household income, before all social transfers                                       | EUR (real, 100 = 2014)                            | EU-SILC                                             | 2009-2015        |                | no              | no           |
|                                 | 4  | The yearly growth rate of the net adjusted available household income                                                           | EUR (real, 100 = 2014)                            | EU-SILC                                             | 2009-2015        |                | no              | no           |
|                                 | 5  | Household total consumption (marketed goods)                                                                                    | EUR (real, per capita, 100 = 2014)                | Household Budget Survey (STATEC)                    | 2009-2015        |                | no              | no           |
|                                 | 5  | Household total consumption (non marketed goods)                                                                                | EUR                                               | Time Use Survey                                     | 2014             |                | no              | NA           |
|                                 | 6  | Gini index                                                                                                                      | 0-100                                             | EU-SILC                                             | 2009-2015        |                | yes             | no           |
|                                 | 7  | Inter-quintile ratio                                                                                                            | ratio                                             | EU-SILC                                             | 2009-2015        |                | no              | no           |
| Occupation                      | 7  | Inter-decile ratio                                                                                                              | ratio                                             | EU-SILC                                             | 2009-2015        |                | yes             | no           |
|                                 | 8  | Men-women wage gap                                                                                                              | hourly gross wages in nominal terms               | EU-SILC                                             | 2009-2015        |                | yes             | no           |
|                                 | 9  | Risk of poverty before social transfers                                                                                         | %                                                 | EU-SILC                                             | 2009-2015        | inverted       | no              | no           |
|                                 | 9  | Risk of poverty after social transfers                                                                                          | %                                                 | EU-SILC                                             | 2009-2015        |                | yes             | no           |
|                                 | 10 | People in situation of severe material deprivation                                                                              | %                                                 | EU-SILC                                             | 2009-2015        |                | yes             | no           |
|                                 | 11 | People unable to make ends meet                                                                                                 | %                                                 | EU-SILC                                             | 2009-2015        |                | yes             | no           |
|                                 | 12 | employment rate                                                                                                                 | %                                                 | EU-LFS                                              | 2009-2015        |                | yes             | no           |
|                                 | 13 | unemployment rate                                                                                                               | %                                                 | EU-LFS                                              | 2009-2015        |                | yes             | no           |
|                                 | 13 | long-term unemployment rate (Eurostat definition)                                                                               | %                                                 | EU-SILC                                             | 2009-2015        | inverted       | no              | no           |
|                                 | 13 | long-term unemployment rate (CES-CSDD definition)                                                                               | %                                                 | EU-LFS                                              | 2009-2015        |                | yes             | no           |
|                                 | 14 | temporary job rate                                                                                                              | %                                                 | EU-LFS                                              | 2009-2015        |                | yes             | no           |
| Housing                         | 15 | Forced part-time rate                                                                                                           | %                                                 | EU-LFS                                              | 2009-2015        |                | yes             | no           |
|                                 | 16 | People living in household with low working intensity                                                                           | ratio over people in the labor force 18-59 y.o.   | EU-SILC                                             | 2009-2015        | inverted       | yes             | no           |
|                                 | 17 | Total accidents at work                                                                                                         | adjusted number of accidents per 100,000 workers  | EUROSTAT                                            | 2009-2015        |                | yes             | no           |
|                                 | 17 | Non-fatal accidents at work                                                                                                     | adjusted number of accidents per 100,000 workers  | EUROSTAT                                            | 2009-2015        |                | no              | NA           |
|                                 | 17 | Fatal accidents at work                                                                                                         | adjusted number of accidents per 100,000 workers  | EUROSTAT                                            | 2009-2015        |                | no              | NA           |
|                                 | 18 | Feeling of job insecurity                                                                                                       | %                                                 | EU-SILC                                             | 2009-2015        |                | yes             | no           |
|                                 | 19 | Number of rooms per person                                                                                                      | continuous                                        | EU-SILC                                             | 2009-2015        |                | yes             | no           |
|                                 | 20 | People living in overcrowded dwelling                                                                                           | %                                                 | EU-SILC                                             | 2009-2015        | inverted       | yes             | no           |
|                                 | 21 | Total housing costs as share of household income                                                                                | %                                                 | EU-SILC                                             | 2009-2015        |                | yes             | no           |
|                                 | 22 | number of new dwellings                                                                                                         | continuous                                        | STATEC                                              | 2009-2013        |                | no              | yes          |
|                                 | 23 | number of new dwellings II                                                                                                      | continuous                                        | STATEC                                              | 2009-2013        |                | yes             | yes          |
| Health                          | 24 | Life expectancy at birth                                                                                                        | number of years                                   | EU-Health for All                                   | 2009-2013        |                | yes             | yes          |
|                                 | 24 | Life expectancy at age 1                                                                                                        | number of years                                   | EU-Health for All                                   | 2009-2013        |                | no              | NA           |
|                                 | 24 | Life expectancy at age 15                                                                                                       | number of years                                   | EU-Health for All                                   | 2009-2013        |                | no              | NA           |
|                                 | 24 | Life expectancy at age 45                                                                                                       | number of years                                   | EU-Health for All                                   | 2009-2013        |                | no              | NA           |
|                                 | 24 | Life expectancy at age 65                                                                                                       | number of years                                   | EU-Health for All                                   | 2009-2013        |                | no              | NA           |
|                                 | 24 | Life expectancy in good conditions, men                                                                                         | number of years                                   | EU-Sustainable Development Strategy                 | 2009-2015        |                | no              | NA           |
|                                 | 24 | Life expectancy in good conditions, women                                                                                       | number of years                                   | EU-Sustainable Development Strategy                 | 2009-2015        |                | no              | NA           |
|                                 | 25 | Prevalence of mental problems                                                                                                   | SDR (Age-standardized death rate)                 | EU-Health for All                                   | 2009-2013        | inverted       | yes             | yes          |
|                                 | 26 | Suicide rate                                                                                                                    | SDR (Age-standardized death rate)                 | EU-Health for All                                   | 2009-2013        |                | yes             | yes          |
|                                 | 27 | Death by cause                                                                                                                  | SDR (Age-standardized death rate)                 | EU-Health for All                                   | 2009-2013        |                | yes             | yes          |
|                                 | 28 | Consumption of drugs, by type                                                                                                   | number of boxes                                   | IGSS                                                | 2009-2014        |                | yes             | yes          |
| Work-life balance               | 29 | Share of adults declaring to be in good or very good health                                                                     | %                                                 | EU-SILC                                             | 2009-2015        |                | yes             | no           |
|                                 | 30 | Share of adults declaring to have chronic diseases                                                                              | %                                                 | EU-SILC                                             | 2009-2015        |                | yes             | no           |
|                                 | 31 | Share of adults declaring to be limited in their everyday activity because of health reasons                                    | %                                                 | EU-SILC                                             | 2009-2015        |                | yes             | no           |
|                                 | 32 | Long hours rate out of employee population                                                                                      | %                                                 | EU-LFS                                              | 2009-2015        | inverted       | yes             | no           |
|                                 | 33 | Leisure and occupation time                                                                                                     | hours                                             | TUS                                                 | 2014             |                | no              | NA           |
|                                 | 34 | Employment rate of women with children in mandatory schooling age                                                               | %                                                 | EU-LFS                                              | 2009-2015        |                | yes             | no           |
|                                 | 35 | Time spent commuting                                                                                                            | minutes                                           | TUS                                                 | 2014             |                | no              | NA           |
|                                 | 36 | Share of parental leaving in the couple                                                                                         | %                                                 |                                                     | 2009-2015        |                | yes             | no           |
|                                 | 37 | satisfaction with work-life balance, employed and non-employed                                                                  | 0-10                                              | EU-SILC                                             | 2013             |                | no              | NA           |
|                                 | 37 | satisfaction with work-life balance, only employed                                                                              | 0-10                                              | EU-SILC                                             | 2013             |                | no              | NA           |
|                                 | 37 | satisfaction with work-life balance, only non-employed                                                                          | 0-10                                              | EU-SILC                                             | 2013             |                | no              | NA           |
| Education and skills            | 38 | Educational attainment                                                                                                          | %(tertiary education)                             | EU-LFS                                              | 2009-2015        | inverted       | yes             | no           |
|                                 | 39 | Young people having left education early                                                                                        | %                                                 | EU-LFS                                              | 2009-2015        |                | yes             | no           |
|                                 | 40 | Reading skills (at 15 years of age)                                                                                             | %                                                 | PISA                                                | 2009, 2012, 2015 |                | yes             | yes          |
|                                 | 41 | Civic skills of students (at 14 years of age)                                                                                   | %                                                 | International Civic and Citizenship Education Study |                  |                | no              | NA           |
| Social relationships            | 42 | Having anyone to discuss with personal matters                                                                                  | %                                                 | EU-SILC                                             | 2013, 2015       |                | no              | NA           |
|                                 | 42 | Possibility to ask for help                                                                                                     | %                                                 | EU-SILC                                             | 2013, 2015       |                | no              | NA           |
|                                 | 42 | Trust in others                                                                                                                 | %                                                 | EU-SILC                                             | 2013, 2015       |                | no              | NA           |
|                                 | 43 | Membership in social, cultural, sport associations                                                                              | %                                                 | European Values Study                               | 2008             |                | no              | NA           |
|                                 | 44 | Time spent volunteering                                                                                                         | minutes                                           | Time Use Survey                                     | 2014             |                | no              | NA           |
| Governance and civic engagement | 45 | Frequency of social contacts                                                                                                    | %                                                 | EU-SILC                                             | 2009, 2013-2015  |                | yes             | yes          |
|                                 | 46 | Voter turnout                                                                                                                   | %                                                 |                                                     | 2009, 2013       |                | no              | NA           |
|                                 | 47 | Consultation on rule making                                                                                                     | average score                                     | Better Life Index                                   | 2013             |                | no              | NA           |
|                                 | 48 | Membership in political and civic associations                                                                                  | %                                                 | European Values Study                               | 2008             |                | no              | NA           |
|                                 | 49 | Knowledge of languages                                                                                                          | %                                                 |                                                     | 2011             |                | no              | NA           |
| Environment                     | 50 | Confidence in institutions                                                                                                      | %                                                 | Eurobarometer                                       | 2009-2015        |                | yes             | no           |
|                                 | 51 | Feeling of discrimination                                                                                                       | %                                                 |                                                     | 2009, 2011, 2014 |                | yes             | yes          |
|                                 | 52 | Air pollution                                                                                                                   | PM10                                              |                                                     | 2009-2014        |                | yes             | yes          |
|                                 | 53 | Water pollution                                                                                                                 |                                                   | Administration de la Gestion de l'Eau               | 2009, 2015       |                | no              | NA           |
|                                 | 54 | Noise                                                                                                                           |                                                   | EU-SILC                                             | 2009-2015        |                | yes             | no           |
| Personal security               | 55 | Recycling rate                                                                                                                  | %                                                 |                                                     | 2009-2015        |                | yes             | no           |
|                                 | 56 | Usage of renewable energies                                                                                                     | %                                                 |                                                     | 2009-2015        |                | yes             | no           |
|                                 | 57 | Car use                                                                                                                         | passengers per kilometer                          |                                                     | 2009-2014        |                | yes             | yes          |
|                                 | 58 | Land use                                                                                                                        | %                                                 | Administration du Cadastre et de la Topographie     | 2009-2015        |                | yes             | no           |
|                                 | 59 | Organic farming                                                                                                                 | %                                                 |                                                     | 2009-2015        |                | yes             | no           |
| Subjective well-being           | 60 | Environmental disease burden                                                                                                    | %                                                 |                                                     | 2012             |                | no              | NA           |
|                                 | 61 | Offence rate                                                                                                                    | number of offences                                |                                                     | 2009-2015        |                | yes             | no           |
| Subjective well-being           | 62 | Feeling of safety: walking alone at night                                                                                       | %                                                 |                                                     | 2013             |                | no              | NA           |
|                                 | 63 | Life satisfaction                                                                                                               | 0-10                                              | Eurobarometer                                       | 2009-2015        |                | yes             | no           |

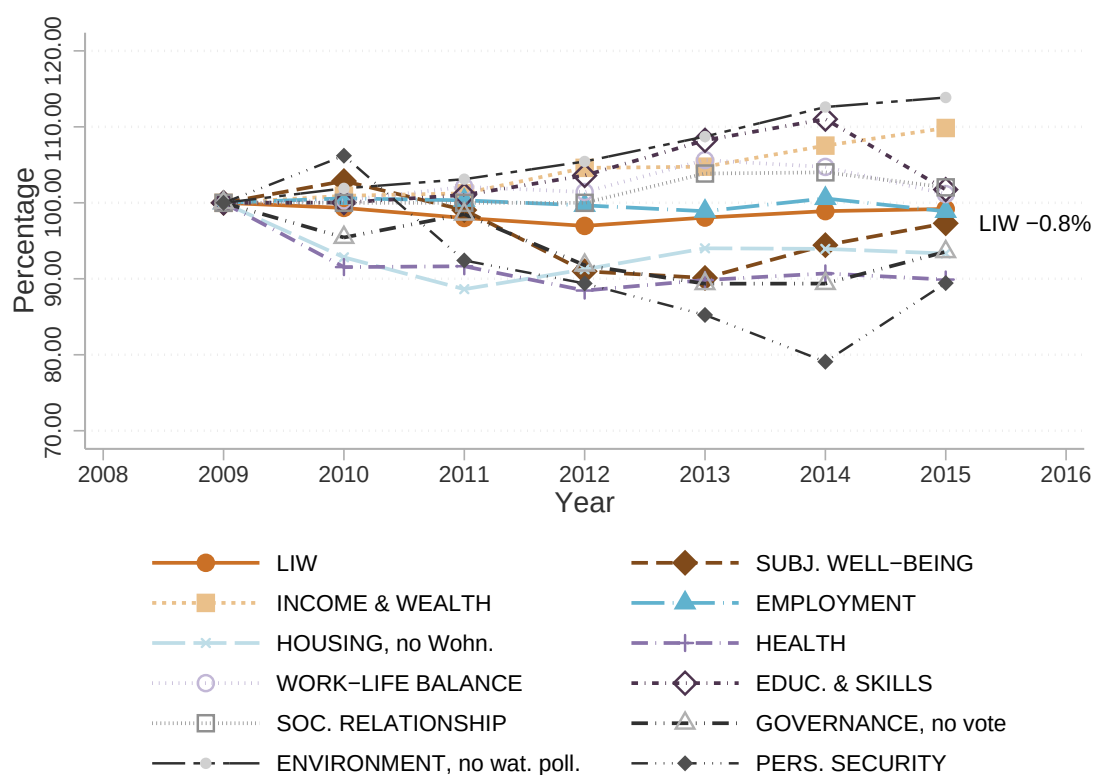
**Note:** Indicators marked as inverted have been recoded so that higher values indicate better quality of life. For instance, the share of people affected by chronic diseases has been inverted in the share of people without chronic diseases according to the following formula: No Chronic diseases = 100 – Chronic disease.

## 5.1 Findings

We start from the trend of LIW and of its components to synthetically illustrate what contributed to quality of life in Luxembourg between 2009 and 2015. This allows us to pinpoint the main domains and indicators driving the changes in quality of life.

Figure 5.1 shows the trend of the LIW and of each of its domains. The LIW is marked with a solid, black line and hollows. The trend shows little change between 2009 and 2015: between 2009 and 2012, the LIW points to a decline in quality of life of about 2%; after 2012 the trend reverts and, by 2015, it reaches the same level of 2009.

**Figure 5.1:** Trend of the Luxembourg Index of Well-being and of its components. The index points to a modest improvement in quality of life which happened after the year 2012.



**Note:** The numbers on the vertical axis are percentages, whereas years are reported on the horizontal axis. All indexes have been normalized to 100 for ease of comparison.

**Source:** Indicators of the PIBien-être project, own elaboration.

Hence, since 2009 there have been no gains in quality of life in Luxembourg. The decomposition of the LIW by its domains allows us to explain in more detail this stagnation. Some domains have upward trends, thus pointing to improving conditions for quality of life. This set of domains includes: Environment, which improves by nearly 13%, Education and skills (+1.5%), Income and wealth (+10%), frequency of social contacts (+1.5%)<sup>2</sup>, and

<sup>2</sup> Among the indicators composing the domain Social relationships, only the frequency of social contacts has been monitored over time, and, therefore, it could be included in the LIW. For more details, please, see section 3.7 on page 135.

work-life balance (+1.5%). The remaining domains have declining trends, thus suggesting worsening conditions. Such domains are: Housing, which declines by 6%, Health (-10%), Personal security (-10%), Governance (-6%), Employment (-3.5%), and Subjective well-being (-2.5%).

### **Domains pointing to improving quality of life**

#### **Income and wealth**

The trends of the indicators composing the *Income and wealth* domain are basically flat, with the exception of the indicator gender wage gap (see figure 5.2). The wage difference between men and women increased by 16 points between 2009 and 2012, when it reversed its trend. This suggests a higher equality of remuneration between men and women. Between 2009 and 2015 the gender wage gap nearly halved, from 13.17 euro/per hour in 2009 to 5.61 in 2015 (for more details see table 3.12 in section 3.1.7 on page 46). All the other indicators remained basically constant at their level of 2009.<sup>3</sup>

#### **Education and skills**

Figure 5.3 indicates that the domain *Education and skills* shows a modest contribution to the trend of quality of life. The trend is mainly explained by two forces acting in opposite directions. On one hand, we observe an increase in the share of people with a university degree from 34.7% in 2009 to 39.8% in 2015. In particular, the share of women with a university degree has increased from 31.7% to 40%, whereas the share of men went from 37.6% to 39.6%. We emphasize that such positive trend hides a slow down between 2014 and 2015: the share of people with a university degree in 2014 was 45.4%, i.e. nearly 6 percentage points higher than in 2015.

On the other hand, the growing share of young people (age 20 - 24) who left education early depressed the trend of the domain Education and skills. In 2009 one out of five young residents left education early, i.e. with a lower secondary education at most. In 2015 this share reached 30%, with an increase of nearly 10% (see table 3.40 and figure 3.62 in section 3.6 for more details).

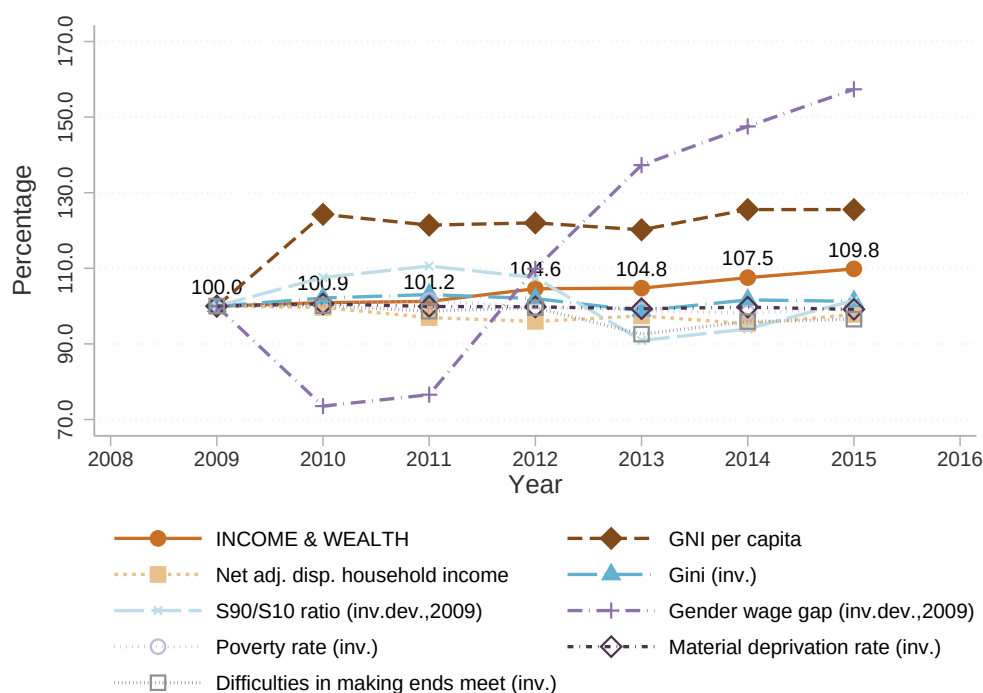
#### **Environment**

The indicators about environmental conditions in Luxembourg suggest improving conditions (see figure 5.4). The trends are particularly positive because of the increase in the use of renewable energy, and of the share of land under organic farming which increase by nearly 2% respectively. The remaining indicators (recycling rate, share of unbuilt areas, share of people using a car, etc.) have also improved over time, but less so, whereas air pollution was the only indicator pointing to worsening conditions.

As reported in table 3.54 on page 158, the percentage of urban population exposed to PM10, one of the most commonly used measures of air pollution, increased by 7% between 2009 (14%) and 2014 (21%). The proportion of the population who declared to be affected by noise remained constant over time: it first declined from 21% in 2009 to 15% in 2011, and then it climbed back to 20% in 2015. On the other hand, the use of renewable energies has nearly doubled since 2009, when they constituted 3% of the gross

<sup>3</sup>The apparent upward trend of the Gross National Income per capita is due to a change in the definition of the variable that happened in 2010. The change shifted upward the level of GNI compared to 2009 thus suggesting an increase of the wealth produced in Luxembourg. We did not truncate the time-series to allow the longest time span possible.

**Figure 5.2:** Trends of the indicators belonging to the Income and wealth domain. All indexes have been normalized to 100 for ease of comparison.



**Note:** The numbers on the vertical axis are percentages, whereas years are reported on the horizontal axis. (inv.) stands for “inverted”, (inv. dev., 2009) stands for “inverted deviation with respect to year 2009”. The poverty rate, the measures of inequality, the subjective measures of material deprivation and the gender wage gap have been inverted for ease of comparison with other indicators of the LIW. For instance, a high (low) score of gender wage gap indicates a low (high) wage difference between men and women.

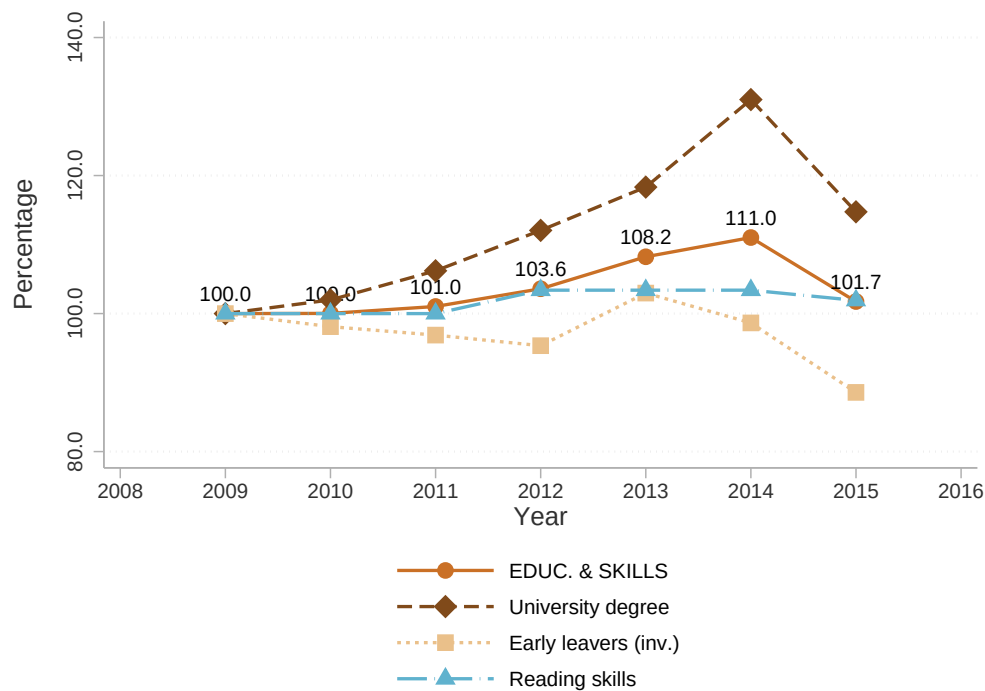
**Source:** Indicators of the PIBien-être project, own elaboration.

final energy consumption. The recycling rate, i.e. the percentage of municipal total waste that is recycled, increased by 2 percentage points in seven years, ranging from 26% in 2009 to 28% in 2015. Another encouraging contribution to quality of life came from the use of land devoted to organic farming which went from 2.7% of the total utilised agricultural area in 2009, to 3.21% in 2015. The only indicator that remained fairly stable over time was the share of car passengers per kilometre, which fluctuated around 83%.

### Work-life balance

The trend of the domain Work-life balance suggests a steady improvement since 2009, despite a slow down in 2013. The net result is, however, a modest increase over time (see figure 5.5). This domain is made of three indicators for which time series are available: the share of paternal to maternal leave, the employment rate of mothers with kids in compulsory school age, and the share of employees working long hours. Although the share of employees declaring to work long time is fairly small (about 0.04% between 2009 and 2014), figures indicate an increase by 0.09% between 2014 and 2015. However, what is more worrying in this regard is the comparison with other European countries: Luxembourg is in the group of countries where the share employees working long hours is

**Figure 5.3:** Trends of the indicators belonging to the Education and skills domain. All indexes have been normalized to 100 for ease of comparison.



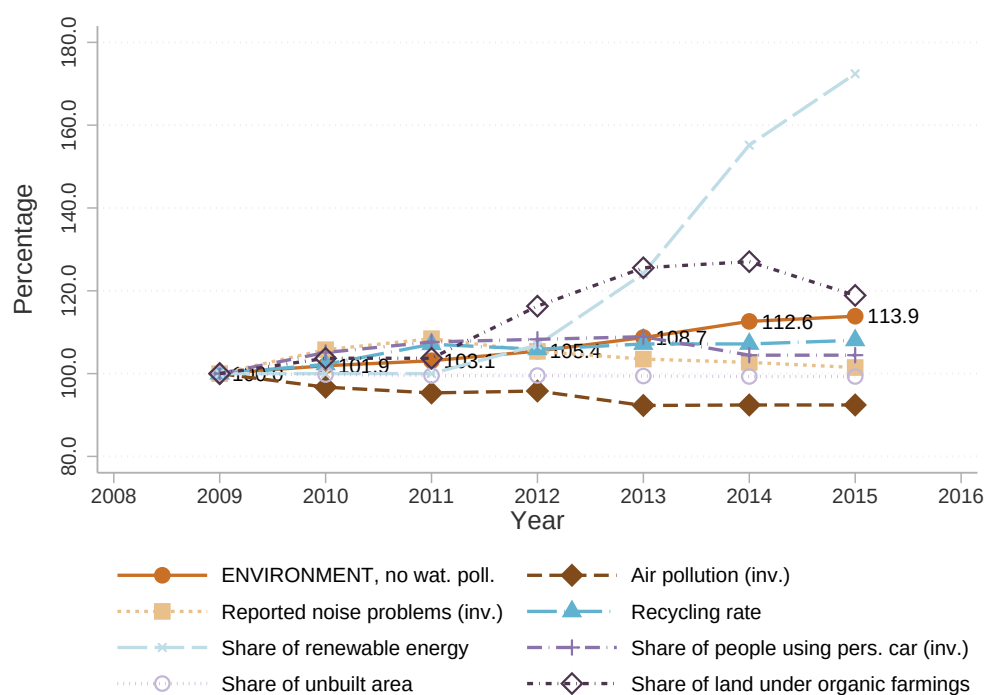
**Note:** The numbers on the vertical axis are percentages, whereas years are reported on the horizontal axis. (inv.) stands for “inverted”. The indicator “Early leavers” has been inverted for ease of comparison with other indicators of the LIW. A high (low) score of early leavers indicates a low (high) share of young people leaving their studies early.

**Source:** Indicators of the PIBien-être project, own elaboration.

above the European average.

The remaining two indicators follow a positive trend, thus indicating improving conditions: the share of parental over maternal leave went from 30.6% in 2009 to 31.7% in 2015. The employment rate of mothers with kids in compulsory school age increased uniformly over time ranging from 68.3% in 2009 to 72.9% in 2015, with a net increase of 4.6 percentage points.

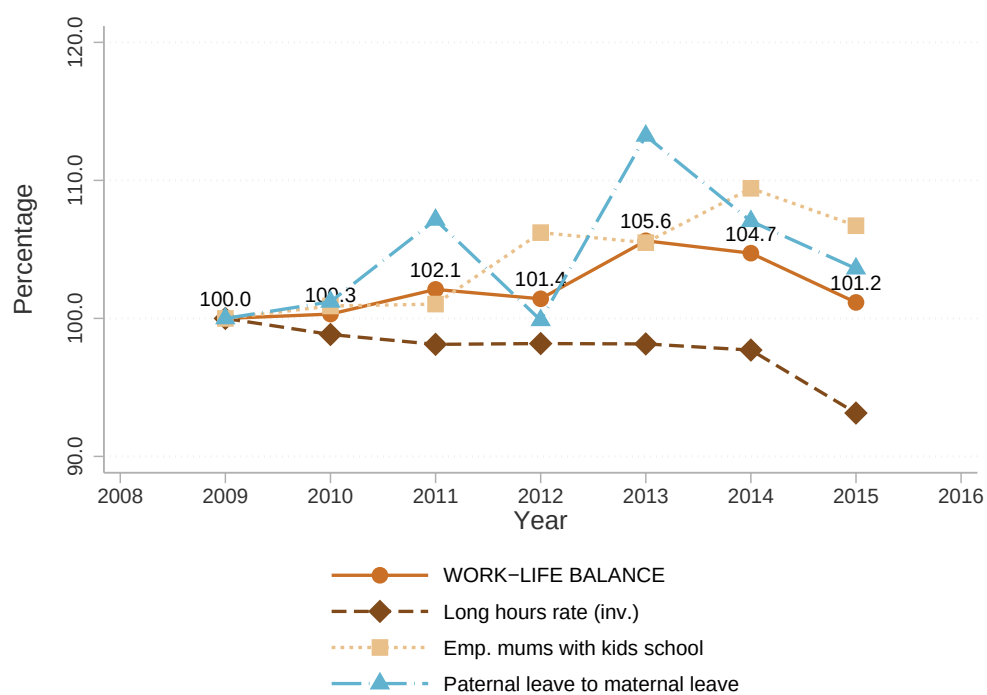
**Figure 5.4:** Trends of the indicators belonging to the Environment domain. All indexes have been normalized to 100 for ease of comparison.



**Note:** The numbers on the vertical axis are percentages, whereas years are reported on the horizontal axis. (inv.) stands for “inverted”. Reported noise problems, air pollution and the share of people using personal cars have been inverted for ease of comparison with other indicators of the LIW. For instance, a high (low) score of reported noise problems indicates the presence of low (high) noise problem.

**Source:** Indicators of the PIBien-être project, own elaboration.

**Figure 5.5:** Trends of the indicators belonging to the Work-life balance domain. All indexes have been normalized to 100 for ease of comparison.



**Note:** The numbers on the vertical axis are percentages, whereas years are reported on the horizontal axis. (inv.) stands for “inverted”. The indicator about long working hours has been inverted for ease of comparison with other indicators of the LIW. For instance, a high (low) long hours rate indicates a low (high) rate of long working hours.

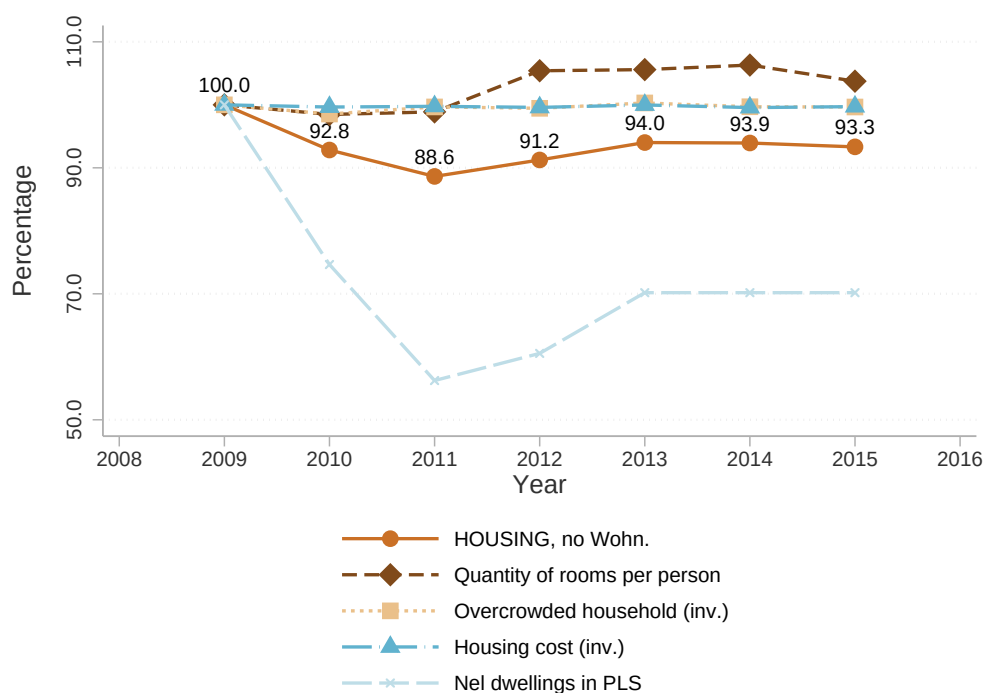
**Source:** Indicators of the PIBien-être project, own elaboration.

### Domains pointing to worsening quality of life

#### Housing

The trends reported in figure 5.6 show that the indicator about the availability of new dwellings pushes the trend of the *Housing* domain downward. Despite the growing resident population, the availability of new dwellings declined by 42% between 2009 and 2011, before sensibly recovering in 2013 with 2642 new dwellings. At the same time, the number of rooms available per person went from 2.26 in 2009 to 2.34 in 2015.

**Figure 5.6:** Trends of the indicators belonging to the Housing domain. All indexes have been normalized to 100 for ease of comparison.



**Note:** The numbers on the vertical axis are percentages, whereas years are reported on the horizontal axis. (inv.) stands for “inverted”. The indicators overcrowded household and housing costs have been inverted for ease of comparison with other indicators of the LIW. For instance, a high (low) score of housing cost indicates a low (high) incidence of housing costs on the total net household income.

**Source:** Indicators of the PIBien-être project, own elaboration.

The two remaining indicators for which time series data are available did not change significantly over time: the percentage of people living in overcrowded dwellings was about 6.5%, besides a temporary peak in 2010. Similarly, total housing costs, as a share of disposable income, stayed constant at about 14.6% since 2009. However, these statistics hide heterogeneity within the population: the housing costs for owners averaged about 5% and they showed a decreasing tendency; owners with a mortgage paid nearly the double (about 10.7% of their disposable income). On the other hand, the housing costs for renters were nearly 6 times higher than for owners: the total housing costs went from 29.2% in 2010 to 34.5% in 2015. Similar discrepancies appeared after disaggregating this figure by income quintile: housing costs represented nearly a third of the disposable income of people belonging to the first (the poorest) income quintile, while they were 7% of the

disposable income of a household belonging to the fifth quintile (see table 3.25 on page 94 for more details.).

### Health

The health of residents in Luxembourg worsened over time (see figure 5.7). The main (negative) driver of this trend is the incidence of mental disorders. The share of people affected by mental disorders doubled between 2009 and 2013. The share of people who died because of a mental problem doubled between 2009 (about 20 per 100,000 residents) and 2013 (about 43 per 100,000 residents). It does not surprise that mental problems prevailed among the elderly, however mental problems increased the most among people below age 65 (about 2.5 times, while it is about 2 times among over 65 years old people). In addition, men were more affected by mental problems than women. In 2009 0.24% of men was affected by mental problem compared to 0.17% of women. In 2015 the share of men with mental problems was 0.47% (+0.23%), while the share of women was 0.37% (+0.20%).

This trend is reinforced by the decrease in the number of years that an adult can expect to live free from disabilities. The number of healthy years that a woman can expect in Luxembourg decreased by 3 years, from 66 years in 2009 to 63 years in 2015. Men follow a similar trend: in 2009 they could expect 65.5 years free from disabilities. By 2014 men's life expectancy in good conditions was 64 years.<sup>4</sup>

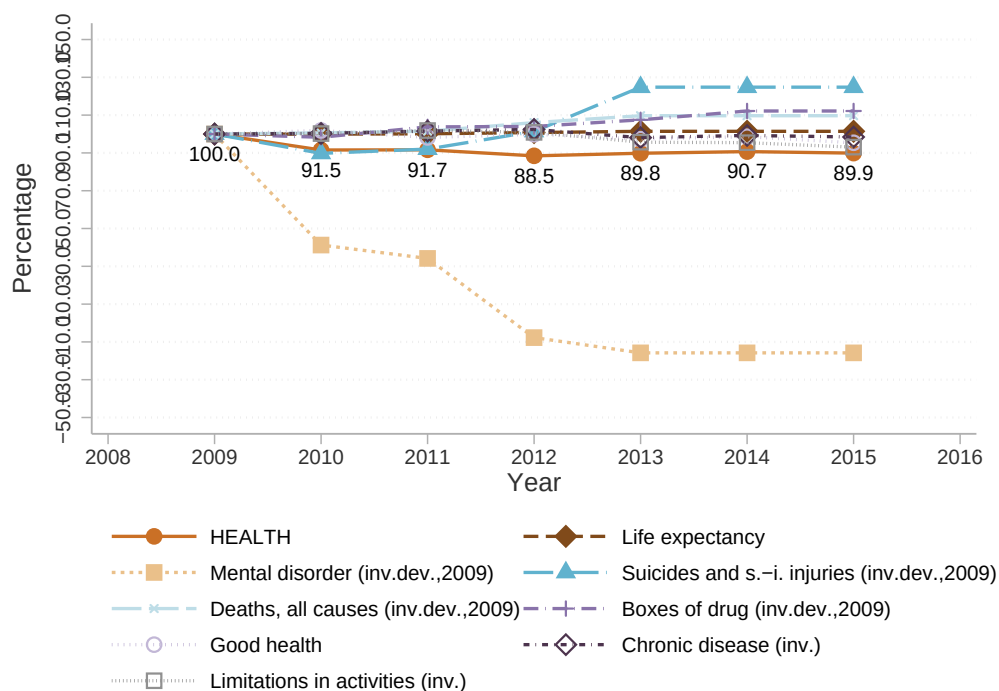
Further four indicators point to worsening health conditions: the share of adults declaring to be in good or very good health, the share of adults with chronic diseases and the share of adults declaring to be limited in their everyday activity because of health issues. At the same time, the share of people declaring to be in good conditions went from 74% to 70.5%, whereas the share of those who declared to be limited in their daily activities increased from 20.1% to 25.7%. Similarly, but to a smaller extent, the share of people declaring to have chronic diseases went from 22% to 23.2%.

The negative trend of the health domain was attenuated by the improvement of the suicide rate, and by the decrease in drug consumption. Between 2009 and 2015, the suicide rates went from 8.8 to 6.6 suicides per 100,000 people. Figures about the consumption of drugs are issued by the General Inspection of Social Security. The consumption of psychotropics, including anxiolytics, hypnotics, sedatives and antidepressants has declined over time: in 2009 an average resident consumed 7.3 boxes of antidepressants, 6.6 of hypnotics or sedatives, and 5.6 of anxiolytics. In 2014, these share declined to 5.4, 6.5 and 5.1 respectively. Our figures indicate that the consumption is fairly equally distributed across socio-demographic groups, except for working status and nationality. Inactive and retired people consume on average about 3 boxes more per person per year than others. While the figure for retired people may reflect the confounding effect of age (retired people are older than others and they may need more drugs), the figure for inactive people requires a more in depth analysis. The figures from the IGSS also indicate that nationals consume about 1.5 boxes per capita per year than EU immigrants, and about two times more boxes than extra-EU immigrants (for more details, see table 3.29 on page 111).

Finally, the number of deaths by causes sensibly decreased, except deaths caused by a

<sup>4</sup>This indicator is not included in the LIW because its time series ends in 2014. We discussed it here because it contributes to describing the quality of health in Luxembourg. For more details, please, see section 3.4 on page 96.

**Figure 5.7:** Trends of the indicators belonging to the Health domain. All indexes have been normalized to 100 for ease of comparison.



**Note:** The numbers on the vertical axis are percentages, whereas years are reported on the horizontal axis. (inv.) stands for “inverted”, (inv. dev., 2009) stands for “inverted deviation with respect to year 2009”. The With the exception of the indicators “good health” and “life expectancy”, all the indicators in this domain have been inverted for ease of comparison with other indicators of the LIW. For instance, a high (low) score of people declaring to be limited in everyday activities indicates a low (high) rate of people declaring to be limited in their activities because of health issues.

**Source:** Indicators of the PIBien-être project, own elaboration.

coronary or artery disease, endocrine disorders, diabetes, mental diseases, and diseases affecting the genitourinary system.

### Personal security

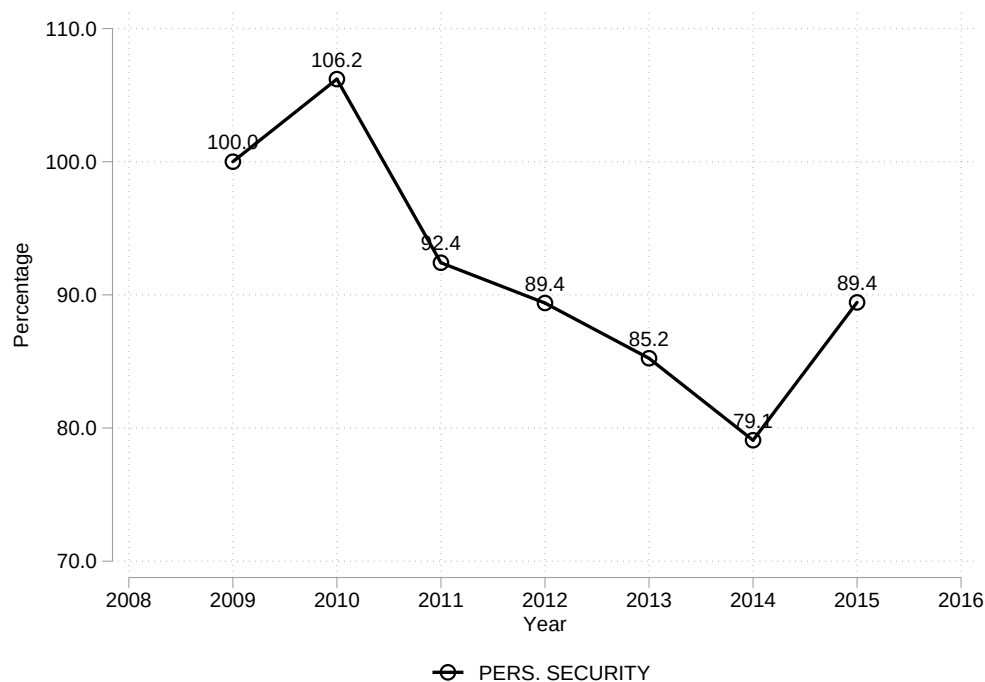
Of the two indicators composing the Personal security domain, only one – the offence rate – has time-series data to inform the LIW. These figures, compiled using data from the Police of Luxembourg and STATEC, indicate an increase from 6,483 to 7,168 offences per 100,000 people, i.e. an increase of about 10.6% in six years.

### Governance

Figure 5.9 documents a decrease of people’s confidence in the Government and in the Parliament. In 2009 75.3% of respondents declared to trust the Government or the Parliament. Six years later the share of people trusting the same institutions was 62%. This trend holds for virtually every breakdown we considered: age, occupation, working status, and gender (see section 3.8.4 on page 149).

Functioning institutions play an important role for quality of life and the negative trends of confidence in national institutions are a source of concern for people’s well-being.

**Figure 5.8:** Trends of the indicators belonging to the Personal security domain. All indexes have been normalized to 100 for ease of comparison.

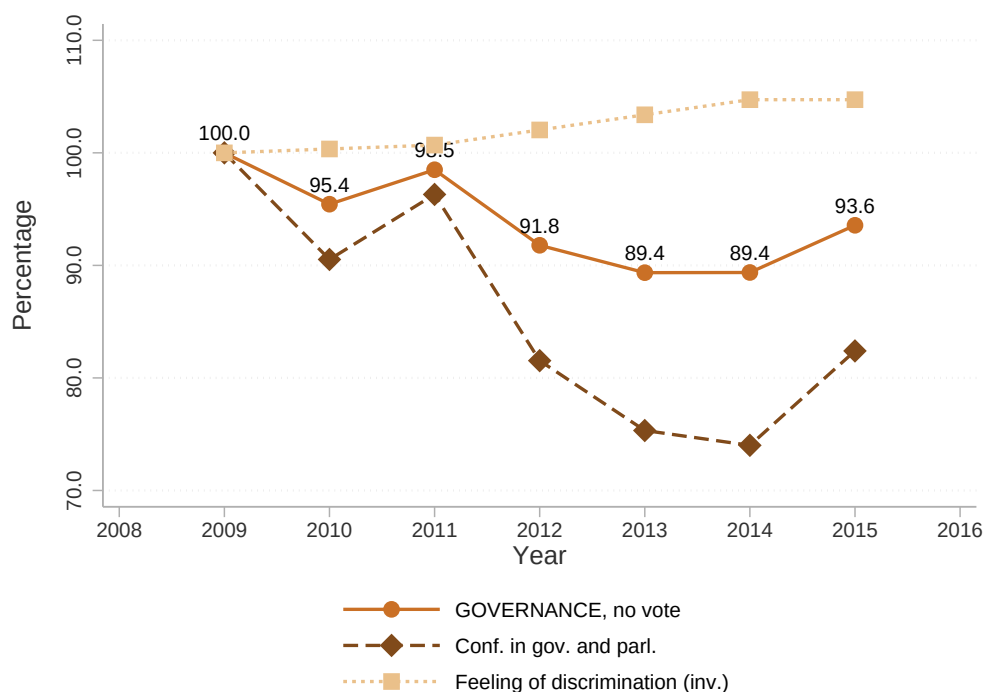


**Note:** The numbers on the vertical axis are percentages, whereas years are reported on the horizontal axis. This indicator has been inverted for ease of comparison with other indicators of the LIW: a high (low) score indicates a low (high) offence rate.

**Source:** Indicators of the PIBien-être project, own elaboration.

Such trend was partly counterbalanced by improvements in the field of discrimination. The indicator reported in figure 5.9 shows an improvement of nearly five percentage points between 2009 and 2015. Feeling of discrimination, as measured by a large battery of forms of discriminations (age, gender, religious, ethnic, etc.), reduced substantially over time. For instance, table 3.8.5 on page 3.8.5 indicates that the perception of race or ethnic related discrimination decreased from 38% in 2009 to 20% in 2015; the perception of sexual discrimination went from 28% to 15% in the same period. Only two of the eleven considered forms of discrimination signal an increase over time: the share of people perceiving discrimination due to nepotism increased by 6% between 2009 (4%) and 2014 (10%); the share of people perceiving discrimination related to sexual orientation increased by 2%, reaching 5% in 2014.

**Figure 5.9:** Trends of the indicators belonging to the Governance domain. All indexes have been normalized to 100 for ease of comparison.



**Note:** The numbers on the vertical axis are percentages, whereas years are reported on the horizontal axis. The indicator “feeling of discrimination” has been inverted for ease of comparison with other indicators of the LIW: a high (low) score indicates a low (high) feeling of discrimination.

**Source:** Indicators of the PIBien-être project, own elaboration.

## Employment

The synthetic index of the *Employment* domain indicates a 3.5% decline since 2009 (see figure 5.10). This is mainly the result of two changes: on one side, the time series of accidents at work, which follows a U-shape trend whereby the average number of accidents per 100,000 workers went from 1.77 in 2009, to 6.31 in 2012, and 3.71 in 2015. On the other side, the share of people forced to part-time contracts, i.e. the share of workers who wish to work more than the contractual part-time, have slightly decreased from 4.3% in 2009 to 3.7% in 2013, before reaching 5.3% in 2015. On average the share of forced part-time was about four times higher for women (7.6%) than for men (1.4%), although the growth rates for the two groups were fairly similar: 18.75% for women, and 17.72% for men.

Such heterogeneity appears also by different educational levels, and income groups. On average, 7.1% of people with lower secondary education wished to work more than the actual number of hours, while 2.8% of people with tertiary education wished to have a full-time job. Additionally, the share of forced part-time increased by nearly 6.5% per year among less educated people, while the growth rate among high educated people was about 3.1% yearly.

Independently from the breakdown, figures indicate that between 2013 and 2015 the share of forced part-time increased by about 10% yearly – from 3.7% to 5.3% – whereas in the previous period it decreased by 3.5% yearly.

Figures concerning employment and unemployment rates show mild changes: the employment rate increased from 65.1% in 2009 to 66.5% in 2015; the unemployment rate increased by 5.1%, ranging from 5.2% in 2009 to 6.8% in 2015. In the same period, also the long term unemployment increased independently from the method used to compute it.<sup>5</sup> Following the CES-CSDD method, the long term unemployment rate in Luxembourg increased by 7.7% yearly, ranging from 1.3% in 2009 to 1.9% in 2015. According to Eurostat, the long term unemployment rate increased by 2.73% yearly, from 24.4% in 2009 to 28.4% in 2015. Both data sources, however, provide a consistent picture: the long term unemployment increased mainly for people between 35 and 49 years old, for men, and for immigrants (for more details, please, refer to tables 3.19 and 3.20 in section 3.2.2 on page 63).

## Subjective well-being

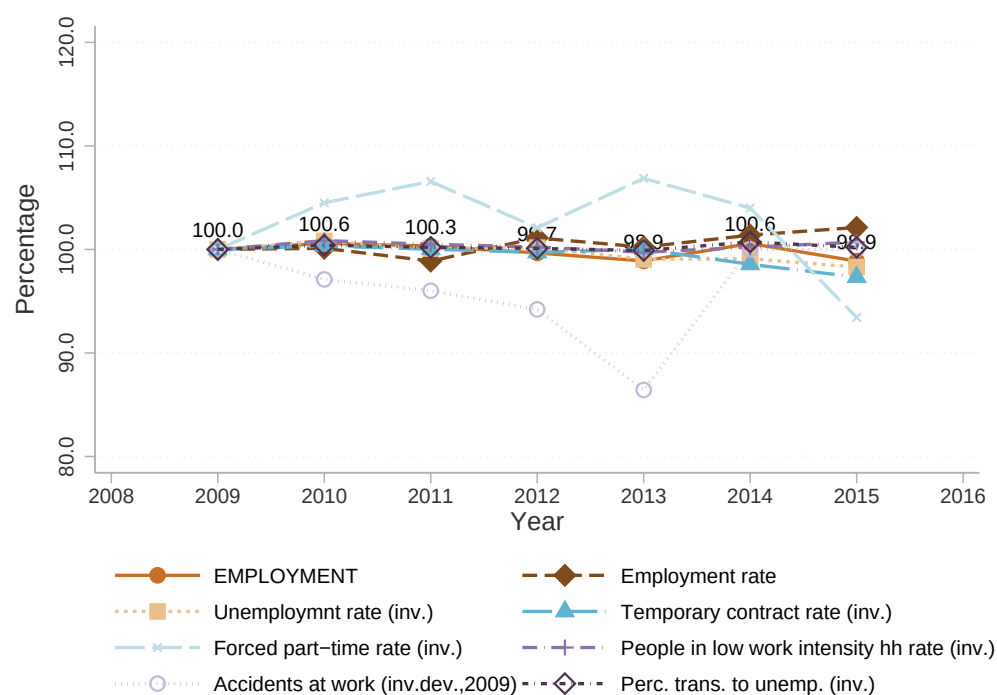
The indicator informing the Subjective well-being domain is based on the share of residents who are more satisfied with their life than the median. Hence, the higher the share, the more are the residents satisfied with their life. The time series indicates that life satisfaction fluctuated around the level of 2009 when 42% of the respondents were satisfied with their life (see figure 5.11). Six years later the share of satisfied people amounted to 41%.

Figures confirm some stylised facts about people's well-being: younger residents were on average more satisfied with their life than elderly people; for each year in the LIW we observe a U-shaped relationship between age and well-being; unemployed people were on average dissatisfied with their life: only one out of five declared to be satisfied with her/his

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<sup>5</sup>The CES-CSDD recommend to compute the long-term unemployment rate using a different method than the one used by Eurostat. The difference is that CES-CSDD computes the share of people in long term unemployment out of the labor force, whereas Eurostat computes the share of people in long term unemployment out of the unemployed people.

**Figure 5.10:** Trends of the indicators belonging to the Employment domain. All indexes have been normalized to 100 for ease of comparison.

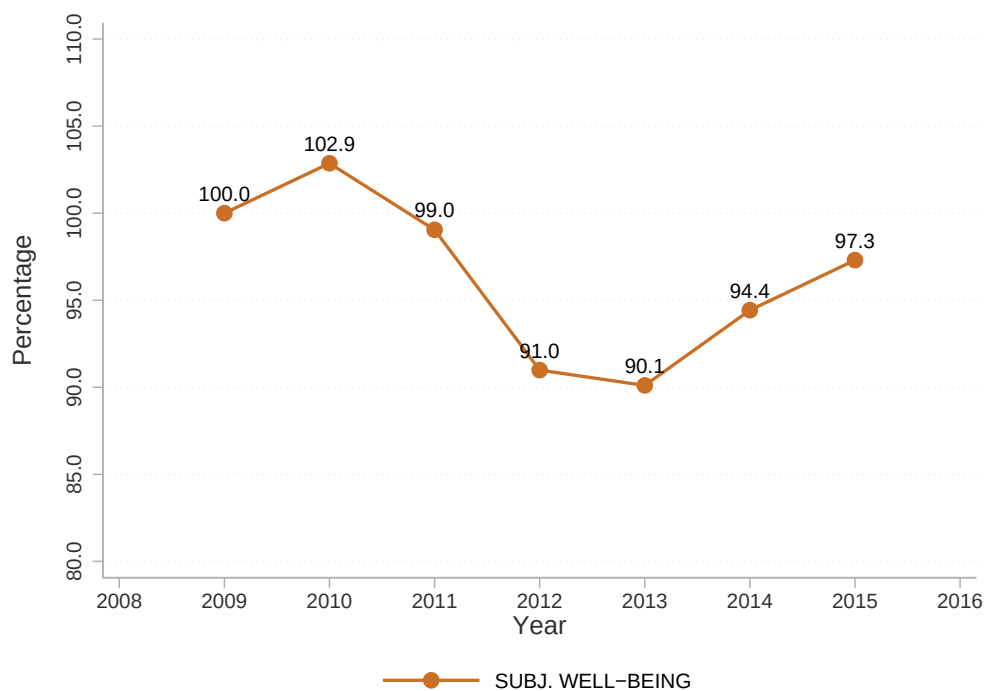


**Note:** The numbers on the vertical axis are percentages, whereas years are reported on the horizontal axis. (inv.) stands for “inverted”, (inv. dev., 2009) stands for “inverted deviation with respect to year 2009”. With the exception of the employment rate, all the indicators belonging to this domain have been inverted for ease of comparison with other indicators of the LIW. For instance, a high (low) unemployment rate indicates a low (high) rate of unemployment.

**Source:** Indicators of the PIBien-être project, own elaboration.

life. Moreover, this share went from 28% in 2009 to 13% in 2015 (for more details, see table 3.59 on page 164).

**Figure 5.11:** Trends of the indicator belonging to the Subjective well-being domain. The index has been normalized to 100 for ease of comparison.



**Note:** The numbers on the vertical axis are percentages, whereas years are reported on the horizontal axis.

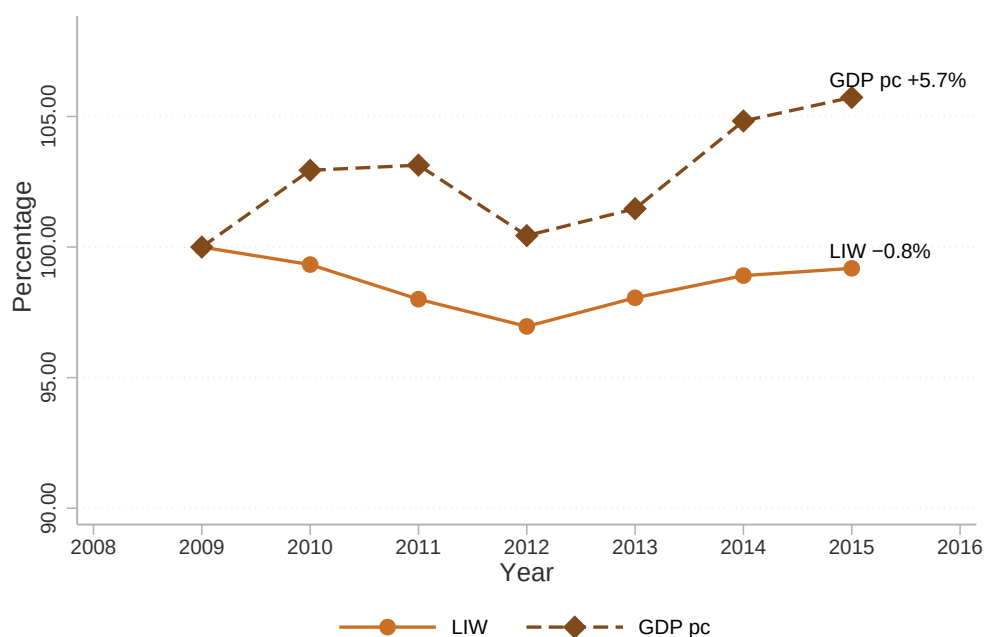
**Source:** Indicators of the PIBien-être project, own elaboration.

## 5.2 Measuring quality of life: LIW and its alternatives

By its conception, the PIBien-être project intends to overcome the limitations of market-based measurements of quality of life, such as economic growth. The LIW summarises the information from the PIBien-être in a single index to provide an encompassing assessment of quality of life in Luxembourg. How do the time-series of LIW compare to other proxies of quality of life (or lack thereof) such as Gross Domestic Product per capita (GDPpc), unemployment rate, GINI index (GINI), and life satisfaction?

Figure 5.12 shows the trends of LIW and of Gross Domestic Product per capita, a purely economic measure of progress. GDP per capita followed a substantially positive trend. LIW, on the contrary, documents stagnating living conditions. Additionally, while both GDP per capita and LIW declined between 2010 and 2012, the former recovers faster than the LIW: by 2014 GDP per capita had reached the level of 2010, while in 2015 the LIW was still lagging behind. This discrepancy is not surprising as we already noticed in section 2 that various measures of quality of life can lead to different conclusions. How does the LIW score compared to other indicators?

**Figure 5.12:** Trend of the Luxembourg Index of Well-being and Gross Domestic Product per capita.

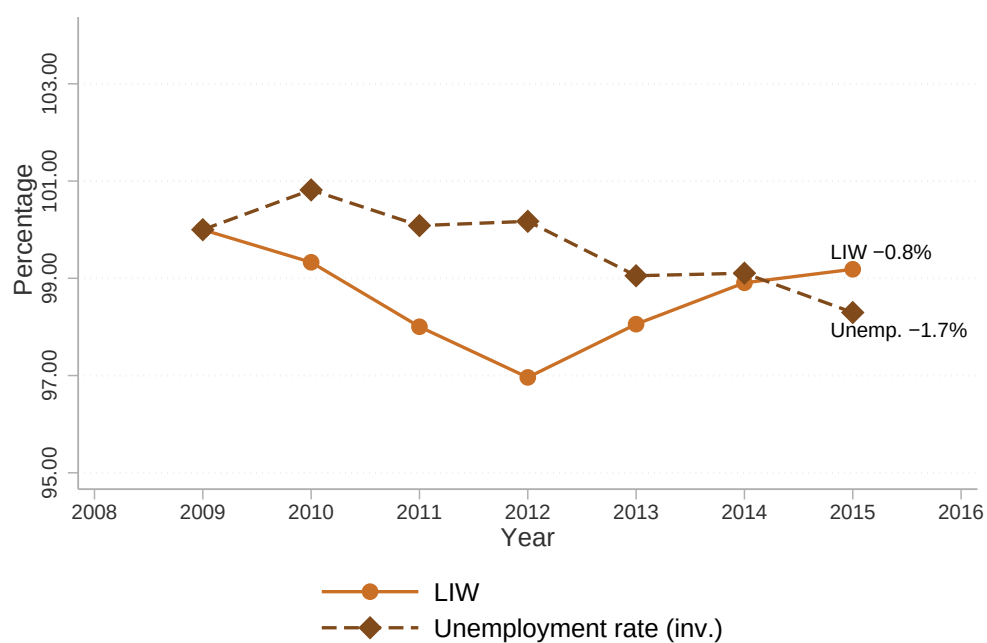


**Note:** The numbers on the vertical axis are percentages, whereas years are reported on the horizontal axis. All indexes have been normalized to 100 for ease of comparison.

**Source:** Indicators of the PIBien-être project, own elaboration.

The unemployment rate (see figure 5.13) increased between 2009 and 2013, indicating worsening working conditions with negative consequences for quality of life. This picture is consistent with the one from LIW, although the unemployment rate does not show any sign of recovery.

Figure 5.14 reports the comparison between the Gini index, a synthetic measure of income inequality, and LIW. The Gini index has been inverted for comparability with the

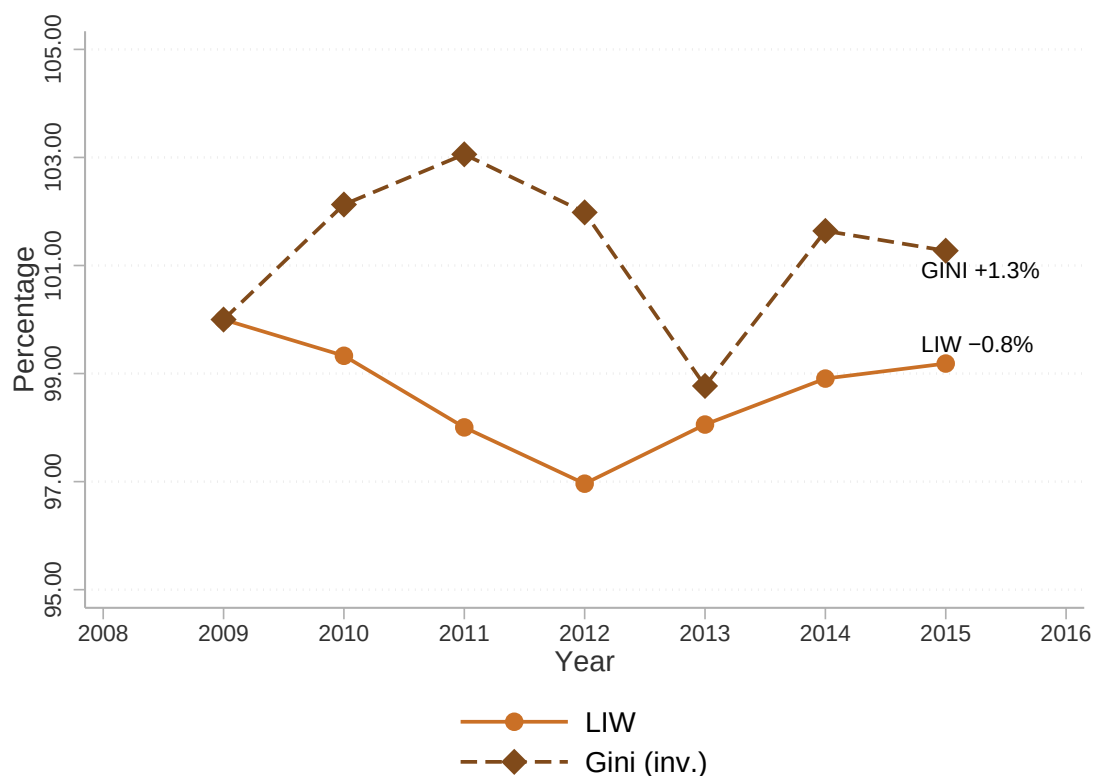
**Figure 5.13:** Trend of the Luxembourg Index of Well-being and unemployment rate.

**Note:** The numbers on the vertical axis are percentages, whereas years are reported on the horizontal axis. All indexes have been normalized to 100 for ease of comparison. The unemployment rate has been inverted for ease of comparison with other indicators of the LIW: a high (low) score indicates a low (high) unemployment rate.

**Source:** Indicators of the PIBien-être project, own elaboration.

other indicators: high scores of the inverted Gini index indicate low inequality. The LIW and the Gini index follow a consistent trajectory: after a period of about two years, the Gini increased suggesting an increase of inequality, which is assumed to hamper quality of life, until 2013 (from 26.9 in 2011 to 30 in 2013). Afterwards, the Gini index declined from 30 to 28.2 in 2015. The latter change suggests an improvement of living conditions that is correctly mirrored by the LIW.

**Figure 5.14:** Trend of the Luxembourg Index of Well-being and Gini index.

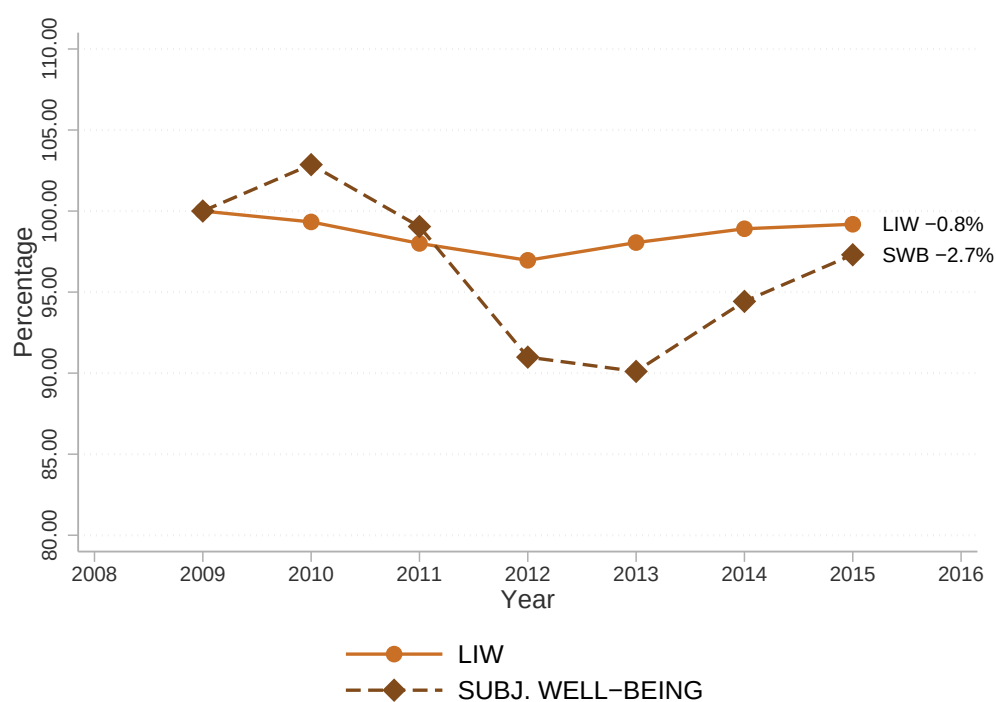


**Note:** The numbers on the vertical axis are percentages, whereas years are reported on the horizontal axis. All indexes have been normalized to 100 for ease of comparison. The Gini index has been inverted for ease of comparison with other indicators of the LIW: a high (low) score indicates low (high) inequality.

**Source:** Indicators of the PIBien-être project, own elaboration.

Figure 5.15 shows the time-series of the share of people declaring to be satisfied with their lives along with the time-series of LIW. Life satisfaction, i.e. people's subjective evaluation of their life as a whole, is a valid proxy of quality of life. This variable significantly correlates with a number of life domains including: income and wealth, occupation, aging, health, social relationships, religiosity, etc. Economists often refer to life satisfaction as an observed measure of utility, and many scholars argue that governments should target people's life satisfaction with ad-hoc policies.

Life satisfaction and LIW follow a similar path: they declined between 2009-10 and 2012-13, and they slowly recovered afterwards. In both cases the recover is not complete: in 2015 both LIW and life satisfaction were below their initial levels of 2009.

**Figure 5.15:** Trend of the Luxembourg Index of Well-being and life satisfaction.

**Note:** The numbers on the vertical axis are percentages, whereas years are reported on the horizontal axis. All indexes have been normalized to 100 for ease of comparison.

**Source:** Indicators of the PIBien-être project, own elaboration.

### 5.3 Sensitivity analysis using various weights

The LIW assumes that each domain composing the PIBien-être project contributes in the same way to quality of life. More precisely, by averaging scores from various domains, the LIW assumes that the score from the Governance domain matters as much as the score for Work-life balance for quality of life. This assumption can be considered as arbitrary: it is well known, for instance, that people would often rate their health as more important than any other domain of their life.

To relax our assumption, and to check the sensitivity of the LIW to different composition of what matters for quality of life, we computed various versions of the LIW using various weighting schemes from the Better Life Initiative. The OECD allows users of the Better Life Initiative web-site to rank various domains of quality of life according to their understanding of what a good life is. We used users' rankings as revealed preferences about the weights that people attach to various domains of quality of life. This is possible because the domains used by the OECD are comparable with those used in the PIBien-être project.

In particular, we used five different sets of weights based on the following rankings: the ranking provided by the average European resident, i.e. any user of the Better Life Initiative who connected from a European domain; and the rankings provided by Luxembourgian, French, Belgian or German residents, respectively.<sup>6</sup> Each set of weights has been used to produce a new weighted LIW which we compared with the unweighted LIW.

Figure 5.16 plots the LIW and the LIW weighted according to the rankings provided by European users. Europeans ordered the domains of quality of life as follows: health, subjective well-being, work-life balance, personal security, environment, housing, social relationships, occupation, income, education, and governance.

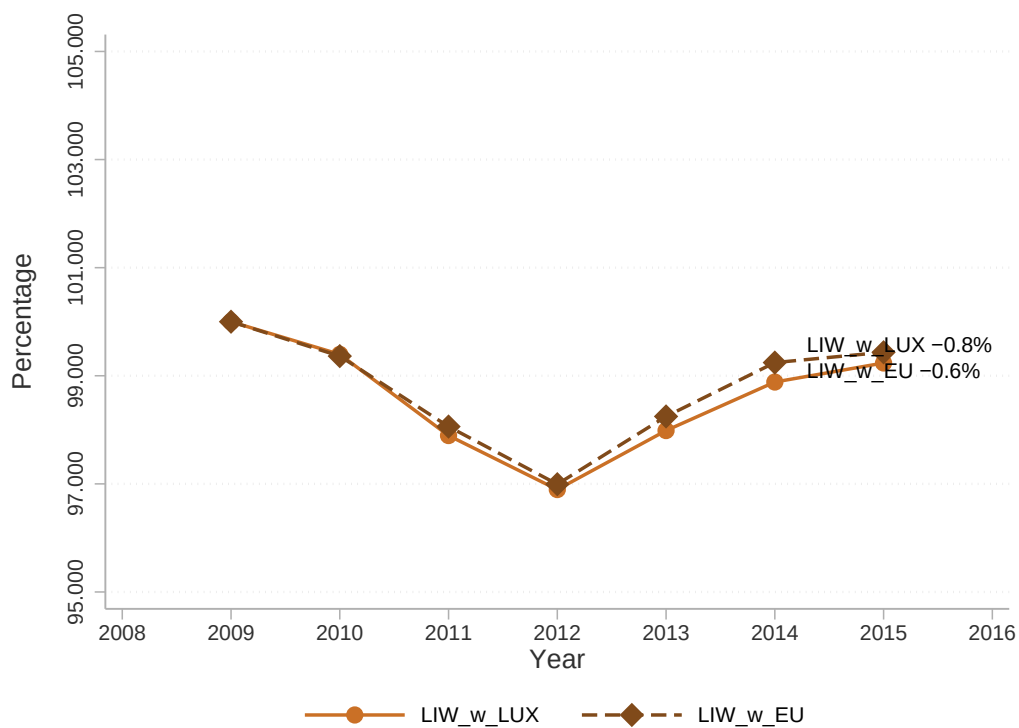
The ranking of the domains chosen by the residents of Luxembourg differs slightly from the one coming from the pooled European data. In Luxembourg domains were ordered as follows: health, subjective well-being, income, occupation, personal security, environment, work-life balance, housing, social relationships, education and governance. Figure 5.17 reports the results for the LIW.

In both cases the discrepancies between the weighted and unweighted LIW are fairly small, and in case of data from Luxembourg there is basically no difference (see figures 5.16 and 5.17). This result suggests that the arbitrary choice of assigning the same weights to each domain of the PIBien-être does not significantly change the LIW: after accounting for people's revealed ranking of what matters for quality of life, the trend of the weighted LIW closely follows the trend of the unweighted LIW.

To further check the reliability of our figures, we compared the trend of the LIW with the weighted LIW using weights from Belgium (figure 5.18), Germany (figure 5.19), and France (figure 5.20). Results support the evidence that the ranking of what matters for quality of life has little effect on the LIW. When we applied the weights from Belgium, Germany, and France to the figures from Luxembourg, the LIW diverted slightly and mainly between 2014 and 2015.

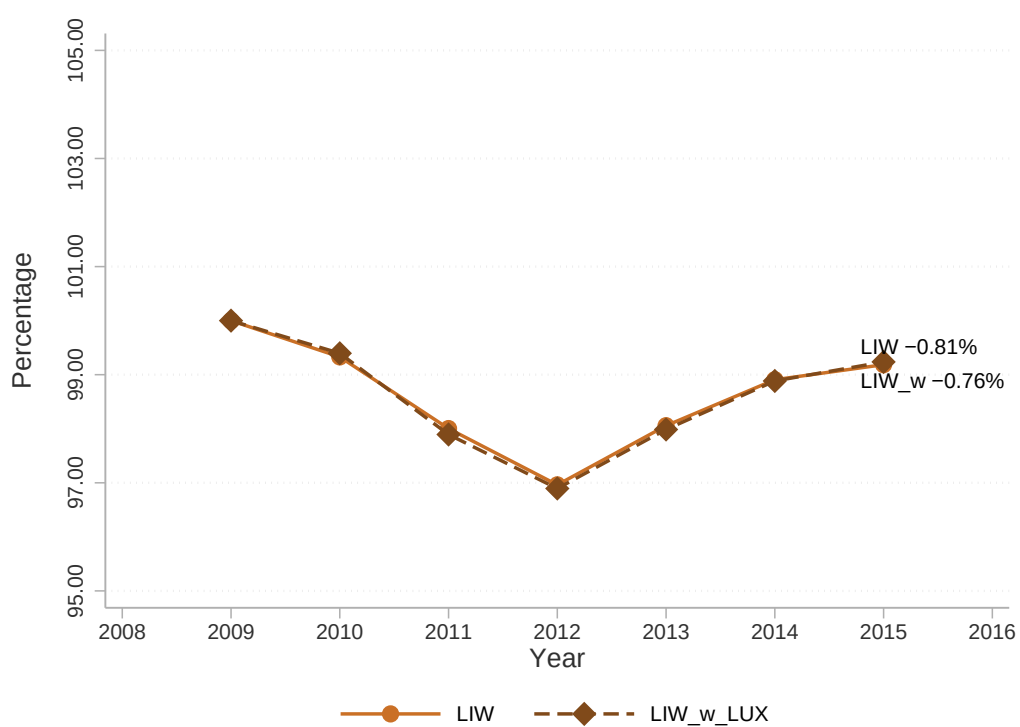
In conclusion, our tests indicate that the results provided by the (unweighted) LIW are robust to different specifications of what matters for quality of life. At least as far as we consider the revealed preferences of a set of homogeneous people, such as those living in

<sup>6</sup>The rankings are publicly available here: <http://www.oecdbetterlifeindex.org/bli/>.

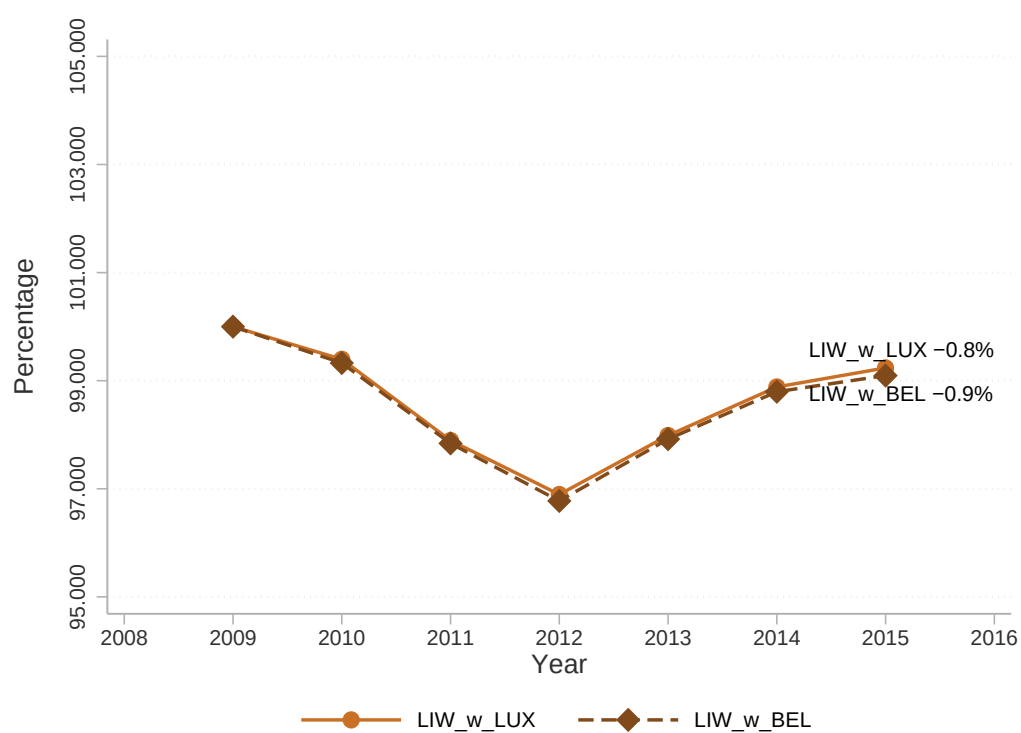
**Figure 5.16:** Weighting LIW according to the preferences of EU residents

**Source:** LIW and OECD Better Life Initiative data, own elaboration.

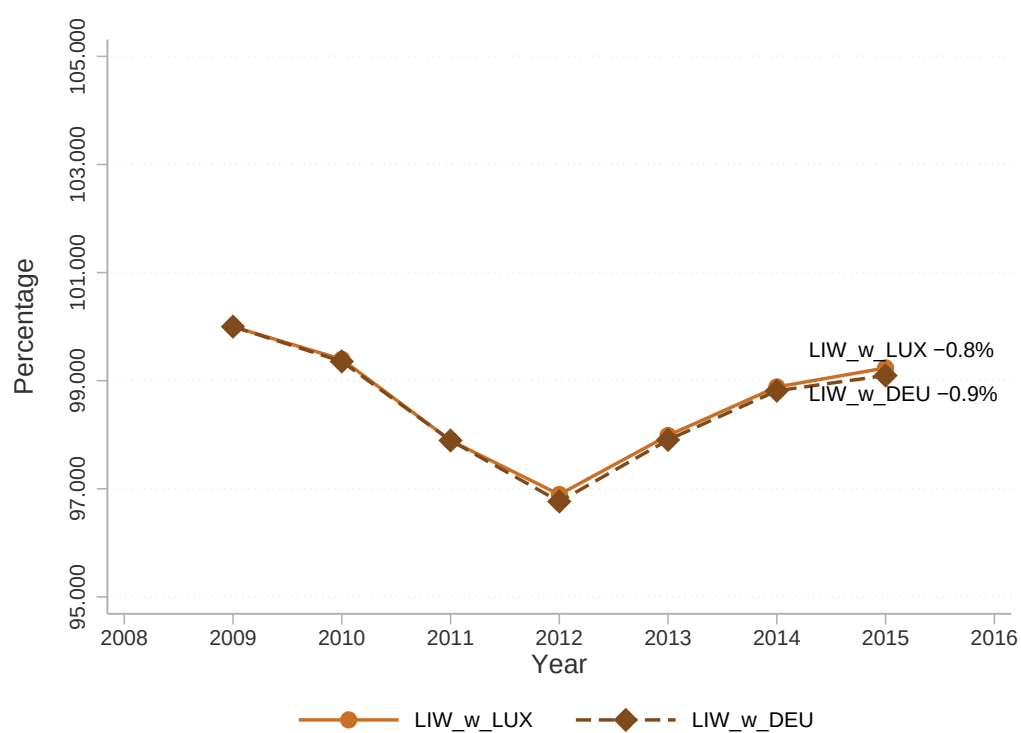
Europe or in Luxembourg's neighbouring countries.

**Figure 5.17:** Weighting LIW according to the preferences of Luxembourgian residents

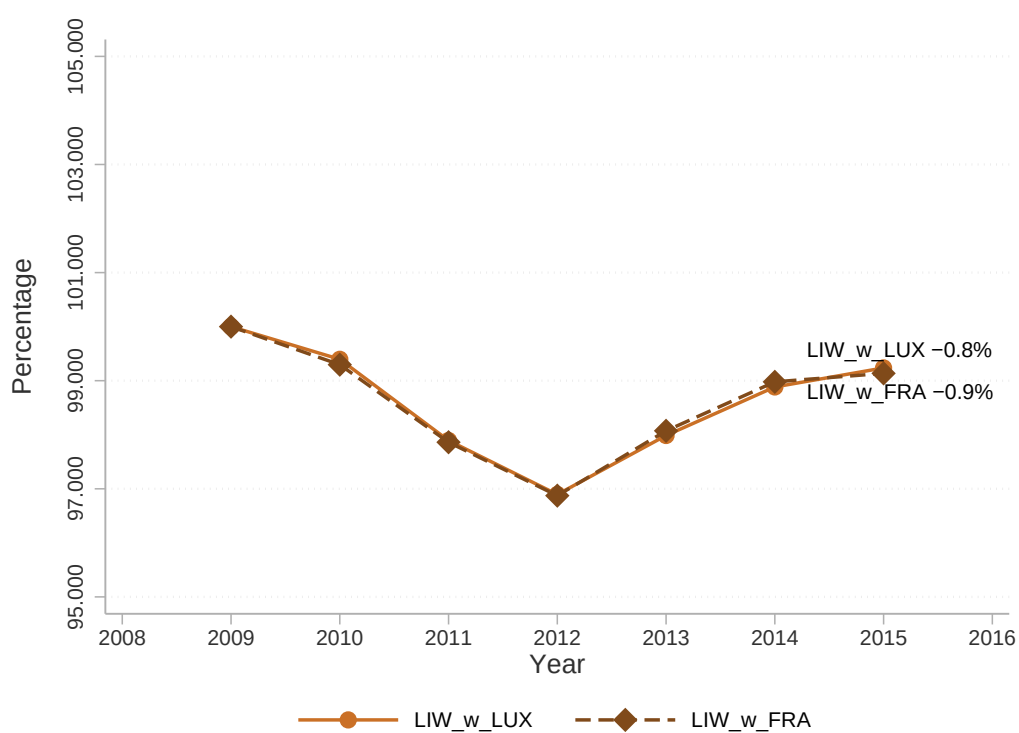
**Source:** LIW and OECD Better Life Initiative data, own elaboration.

**Figure 5.18:** Weighting LIW according to the preferences of Belgian residents

**Source:** LIW and OECD Better Life Initiative data, own elaboration.

**Figure 5.19:** Weighting LIW according to the preferences of German residents

**Source:** LIW and OECD Better Life Initiative data, own elaboration.

**Figure 5.20:** Weighting LIW according to the preferences of France residents

**Source:** LIW and OECD Better Life Initiative data, own elaboration.





## 6. Forecasting life satisfaction

Statistical surveys are widespread tools to study people's behaviours, preferences and well-being, and provide valuable information for policy making. Survey data, however, suffer from the problem of **timeliness**, which refers to the lengthy delay between collecting the data and disseminating it for analysis and research. To address this problem analysts resort to techniques from the field of time series to predict the values of variables of interest. These predictions are referred to as forecasts. The problem of timeliness is very relevant to quality of life data, and the PIBien-être project in particular, as indicators are mainly compiled from survey data. For example, many indicators are sourced from SILC, for which the last available observation is 2015. This chapter presents an empirical method to forecast current and future values of well-being. This constitutes a first attempt to forecast quality of life variables, and is mainly aimed at suggesting venues for future research.

Broadly speaking, variables' forecasts are produced by estimating a model in which (changes of) a variable of interest are regressed over a set of explanatory variables. The variable to forecast is called response while the explanatory variables are referred to as predictors. The set of predictors typically includes lagged values of the variable of interest, and present and lagged values of variables that are found to correlate with the response and/or are suggested by the theory or previous research (Hendry, 1995). Forecasting poses the following methodological challenges: 1) variable selection; 2) model specification; 3) mixed frequencies problem. Researchers need to make several choices when forecasting. Namely, they need to select the variables and the number of lags entering the model; they also need to specify a functional form of the relation between response and predictors. A further issue is that relevant predictors might be available at different frequencies. What follows addresses the issues listed above in the following manner:

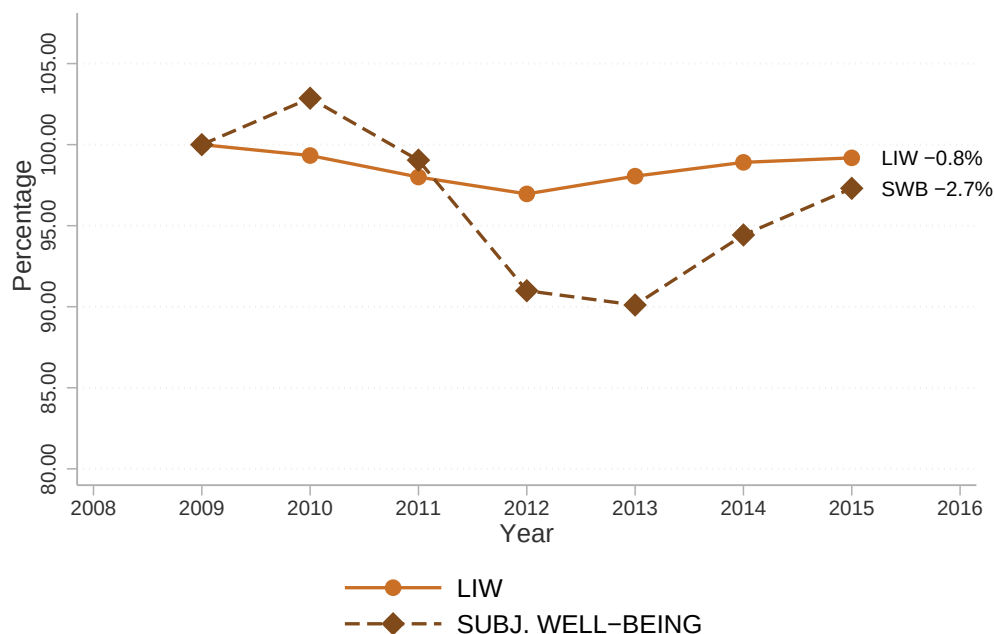
- The response variable to forecast is **subjective well-being**, a variable that correlates with a quality of life index for Luxembourg and is available at biannual frequency from the Eurobarometer;
- Predictors are from **business and consumer surveys** produced by the European

Commission. This data is a source of up-to-date information to predict life satisfaction;

- A **mixed frequencies approach (MIDAS)** (Ghysels et al., 2004) permits to handle data available at different frequencies.

This chapter focuses on life satisfaction for several reasons. Firstly, this data is a direct measure of well-being and is regarded as a reliable proxy of quality of life. Secondly, it is available at biannual frequency from the Eurobarometer. Lastly, it correlates with the Luxembourg Index of Well-being (LIW), a composite indicator of quality of life. Indeed, figure 6.1 shows that residents' Subjective well-being (SWB) and the LIW evolve in a comparable manner over time.<sup>1</sup>

**Figure 6.1:** LIW and subjective well-being (SWB): time series.



**Note:** The figure shows indices of LIW and SWB (base year 2009=100). values are red on the vertical axis. Differences between two data points represent variables' growth rates, eg 100-98=2 represents a 2% change in the variable.

**Source:** LIW and Eurobarometer data, own elaboration.

Section 6.1 illustrates the results from the forecasting exercise, then section 6.2 describes the data and method used in the forecasting exercise.

## 6.1 Forecasting well-being

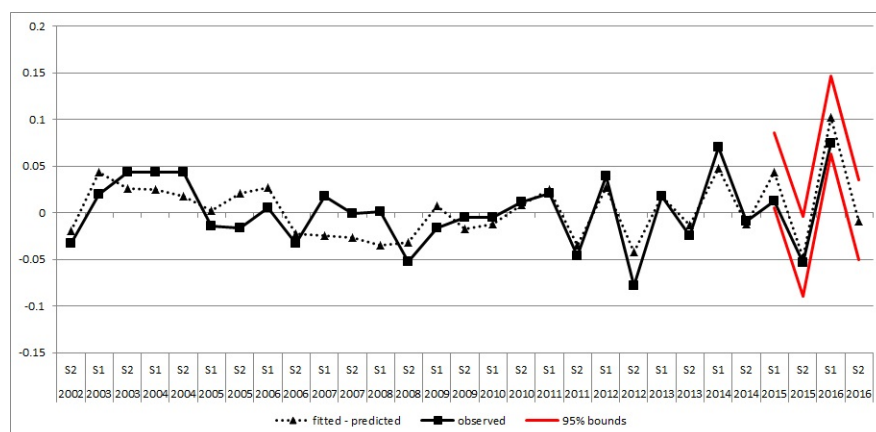
According to the Eurobarometer, 42% of the residents in Luxembourg are very satisfied with their life, 54% are fairly satisfied, 2% are not very satisfied, and 2% are not satisfied at

<sup>1</sup>The two variables are statistically significantly correlated, with a correlation of 0.7. Here, life satisfaction measures residents' subjective well-being. Although life satisfaction and subjective well-being are two distinct psychological phenomena, the two wordings are often used interchangeably because of the empirical association between the two variables.

all. This data refers to the first semester of 2016. Should we expect these shares to change substantially in the near future? To answer this question, we have performed a forecasting exercise on life satisfaction data. The objective of this exercise is to forecast changes in the share of respondents in each category of life satisfaction. (The Eurobarometer has four categories: 1) very satisfied; 2) fairly satisfied; 3) not very satisfied; 4) not satisfied.) The results suggest that this datum will not change significantly. The share of satisfied and dissatisfied people will decline by, respectively, 1.5 and about 1 percentage points.

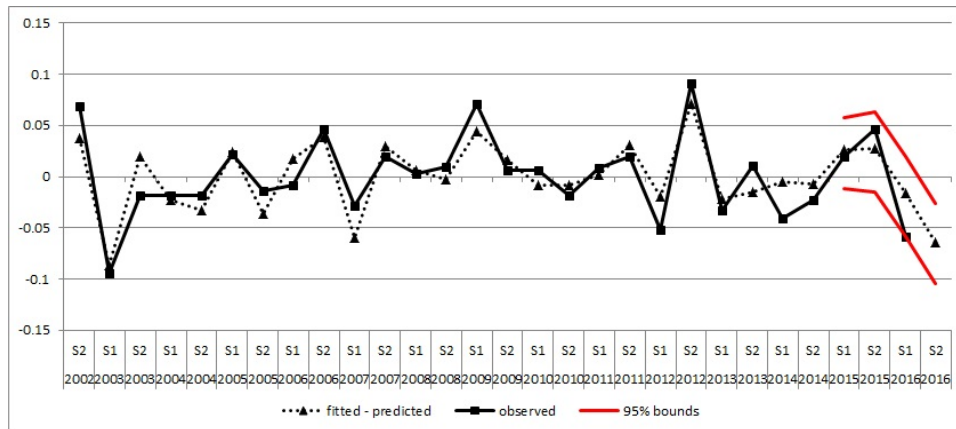
Figures 6.2 – 6.5 report, respectively, observed values (solid lines) and forecasts (dashed lines) of the share of people declaring to be very satisfied, fairly satisfied, not very satisfied, and not satisfied with their lives. Figure 6.2 indicates that between the first and the second semester of 2016, the share of people satisfied with their life will decline by about 1 percentage point. In the same period, the share of fairly satisfied people will decline by 0.5 percentage points, the share of dissatisfied people will decline by 0.2 percentage points, and the share of very dissatisfied people will decline by 0.7 percentage points. Note that, in the latter case, the model fails to correctly predict the variation of the life satisfaction between the second semester of 2015 and the first semester of 2016, which casts doubts on this result. The gap between the predicted and the observed change in the first semester 2016 amounts to about 2.2 percentage points. However, despite this forecast error, the predictions in the second semester 2016 and their confidence interval suggest that we can be reasonably confident that the share of very dissatisfied people will decline or, in the worst case scenario, stay constant. Overall, results suggest a shift towards the center of the distribution of life satisfaction by the end of 2016, a pattern of the well-being distribution which is commonly found in developed countries' data.

**Figure 6.2:** Share of people very satisfied with their life: observed and fitted time series.



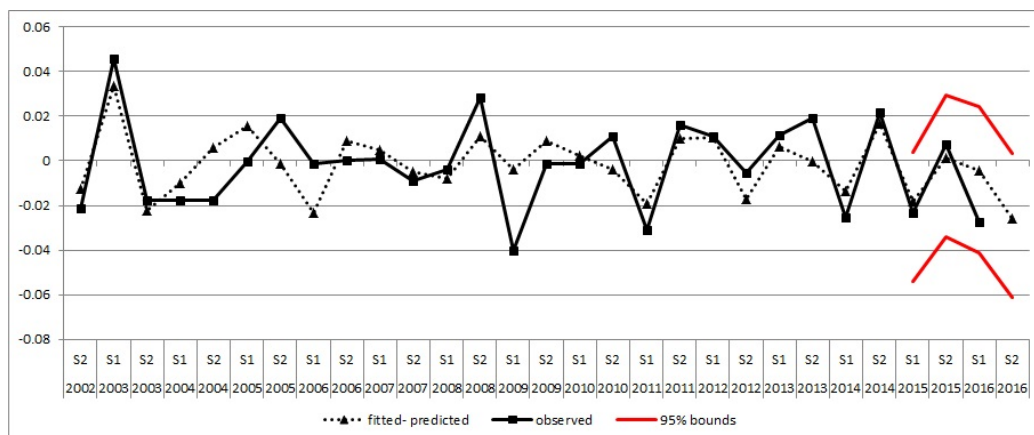
**Note:** The graph plots fitted values, or forecasts, (dashed lines) along with observed values (solid line). The x-axis reports years, while the y-axis reports the changes in the share of population declaring to be very satisfied with life. Red lines are confidence intervals.

**Source:** Eurobarometer and monthly opinion surveys from the European Union Directorate General for Economic and Financial Affairs, own elaboration.

**Figure 6.3:** Share of people fairly satisfied with their life: observed and fitted time series.

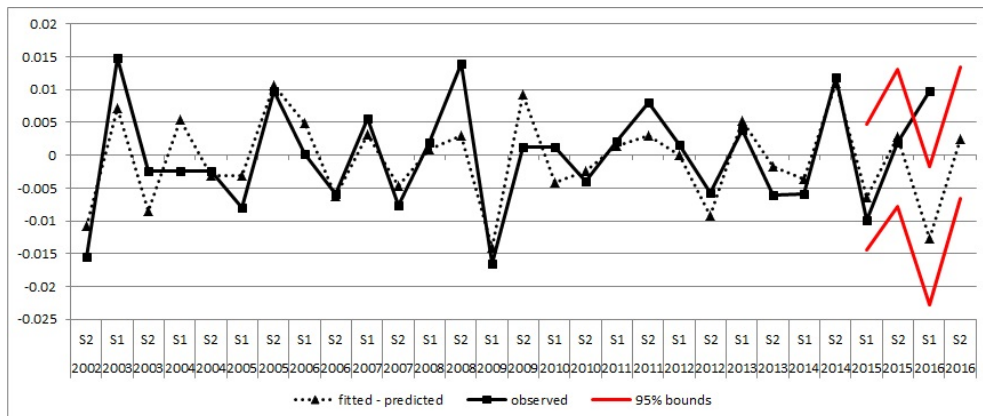
**Note:** The graph plots fitted values, or forecasts, (dashed lines) along with observed values (solid line). The x-axis reports years, while the y-axis reports the changes in the share of population declaring to be fairly satisfied with life. Red lines are confidence intervals.

**Source:** Eurobarometer and monthly opinion surveys from the European Union Directorate General for Economic and Financial Affairs, own elaboration.

**Figure 6.4:** Share of people not very satisfied with their life: observed and fitted time series.

**Note:** The graph plots fitted values, or forecasts, (dashed lines) along with observed values (solid line). The x-axis reports years, while the y-axis reports the changes in the share of population declaring to be not very satisfied with life. Red lines are confidence intervals.

**Source:** Eurobarometer and monthly opinion surveys from the European Union Directorate General for Economic and Financial Affairs, own elaboration.

**Figure 6.5:** Share of people not satisfied with their life: observed and fitted time series.

**Note:** The graph plots fitted values, or forecasts, (dashed lines) along with observed values (solid line). The x-axis reports years, while the y-axis reports the changes in the share of population declaring to be not satisfied with life. Red lines are confidence intervals.

**Source:** Eurobarometer and monthly opinion surveys from the European Union Directorate General for Economic and Financial Affairs, own elaboration.

## 6.2 Data and method

This chapter sets to forecast life satisfaction of residents population in Luxembourg. Data on life satisfaction come from the EU Commission's Eurobarometer, which surveys well-being among European citizens twice per year.<sup>2</sup> The sample ranges from 2002:1 to 2016:1. Information on life satisfaction arrives with little delay compared to data collection, which allows to minimise the number of data points to forecast. Additionally, the Eurobarometer provides relatively long time series of life satisfaction which benefits the accuracy of the forecasts. Respondents rate their life satisfaction on a scale from one to four, where higher scores indicate higher satisfaction. As the variable of interest is a categorical variable, forecasting life satisfaction amounts to forecast the *changes* in the percentage of population within each response class.

Formulating a forecasting model for life satisfaction requires the choice of predictor variables. Predictors typically include correlates of well-being, their past values, together with lagged values of life satisfaction itself. The literature shows that health, income and inequality, employment status, education, social and personal relationships are all important correlates of well-being and life satisfaction.<sup>3</sup> These variables, however, come from surveys and are typically available with a significant delay. Thus, to construct up-to-date predictors we resort to opinion surveys.

In the European Union, the Directorate General for Economic and Financial Affairs of the European Commission conducts mostly harmonised business and consumer surveys covering different sectors of the economy. These surveys are addressed to representatives of the industry, services, retail trade and construction sectors, as well as to consumers, and have numerous advantages. They are readily accessible, timely, they are never revised and have little or no measurements errors (Hansson et al. (2003)). Additionally, these surveys

<sup>2</sup>Eurobarometer is a survey administered by the TNS institute on behalf of the European Commission.

<sup>3</sup> One can see Dolan et al. (2008) for a survey of main factors explaining well-being.

provide information about people's feelings on the recent past, the current situation and the immediate future conditions. In particular, people are interviewed about households income and consumption, as well as their perceptions about their economic conditions, while business agents are asked information about the business cycle. In sum, opinion surveys provide a rich set of explanatory variables that are frequently collected and quickly released, features that make ideal data to use in forecasting exercises.

Variables from opinion surveys and life satisfaction, however, have different frequencies, and are released at different times. In principle, one may solve this issue by aggregating monthly data by semester and estimate a model that include only biannual variables. This solution, however, discards the information contained in the monthly data. (The idea is that monthly observations in a given semester contain more information than an average computed over the six months.) An alternative solution is to include all monthly observations of a given semester as explanatory variables, but this increases the number of parameters to be estimated (Armesto et al., 2010), which carries the risk of overfitting (Babayak, 2004).

Ghysels et al. (2004) propose a modelling strategy, called Mixed data Sampling Mixed Data Sampling (MIDAS), that permits to exploit large information sets (eg data observed at different frequencies) while restricting the number of parameters to be estimated. MIDAS is a dimension-reduction technique that replaces parameters with a function of the lags in the model. In practice, the coefficients of the explanatory variables and of their lags are captured by a known function of fewer parameters.

Let us make an example with one explanatory variable only. Formally, a model with unrestricted parameters is as follows:

$$\Delta Y_t = \alpha_0 + \sum_{i=1}^p \alpha_i \Delta Y_{t-i} + \sum_{k=1}^m \beta_k X_{t-k} + \varepsilon_t; \quad (6.1)$$

Here,  $\Delta Y_t$  are the changes in life satisfaction;  $\alpha_0$  is a constant;  $\sum_{i=1}^p \alpha_i \Delta Y_{t-i}$  includes the lagged changes of the dependent variable; the last term includes the  $m$  lags of the explanatory variable;  $\varepsilon_t$  is the error term. In such equation, the number of parameters is equal to  $p + m + 1$ . Clearly, this number increases as the number of explanatory variables increases. MIDAS addresses this limitation by introducing a function  $\Phi(k; \Theta)$  which summarises the information in the unrestricted model using a smaller number of parameters, as follows:

$$\Delta Y_t = \alpha + \sum_{i=1}^p \alpha_i L^i \Delta Y_t + \gamma \sum_{k=1}^m \Phi(k; \Theta) L^k X_t + \varepsilon_t \quad (6.2)$$

where  $\Phi$  is a function of time lags  $k$ . Although any kind of continuous, derivable functions can be used for  $\Phi$ , the exponential Almon specification is usually adopted to estimate the  $\Theta$  parameters (Ghysels et al., 2007):

$$\Phi(k; \Theta) = \frac{\exp(\theta_1 k + \theta_2 k^2)}{\sum_{j=1}^m \exp(\theta_1 j + \theta_2 j^2)}$$

The Almon specification allows to estimate only three parameters ( $\theta_1, \theta_2, \gamma$ ), rather than the whole set of  $m$  original parameters. This leads to sizeable gains in efficiency (Kvedaras

and Zemlys (2012)). Parameters are estimated using non linear least squares (Nonlinear Least Squares (NLS)).<sup>4</sup>

In the remaining of this chapter we first illustrate how MIDAS works using a simple basic model with only one explanatory variable. In section 6.2.2 we report the results from models fitted with several explanatory variables.

### 6.2.1 A basic model to forecast life satisfaction

This section illustrates a simple life satisfaction forecasting model with only one explanatory variable. We use life satisfaction data from the Eurobarometer. The full sample goes from 2002:1 to 2016:2. This is split into an in-sample period (the training sample), which excludes the last two years of observations, and an out-of-sample forecast period. This allows us to compare the forecasts with “true” (observed) values to assess the predictive ability of the model.<sup>5</sup> The full sample goes from 2002:1 to 2016:1. The training sample goes from the second semester 2002 to the second semester of 2014, whereas the forecast sample covers the period from the first semester 2015 to the second semester 2016. (The last value is a “pure” forecast, no observed value is available.)

The analysis proceeds in two steps: first, we select the explanatory variable from the business and consumer surveys; then, the model that produces the best fit is retained to forecast the changes in life satisfaction using MIDAS. Note that the single predictor is selected by fitting models with one explanatory variable at a time, then by selecting the predictor from the model with the best fit. In addition, Principal Component Analysis (PCA) on the survey variables is used to identify a single component for inclusion as a predictor in the forecasting model.

Let us consider a model with unrestricted parameters and one explanatory variable:

$$\Delta Y_T = \alpha_0 + \alpha_1 \Delta Y_{T-1} + \sum_{j=0}^5 \beta_j X_{t-j,T} + \sum_{j=6}^{11} \gamma_j X_{t-j,T-1} + \varepsilon_t \quad (6.3)$$

Here,  $Y_T$  denotes life satisfaction, which is sampled twice a year.  $X$  denotes the explanatory variable, which is sampled instead at monthly frequency.  $X_{t-j}, j \in [0, 5]$  are the monthly observations of the explanatory variable observed during semester  $T$ ,  $X_{t-j}, j \in [6, 11]$  are the monthly observations of the explanatory variables observed during semester  $T - 1$ . (Thus,  $T$  denotes semesters, while  $t$  denotes monthly observations.) Note that if we were to average the explanatory variables over each semester, the model would look as:

$$\Delta Y_t = \alpha_0 + \alpha_1 \Delta Y_{t-1} + B_1 \bar{X}_t + B_2 \bar{X}_{t-1} + \varepsilon_t \quad (6.4)$$

where  $\bar{X}$  denotes the average value of the explanatory variable.

The models of equations 6.3 and 6.4 are standard linear time series regressions. The difference is that model 6.4 requires to estimate four parameters, in place of the 14 parameters of model 6.3, but discards the information from the monthly observations.

<sup>4</sup>The validity of MIDAS modelling can be tested against classical regression with free parameters. The test evaluates if at least one free parameter at lag  $k$  is significantly different from the estimated value by the function  $\Phi$  at lag  $k$ . The test statistic follows a  $\chi$  squared distribution (Kvedaras and Zemlys, 2012).

<sup>5</sup>Note that there is an obvious break in the volatility at the end of the time series; then not considering the latest observations hamper accuracy of forecasts as it will be seen later in this section.

The model 6.3 includes 14 parameters: the constant, the lag value of the changes in life satisfaction, six lags for monthly observations of the current semester for the explanatory variable, and six observations for the explanatory variables observed in the previous semester. It goes without saying that, given the sample size, adding one more explanatory variable is not possible as we lack degrees of freedom.

As life satisfaction is a categorical variable, it makes little sense to compute the forecast of the changes of its average. Hence, we forecast the changes in the probability to choose any of the four categories of life satisfaction. For parsimony, the following describes the basic model estimation for one category, namely the “very satisfied” one.

Table 6.1 reports the estimation results for the unrestricted model where the explanatory variable is the **consumers’ evaluation of financial situation** over the last 12 months. One can see that five lags are significantly different from zero. Their signs – both positive and negative – indicate an erratic evolution over time.

**Table 6.1:** Share of people very satisfied with their life: linear model.

| Changes in share very satisfied           |        |               |              |
|-------------------------------------------|--------|---------------|--------------|
| Coeff.                                    | value  | sandard error | significance |
| constant ( $\alpha_0$ )                   | 0.019  | 0.008         | *            |
| $\Delta Y_{t-1}$                          | -0.546 | 0.193         | *            |
| $X_T$                                     | -0.003 | 0.004         |              |
| $X_T(-1)$                                 | 0.008  | 0.004         | *            |
| $X_T(-2)$                                 | 0.012  | 0.006         |              |
| $X_T(-3)$                                 | -0.001 | 0.005         |              |
| $X_T(-4)$                                 | -0.001 | 0.003         |              |
| $X_T(-5)$                                 | -0.002 | 0.004         |              |
| $X_{T-1}(-6)$                             | -0.019 | 0.007         | *            |
| $X_{T-1}(-7)$                             | 0.012  | 0.004         | **           |
| $X_{T-1}(-8)$                             | -0.005 | 0.004         |              |
| $X_{T-1}(-9)$                             | 0.019  | 0.005         | **           |
| $X_{T-1}(-10)$                            | -0.004 | 0.003         |              |
| $X_{T-1}(-11)$                            | -0.011 | 0.004         | *            |
| Signif. codes: ***0.001 **0.01 *0.05 `0.1 |        |               |              |
| Residual std error: 0.02439 df=11         |        |               |              |

**Source:** Eurobarometer and Public Opinion survey data, own elaboration.

At this stage, we need to identify a suitable functional form to summarise the behaviour of coefficients. This allows us to restrict the number of parameters to estimate. After various trials, we achieve the following specification for the time-lag function:

$$\Phi(j; p) = p_1 + p_2 \cdot \cos(p_3 + j)^{-1} \cdot \sin(p_4 + j)^{-1} \quad (6.5)$$

( $j$  are lags and  $p$ s are parameters to be estimated.) This function replaces the unrestricted parameters of equation 6.3, which gives a MIDAS model. The new model is more parsimonious and efficient than the one of equation 6.3, as it uses less parameters. Table 6.2 below reports the results from the estimation of the simplified MIDAS model.<sup>6</sup>

<sup>6</sup>The general form of the function 6.5 is  $\Phi(j; p) = p_1 + p_2 \cdot \sin(p_3 \cdot j)^a \cos(p_4 \cdot j)^b$ ,  $j = 1, \dots, 12$ , where  $a$

**Table 6.2:** Share of people very satisfied with their life: MIDAS model.

| Changes in share very satisfied           |         |                |              |
|-------------------------------------------|---------|----------------|--------------|
| Coeff./parameters                         | value   | standard error | significance |
| constant                                  | 0.011   | 0.005          | *            |
| $\Delta Y_{t-1}$                          | -0.468  | 0.137          | **           |
| $p1$                                      | 0.000   | 0.000          |              |
| $p2$                                      | -0.022  | 0.004          | ***          |
| $p3$                                      | 6.689   | 0.101          | ***          |
| $p4$                                      | -15.160 | 0.152          | ***          |
| Signif. codes: ***0.001 **0.01 *0.05 '0.1 |         |                |              |
| Residual std error: 0.02713 df=19         |         |                |              |
| hAh = 12.5149, df = 8, p-value = 0.1297   |         |                |              |

**Source:** Eurobarometer and Public Opinion survey data, own elaboration.

Figure 6.6 compares the point estimates of parameters and the time-lag function that describes the evolution of parameters. A test of restrictions confirms that the 14 parameters can be replaced by the more parsimonious model.

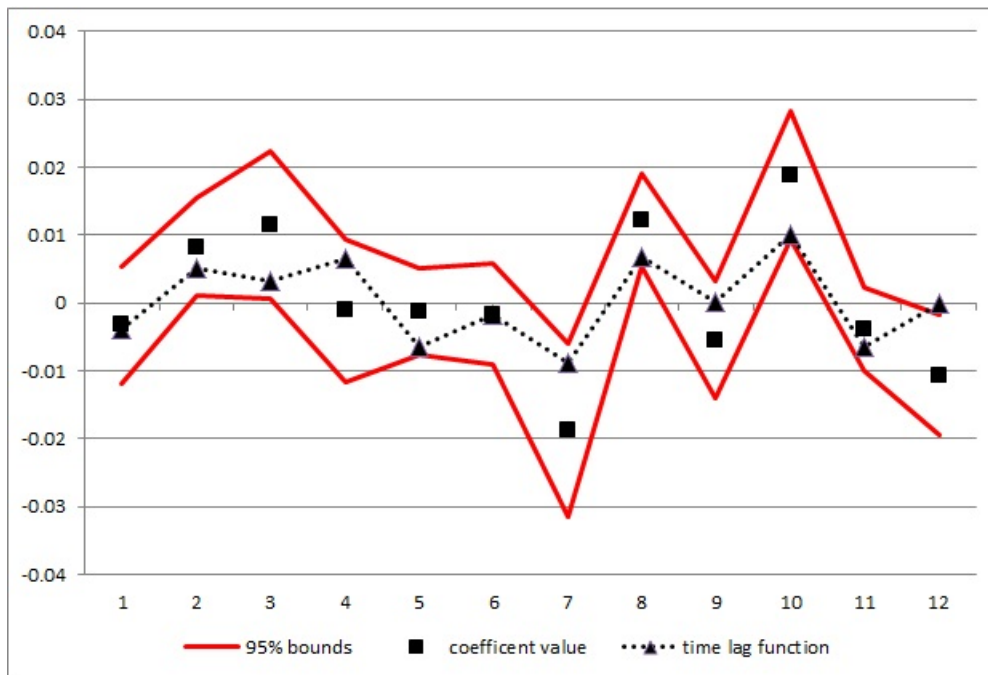
Figure 6.7 reports the results of the forecasting exercise. The graph compares fitted to observed values of the change of life satisfaction from the first semester of 2002 to the first semester of 2016. Additionally, the figures reports the forecast of the change of life satisfaction for the second semester of 2016. Considering its relative simplicity, the model seems to provide an adequate fit of the dependent variable. The result indicate that, in the second half of 2016, the share of people declaring to be very satisfied should decline by about five percentage points. (Here, we compare the forecast of well-being to the last observation.) We emphasise that the results should be treated with care. This result may be explained by the simplicity of the model, which includes only one explanatory variable, and/or by the increased volatility in the time series after the year 2011. The next section reports the results obtained from a "complete model", which uses a larger set of explanatory variables. This makes the models more complicated to handle, but produces more reliable results.

### 6.2.2 Complete models

This section reports the complete set of results commented in section 6.1. As discussed in the previous section, we test the predictive power of all the explanatory variables and their principal components in unrestricted models of the type given by equation 6.1. The model that best fits the changes of a specific life satisfaction category is then used to derive the parameters of the  $\Phi$  function of the MIDAS model. For each model we retain the two best fitting explanatory variables.

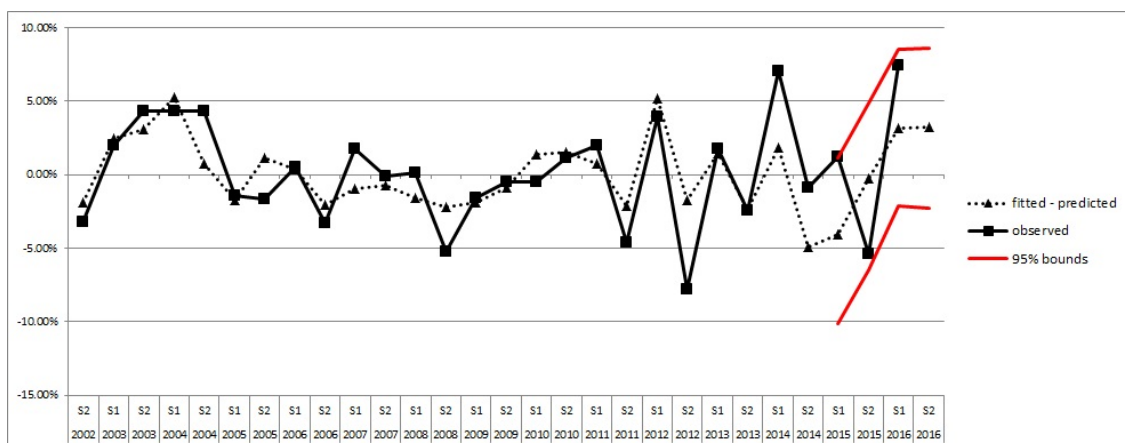
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and  $b$  are integers assuming values in  $[-3, 3]$ . The model in the main text was selected after comparing the fit from all possible combinations of the values of  $a$  and  $b$ .

**Figure 6.6:** Time-lag function: goodness of fit.

**Note:** Time lags are reported on the x axis (from present to past), while the changes in the share of people declaring to be very satisfied with their lives is reported on the y axis (in percentage points). The dashed line indicates the time lag function, whereas the black squares indicates the value of the coefficient. The two red lines indicate the upper and lower bounds of the confidence interval.

**Source:** Eurobarometer and Public Opinion survey data, own elaboration.

**Figure 6.7:** Share of people very satisfied with their life: forecast from MIDAS model.

**Note:** The graph plots fitted values, or forecasts, (dashed lines) along with observed values (solid line). The x-axis reports years, while the y-axis reports the changes in the share of population declaring to be not satisfied with life. Red lines are confidence intervals.

**Source:** Eurobarometer and Public Opinion survey data, own elaboration.

**Forecasting the changes in the share of people not satisfied with their life:**

The parameters of the  $\Phi$  function that best fit the data are:

$$\Phi(k : p, SC8) = p_1 + p_2 \cdot \sin(p_3 \cdot k)^{-2} \cdot \cos(p_4 \cdot k)^{-3}$$

$$\Phi(k : q, SB10) = q_1 + q_2 \cdot \sin(q_3 \cdot k)^2 \cdot \cos(q_4 \cdot k)^{-3}$$

where *SC8* is a component that is positively correlated with “financial situation over the next 12 months” and negatively associated with “savings at present”. *SB10* is a component that mirrors the expectations about the “evolution of your current overall order books (positive / negative)”, and “building activity development over the past 3 months (positive / negative)” in the constructions sector. Table 6.3 reports the results of the MIDAS model using these two components as explanatory variables.

**Table 6.3:** MIDAS model predicting the changes in the share of people not satisfied with their life.

| time lag function model                   |          |           |       |
|-------------------------------------------|----------|-----------|-------|
|                                           | value    | std error | sign. |
| Intercept                                 | -0.00096 | 0.00091   |       |
| dNS(-1)                                   | -0.55870 | 0.11600   | ***   |
| p1                                        | -0.00019 | 0.00007   | *     |
| p2                                        | -0.00001 | 0.00000   | *     |
| p3                                        | 0.70960  | 0.00474   | ***   |
| p4                                        | 67.05000 | 0.00565   | ***   |
| q1                                        | -0.00036 | 0.00014   | *     |
| q2                                        | 0.00005  | 0.00024   |       |
| q3                                        | 0.52310  | 0.13600   | **    |
| q4                                        | 50.14000 | 0.07078   | ***   |
| Signif. codes: ***0.001 **0.01 *0.05 '0.1 |          |           |       |
| Residual std error: 0.00596 df=16         |          |           |       |

**Source:** Eurobarometer and monthly opinion surveys from the European Union Directorate General for Economic and Financial Affairs, own elaboration.

**Forecasting the changes in the share of people not very satisfied with their life:**

The parameters of the  $\Phi$  function that best fit the data are:

$$\Phi(k : p, C1) = p_1 + p_2 \cdot \cos(p_3 \cdot k)^2 \cdot \sin(p_4 \cdot k)^{-3}$$

$$\Phi(k : q, IND3) = q_1 \cdot \cos(q_2 \cdot k) \cdot \sin(q_3 \cdot k)^2$$

where *C1* is a confidence indicator made of the following variables: 1. “financial situation over next 12 months”, 2. “general economic situation over next 12 months”, 3. “unemployment expectations over next 12 months”, 4. “savings over next 12 months”. *IND3* informs about the “evolution of your current overall order books (positive / negative)” in the industry. Table 6.4 reports the results of the MIDAS model using these two components as explanatory variables.

**Table 6.4:** MIDAS model predicting the changes in the share of people not very satisfied with their life.

| time lag function model                   |         |           |       |
|-------------------------------------------|---------|-----------|-------|
|                                           | value   | std error | sign. |
| Intercept                                 | -0.001  | 0.008     |       |
| dNVS(-1)                                  | -0.471  | 0.186     | *     |
| p1                                        | 0.001   | 0.000     | *     |
| p2                                        | 0.000   | 0.000     | *     |
| p3                                        | 0.577   | 0.022     | ***   |
| p4                                        | -26.120 | 0.011     | ***   |
| q1                                        | 0.000   | 0.000     | ,     |
| q2                                        | 0.799   | 0.038     | ***   |
| q3                                        | 1.093   | 0.108     | ***   |
| Signif. codes: ***0.001 **0.01 *0.05 '0.1 |         |           |       |
| Residual std error: 0.01761 df=16         |         |           |       |

**Source:** Eurobarometer and monthly opinion surveys from the European Union Directorate General for Economic and Financial Affairs, own elaboration.

#### Forecasting the changes in the share of people fairly satisfied with their life:

The parameters of the  $\Phi$  function that best fit the data are:

$$\Phi(k : p, C1) = p_1 + p_2 \cdot \cos(p_3 \cdot k)^2 \cdot \sin(p_4 \cdot k)^{-1}$$

$$\Phi(k : q, SIND1) = q_1 + q_2 \cdot \cos(q_3 \cdot k) \cdot \sin(q_4 \cdot k)^{-3}$$

where  $C1$  is a confidence indicator made of the following variables: 1. “financial situation over next 12 months”, 2. “general economic situation over next 12 months”, 3. “unemployment expectations over next 12 months”, 4. “savings over next 12 months”.  $SIND1$  is a component that is negatively correlated with the “assessment of export order-book levels” and with the “assessment of stocks of finished products”. Table 6.5 reports the results of the MIDAS model using these two components as explanatory variables.

#### Forecasting the changes in the share of people very satisfied with their life:

The parameters of the  $\Phi$  function that best fit the data are:

$$\Phi(k : p, C1) = p_1 + p_2 \cdot \cos(p_3 \cdot k)^2 \cdot \sin(p_4 \cdot k)^2$$

$$\Phi(k : q, SIND7) = q_1 + q_2 \cdot \cos(q_3 \cdot k)^3 \cdot \sin(q_4 \cdot k)^3$$

where  $C1$  is a confidence indicator made of the following variables: 1. “financial situation over next 12 months”, 2. “general economic situation over next 12 months”, 3. “unemployment expectations over next 12 months”, 4. “savings over next 12 months”.  $SIND7$  is a component that is positively correlated with the “production trend observed in recent months”. Table 6.6 reports the results of the MIDAS model using these two components as explanatory variables.

**Table 6.5:** MIDAS model predicting the changes in the share of people fairly satisfied with their life.

| time lag function model                   |         |           |       |
|-------------------------------------------|---------|-----------|-------|
|                                           | value   | std error | sign. |
| Intercept                                 | -0.006  | 0.005     |       |
| dFS(-1)                                   | -0.345  | 0.161     | *     |
| p1                                        | 0.000   | 0.001     |       |
| p2                                        | -0.006  | 0.001     | ***   |
| p3                                        | 0.445   | 0.027     | ***   |
| p4                                        | 0.841   | 0.009     | ***   |
| q1                                        | 0.000   | 0.000     |       |
| q2                                        | 0.000   | 0.000     |       |
| q3                                        | 2.502   | 0.516     | ***   |
| q4                                        | -26.830 | 0.026     | ***   |
| Signif. codes: ***0.001 **0.01 *0.05 '0.1 |         |           |       |
| Residual std error: 0.02613 df=15         |         |           |       |

**Source:** Eurobarometer and monthly opinion surveys from the European Union Directorate General for Economic and Financial Affairs, own elaboration.

**Table 6.6:** MIDAS model predicting the changes in the share of people very satisfied with their life.

| time lag function model                   |        |           |       |
|-------------------------------------------|--------|-----------|-------|
|                                           | value  | std error | sign. |
| intercept                                 | 0.005  | 0.012     |       |
| dVS(-1)                                   | -0.352 | 0.168     | '     |
| p1                                        | -0.002 | 0.001     |       |
| p2                                        | 0.007  | 0.004     |       |
| p3                                        | 0.657  | 0.034     | ***   |
| p4                                        | 2.049  | 0.058     | ***   |
| q1                                        | -0.002 | 0.001     | *     |
| q2                                        | 0.037  | 0.015     | *     |
| q3                                        | 0.905  | 0.009     | ***   |
| q4                                        | 0.928  | 0.008     | ***   |
| Signif. codes: ***0.001 **0.01 *0.05 '0.1 |        |           |       |
| Residual std error: 0.02775 df=15         |        |           |       |

**Source:** Eurobarometer and monthly opinion surveys from the European Union Directorate General for Economic and Financial Affairs, own elaboration.





## 7. List of acronyms

|                |                                                           |
|----------------|-----------------------------------------------------------|
| <b>ACT</b>     | Administration du Cadastre et de la Topographie           |
| <b>API</b>     | Application Programming Interface                         |
| <b>BES</b>     | Benessere equo e solidale                                 |
| <b>BLI</b>     | Better Life Index                                         |
| <b>CET</b>     | Centre pour l'égalité de traitement                       |
| <b>CIVED</b>   | Civic Education Study                                     |
| <b>CIW</b>     | Canadian index of well-being                              |
| <b>CNPF</b>    | Caisse nationale des prestations familiales               |
| <b>DDD</b>     | Drug Dose per Day                                         |
| <b>DFLE</b>    | Disability-Free Life Expectancy                           |
| <b>DPS</b>     | Data Presentation System                                  |
| <b>ECB</b>     | European Central Bank                                     |
| <b>EEA</b>     | European Environment Agency                               |
| <b>ESA</b>     | European System of National and Regional Accounts         |
| <b>ESAW</b>    | European Statistics on Accidents at Work                  |
| <b>EU</b>      | European Union                                            |
| <b>EU-LFS</b>  | European Union Labour Force Survey                        |
| <b>EU-SDS</b>  | European Union Sustainable Development Strategy           |
| <b>EU-SILC</b> | European Union Statistics on Income and Living Conditions |
| <b>EVS</b>     | European Value Study                                      |
| <b>EWCS</b>    | European Working Conditions Survey                        |
| <b>FISIM</b>   | Financial Intermediation Services Indirectly Measured     |
| <b>GDP</b>     | Gross Domestic Product                                    |
| <b>GDPpc</b>   | Gross Domestic Product per capita                         |
| <b>GESIS</b>   | German Social Science Infrastructure Services             |

**GINI** GINI index  
**GNI** Gross National Income  
**GNIpc** Gross National Income per capita  
**HBS** Household Budget Survey  
**HFA** European Health for All Family  
**HFCS** Household Finance and Consumption Survey  
**ICCS** International Civic and Citizenship Education Study  
**IDEA** Institute for Democracy and Electoral Assistance  
**IEA** International Association for the Evaluation of Educational Achievement  
**IGSS** Inspection générale de la sécurité sociale  
**ILO** International Labour Organization  
**ISCED** International Standard Classification of Education  
**ISTAT** Istituto nazionale di statistica  
**LIW** Luxembourg Index of Well-being  
**MAP** Measures of Australia's Progress  
**MIDAS** Mixed Data Sampling  
**NLS** Nonlinear Least Squares  
**OECD** Organisation for Economic Cooperation and Development  
**ONS** Office of National Statistics of Great Britain  
**PCA** Principal Component Analysis  
**PISA** Programme for International Student Assessment  
**pkm** passengers per kilometer  
**SDIs** Sustainable Development Indicators  
**SDR** Age-standardized death rates  
**SWB** Subjective well-being  
**TNS Ilres** Taylor Nelson Sofres - Institut Luxembourgeois de Sondages et d'Études d'Opinion  
**TUS** Time Use Survey  
**UAA** Utilised Agricultural Area  
**WHO** World Health Organization



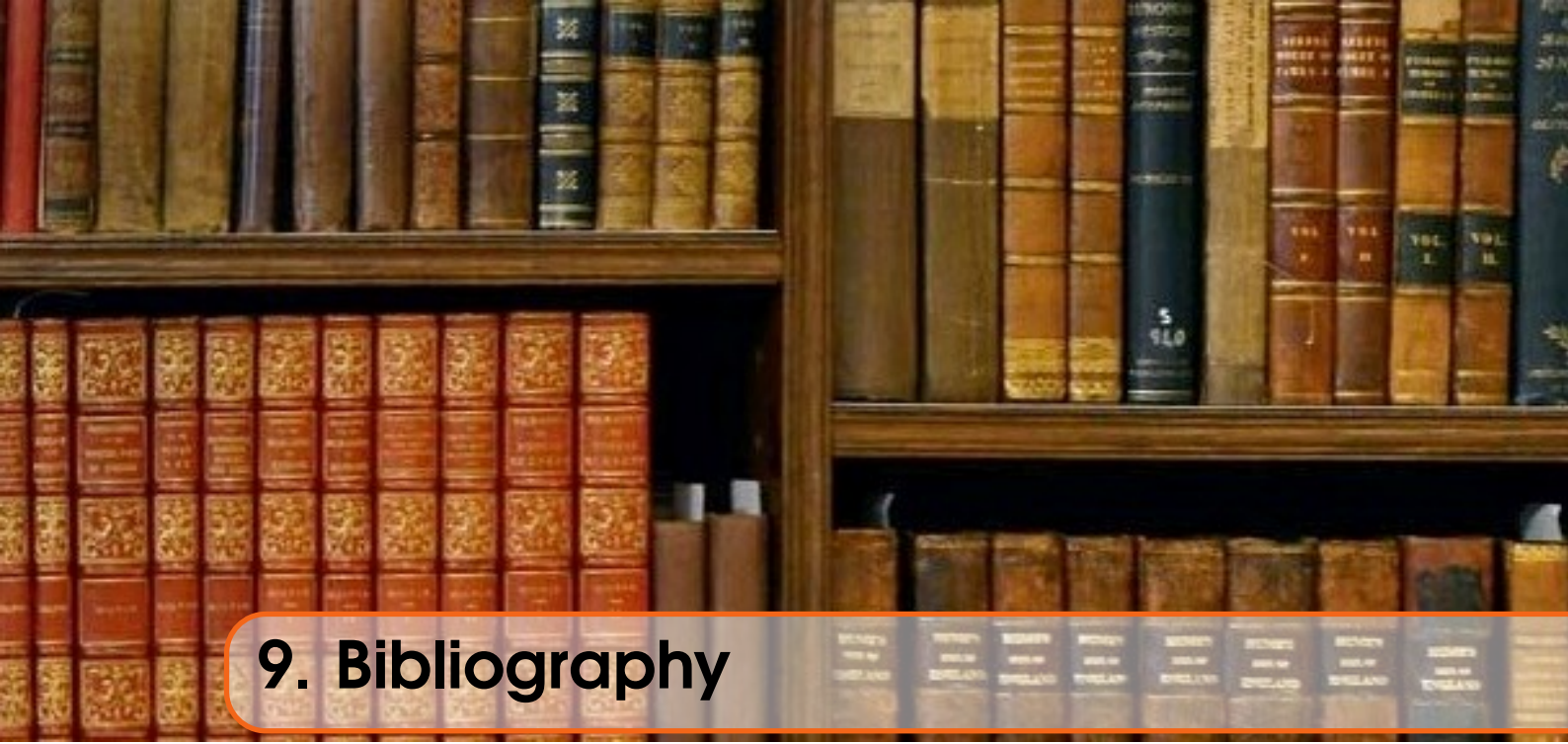
## 8. List of countries

Data availability constrains the number of countries we could use for international comparisons. Hence, the number of countries varies from indicator to indicator depending on the data source. The list below reports the set of countries used in case of data sourced from the EU-SILC. Indicators based on other data-sets may refer to slightly different subsets of countries.

**Table 8.1:** List of countries used for international comparisons

| Country | Abbreviation | Country        | Abbreviation |
|---------|--------------|----------------|--------------|
| Austria | AT           | Italy          | IT           |
| Belgium | BE           | Malta          | MT           |
| Cyprus  | CY           | Netherlands    | NL           |
| Denmark | DK           | Norway         | NO           |
| Finland | FI           | Portugal       | PT           |
| France  | FR           | Sweden         | SE           |
| Greece  | EL           | Spain          | ES           |
| Ireland | IE           | United Kingdom | UK           |
| Iceland | IS           |                |              |





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