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https://www.emerald.com/insight/1741-038X.htm

Received 31 October 2020
Revised 27 February 2021
3 June 2021
8 July 2021
Accepted 22 July 2021

Manufacturing internationalization: from distance to proximity? A longitudinal analysis of offshoring choices

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Abstract

Purpose – This paper aims to offer a long-term systematic picture of the evolution of manufacturing offshoring (in terms of intensity, geography and drivers) highlighting the changes in the surrounding context and the resulting transitions points ("points in time") that have shaped its development path.

Design/methodology/approach – Three statistical tools were adopted on a dataset of 644 cases. First, the authors resorted to multiple structural change tests to identify the transition points. Second, the authors explored offshoring geography by conducting a network analysis. Finally, the authors adopted gravity models to shed light on offshoring drivers.

Findings – Results highlight three offshoring phases: expansion (2002–2006), reconsideration (2007–2009) and rationalization (2010 onwards). During the first phase, characterized by economic growth, firms were mainly interested in economic savings; offshoring to low-cost countries was the prevailing location strategy. Subsequently, during the economic crisis, the number of cases declined and the main drivers became market-based factors together with the research for cost savings. Finally, in the third phase, when the economy was still stagnating and new manufacturing technologies appeared, the number of offshoring cases has further decreased, and technological- and market-based factors have become the main location drivers.

Originality/value – The study is the first to adopt a systematic, empirical and quantitative approach to analyze the evolution of the manufacturing offshoring considering both the phenomenon itself and the triggering changes in the surrounding context. In doing this, the authors also tested the importance of considering the point in time in offshoring strategies.

Keywords Manufacturing, Production, Relocation, Offshoring, Reshoring, Internationalization, Location choices, Location advantages, Longitudinal analysis, Drivers, Geography, Point in time

Paper type Research paper

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The authors acknowledge the financial support of the Regione Autonoma Friuli-Venezia Giulia (Specific Program 89/2019 - Fondo Sociale Europeo 2014/2020).

Journal of Manufacturing Technology Management
Vol. 32 No. 9, 2021
pp. 346-368
Emerald Publishing Limited
1741-038X
DOI 10.1108/JMTM-10-2020-0430

1. Introduction

In the last few decades, manufacturing offshoring – the transfer of production facilities (captive offshoring) or supply basins (offshore outsourcing) to foreign locations (Ferdows, 1997) – has emerged as a major industry trend and, at the same time, as a popular research topic in Operations Management (OM) and International Business (IB). Literature has shed light on several issues including motivations, drivers, timing and outcomes of the phenomenon (Schmeisser, 2013).

The analysis of the European industrial system shows that over time location choices have gone through a transformation. In the 1990s and early 2000s, together with the expansion of the World Trade Organization (WTO), the enlargement of the European Union, and the liberalization of international trade, a massive transfer of production took place. The main motivation was the research for cost advantages (Aubert *et al.*, 1996), especially in high-labor and low-tech industries or where price-based competition prevailed. As time went by, firms realized not only the advantages but also the unexpected costs and risks of offshoring (Patrucco *et al.*, 2016). For this reason, companies reconsidered their choices with the growth of phenomena such as reshoring and right-shoring (Johansson and Olhager, 2018).

Although these changes, only a few scholars have tried to explore the temporal evolution of the manufacturing offshoring phenomenon so far (e.g. Kinkel and Maloca, 2009; Kinkel, 2012). However, such contributions are mainly descriptive and country-specific (i.e. they are only focused on a single country). Moreover, they usually consider time frames up to the first decade of the 2000s. They therefore neglect the effects of factors such as the production overcapacity in Western countries (legacy of the financial crisis), the increase in prices in key developing countries (e.g. China), the new technological trajectories (e.g. Industry 4.0), and the recent EU and country policies aimed at revitalizing the manufacturing industry (Arlbjørn and Mikkelsen, 2014; Ancarani *et al.*, 2019; Storrie, 2019).

Against this background, this paper aims to offer a long-term systematic picture of the evolution of manufacturing offshoring (considering the intensity of the phenomenon, its geography and drivers) highlighting the changes in the surrounding context and the resulting transitions points ("points in time") that have shaped its development path.

The study is based on the European Restructuring Monitor (ERM) database (https://www.eurofound.europa.eu/observatories/emcc/erm/factsheets), which includes secondary data related to offshoring decisions. The analyzed dataset consists of 644 manufacturing offshoring cases covering 58 countries and 24 industries.

As far as the methodology is concerned, we used an approach partially borrowed from other disciplines. First, we defined the transition points by empirically testing for multiple structural changes in the data and by linking them to the economic and technological factors that have evolved/emerged over time. Then, we carried out a network analysis to assess the geographical transformation of the phenomenon. Finally, we investigated offshoring drivers through the gravity models.

Our study contributes to both theory and practice. From a theoretical point of view, our paper is the first to adopt a systematic quantitative approach to analyze the evolution of the offshoring phenomenon and to link it to the changes in the surrounding context. From a practical point of view, the study shows that managers should be aware of the change of the relative importance of the most important offshoring drivers and the resulting need to periodically re-verify location decisions. Moreover, these findings could also help policymakers in designing effective and timely actions to support their country's manufacturing base and attractiveness.

The remainder of the paper is organized as follows. Section 2 reviews the relevant literature and develops the research questions. Section 3 presents the methodology. Sections 4 and 5 illustrate and discuss the findings. Finally, contributions and limitations are summarized in Section 6.

2. Background and research questions

2.1 Literature background

A wide set of OM and IB studies have been devoted to international location choices (offshoring and manufacturing internationalization). We summarize here the main findings. For a more systematic review, the interested reader might see Schmeisser (2013) on offshoring, Jia *et al.* (2017) on global sourcing, Wiesmann *et al.* (2017) and Barbieri *et al.* (2018) on reshoring.

Most offshoring studies have focused the **drivers and motivations** of the phenomenon and their link with the configuration of firms' activities abroad (Lin, 2020). While many drivers were identified by the different studies (for an overview see MacCarthy and Atthirawong, 2003), the majority of scholarly (e.g. Barbieri *et al.*, 2019; Ellram *et al.*, 2013) and policy (e.g. UNCTAD, 2018) research agree that they can be essentially traced back to the categories (raisons d'être) of the Ownership-Location-Internationalization (OLI) paradigm (Dunning, 1998). Hence, according to Dunning categorization, offshoring drivers can be described as:

(1) Efficiency-seeking motivations: Firms offshore to take advantage of cost differences in production factors.

(2) Resource-seeking motivations: Firms offshore to have access to resources not available in the home country.

(3) Market-seeking motivations: Firms offshore to penetrate new markets and to serve key customers.

Other studies have analyzed the **geography** of the phenomenon exploring the disaggregation/dispersion of firms activities (Jensen and Pedersen, 2011), the role of institutions in attracting companies (Kleibert, 2014), and the effects of offshoring activities on knowledge production (D'Agostino *et al.*, 2013) and labor demand (Nordås, 2020) of industries located in different countries. Initial studies focused on European countries and districts (Dunford, 2006; Bevan and Estrin, 2004). Subsequently, together with the geographic extension of the phenomenon, scholars began to consider developing (or low-cost) countries such as India and China (McDonald *et al.*, 2018).

Some authors have shed light on the **timing and the evolutionary steps of international growth**, which origin dates back to Vernon (1966), Caves (1982) and the Uppsala school (Johanson and Vahlne, 1977). A central element detectable both in the above-mentioned seminal contributions and in the developments of the topic (Johanson and Vahlne, 2009), namely, the incremental nature of international development, has been recently challenged. Evidence has shown that firms pursue several different internationalization strategies and can overcome some steps (Chang and Rosenzweig, 2001). These strategies can also be affected/disrupted by contingencies, macro-economic shifts and national/supranational policies, e.g. China's WTO access, "America First" political agenda, Brexit and COVID-19 (e.g. Hong, 2008; Bailey *et al.*, 2020; Barbieri *et al.*, 2020; Goulard, 2020).

Offshore productions might also have some **risks** and **problems**. First studies on the topic can be traced back to the 1980s when Markides and Berg (1988) highlighted the flaws in the offshoring strategies of US companies (e.g. lack of consideration of: exchange rates variations, governmental pressures, flexibility losses). Moving to more recent contributions, subtraction of know-how/violation of intellectual property rights (Hansen *et al.*, 2013), quality issues (Steven *et al.*, 2014) and underestimation of offshoring projects costs (Platt and Song, 2010) are often cited. Other critical aspects refer to country risks, in particular to geographical/cultural distance (Hutzschenreuter *et al.*, 2016) and political instability (Hansen *et al.*, 2017). Finally, risk-related literature has also analyzed the challenges of transferring the knowledge/technology embedded in the home context (Kohlbacher and Krähe, 2007) and the specific practices to deal with such problems (Knudsen and Madsen, 2014; Chai *et al.*, 2003). Among the most debated issues, we can cite the risks associated with the learning curves (e.g. ramp-up performance) (Pedersen and Slepniov, 2016) and their underestimation (Steenhuis and De Bruijn, 2002), the role of different types of distance (including cultural one) in the management and productivity outcomes of overseas facilities (Mykhaylenko *et al.*, 2017; Steenhuis and De Bruijn, 2007), the impact of knowledge characteristics on its transferability (Grant and Gregory, 1997) and on the performance of the transfer process (Fredriksson and Jonsson, 2019).

Above-mentioned drawbacks of manufacturing offshoring, alongside with changes in some countries characteristics, have led some companies to revise their choices resorting to divestment strategies (Loke, 2008; Silva and Moreira, 2019) and/or moving production (1) back to the home country (*backshoring*), (2) to another country closer to the home country (*nearshoring*) or (3) to another country far away from the initial host country (*further offshoring*) (Ellram *et al.*, 2013; Barbieri *et al.*, 2019; Boffelli and Johansson, 2020). Recent literature has started to investigate these **re-location strategies** shedding light on reshoring (e.g. Fratocchi *et al.*, 2016; Srai and Ané, 2016; Di Mauro *et al.*, 2018; Martínez-Mora and Merino, 2020) and further offshoring (Barbieri *et al.*, 2019) motivations, relationship between reshoring drivers and contingency elements (Moore *et al.*, 2018), factors affecting the duration of abroad staying before reshoring (Ancarani *et al.*, 2015), links between reshoring drivers and type of re-location decision (Moretto *et al.*, 2020), home countries roles in reshoring choices (Wan *et al.*, 2019), and differences in perceived product quality between offshored and reshored productions (Cassia, 2020).

Offshoring literature has also focused on the influence of firm's location strategies in defining **plant roles in international manufacturing networks**. The most relevant papers are usually attributed to Ferdows (1997) who proposed a taxonomy of different plant roles and to Shi and Gregory (1998) who classified manufacturing networks identifying their capabilities and configurations. Further studies have tried to test Ferdows model (Vereecke and Van Dierdonck, 2002); expand/elaborate it exploiting the link between site competence, location reason and the resulting operational performance (Feldmann and Olhager, 2013); understand the relationship between plant type and its long term-stability (Vereecke *et al.*, 2008); or even propose new typologies of plants based on knowledge rather than material flows (Vereecke *et al.*, 2006). Extant research has also shed light on the interplay of capabilities at factory and multi-plant/network level (Blomqvist and Turkulainen, 2019) and their effects on operational performance (Colotla *et al.*, 2003), and on the role of inter-firm collaborations in shaping manufacturing networks (Shi and Gregory, 2005; Chai *et al.*, 2009). Again, although there are many factors that influence site choices, scholars (Ferdows, 1997; Vereecke and Van Dierdonck, 2002; Feldman and Olhager, 2013) agree that location drivers are essentially aligned with Dunning's categories: access to low-cost production/efficiency-seeking, access to resources and knowledge/resource-seeking and exploitation of market opportunities/market-seeking.

As for the theories adopted to understand firm's choices, scholars have mainly relied on transaction cost economics (TCE) (Williamson, 1985), resource-based view (RBV) (Barney, 1991), contingency theory (Lawrence and Lorsch, 1967) and relational-based view (Dyer and Singh, 1998). TCE explains efficiency-seeking offshoring (low-cost countries oriented) through the comparison between production and transaction costs (Farrel, 2005). Whereas RBV, privileged by studies investigating resource-seeking and market-seeking drivers (Jahns *et al.*, 2006), argues that the competitive advantage is linked to rare and inimitable resources that companies should identify, develop, employ and protect (Penrose, 1959). Contingency theory, instead, shows the role of contextual factors in affecting offshoring decisions (Metters, 2008). Finally, the relational-based view is less structured than TCE and RBV and argues that organizational forms of offshoring relationships evolve over time in a joint effort to create value for the involved actors (Vivek *et al.*, 2009).

2.2 Research questions

As seen in the previous section, several research streams have shed light on the offshoring phenomenon. Available contributions are useful, but not sufficient to fully understand manufacturing offshoring evolution, for at least three reasons.

First, although offshoring drivers and geography have changed over time, only a few studies have analyzed them by adopting a longitudinal perspective (e.g. Kinkel and Maloca, 2009; Kinkel, 2012). However, such contributions are mainly descriptive and country-specific. Moreover, they only consider data up to the first decade of the 2000s, while in recent years firms' footprints have faced the disruptive technological evolution of Industry 4.0, the effects of the financial crisis (and the resulting revitalization policies), and the changes in cost advantages of some foreign markets.

Second, despite some studies have acknowledged the dynamic nature of firm's internationalization choices (evolution of plant roles over time – Ferdows, 1997; continual improvement of factory/network capabilities over the years – Colotla *et al.*, 2003; interplay between plant characteristics and operations stability – Vereecke *et al.*, 2008), literature still exhibits a lack of conceptual development and systematic evaluation of the temporal issues (Hilmersson *et al.*, 2017), which are usually reduced to a mere early versus late decisions (e.g. Romanello and Chiarvesio, 2019; Abele *et al.*, 2008). In this perspective, some scholars have argued (1) that the *point in time* of internationalization choices is underestimated (Andersson and Mattsson, 2006) and (2) that "*empirically, we have not achieved enough in terms of longitudinal studies. The time dimension to internationalisation has been neglected and that is a loss of opportunity to understand the cycles over time as influenced by the broader external economic environment*" (McAuley, 2010). This lack of attention to temporal aspects represents a significant limitation of the offshoring/internationalization literature because strategic decisions are embedded in a series of factors and such factors change over time. This is particularly true in the current context, where markets, technology, as well as the economic geography of the globe and the location advantages of the various countries, show an unprecedented change rate (UNCTAD, 2020).

Third, the traditional modelling of offshoring choices based on TCE and RBV (i.e. the theoretical lenses most frequently adopted by offshoring research) is essentially static in nature (Eisenhardt and Martin, 2000; Madhani, 2010). Accordingly, it is not clear whether these theories alone can fully account for the interplay between the evolution of the surrounding context and the changes in offshoring trends or whether a more eclectic approach based on the adoption of dynamic (time-dependent) perspectives is needed.

Against this background, the research questions of this study are:

RQ. What changes has the manufacturing offshoring phenomenon undergone over time?

RQa. How has the manufacturing offshoring geography changed over time?

RQb. How have the manufacturing offshoring drivers changed over time?

3. Methodology

3.1 Dataset

The European Union (EU) agency Eurofound has been monitoring since 2002 all the major restructuring events, including offshoring decisions and made data available through the European Restructuring Monitor database. The information is collected daily by a network of experts analysing newspapers, business press, specialized websites and company websites of 29 countries (28 EU members plus Norway).

Considering the availability of the above-mentioned institutional database, we used ERM as source of information for our study. Written records have been considered particularly useful to investigate location choices (Ancarani *et al.*, 2015, 2019). Furthermore, achieving our objectives with other approaches – like case studies – would have been complicated by some issues: difficulty to know the population of interest and find a representative sample; difficulty to find respondents that can provide information about past events of their companies; difficulty for respondents to remember and explain in detail previous events; and difficulty to ensure that responses do not vary with selected informants (Pettigrew, 1990, 1997; Van de Ven and Huber, 1990).

We resorted to a database focused on European plants because, as already highlighted by previous studies on the topic (e.g. Fratocchi *et al.*, 2016), the European context has been deeply affected by the changes in firms locations strategies and has been subject to important political and economic transformations in the last 20 years, thus making this region the ideal setting for our study.

Consistent with previous research (Ancarani *et al.*, 2015), the unit of analysis was the single restructuring event. If a company has made a certain number of restructurings, it accounts for the same number of records in the database, each containing industry, event date, number of jobs restructured, origin/destination country, and the media news reporting the event.

The ERM database includes different types of restructuring events (e.g. "offshoring/delocalization," "closure," "bankruptcy"). We extracted all the "offshoring/delocalization" cases, read the announcement news and deleted some cases reporting incomplete data (e.g. missing destination country). This led to 644 records covering 58 countries and 24 industries (see Tables 1 and 2).

Previous adoptions of the ERM database can be found in Barbieri *et al.* (2019) and Goos *et al.* (2009), among others.

Country	Number of cases	Number of jobs restructured	Country	Number of cases	Number of jobs restructured
France	78	18,975	Poland	107	28,727
United Kingdom	77	21,570	China	100	29,237
Germany	66	21,486	Czech Republic	63	16,843
Sweden	61	10,905	Hungary	44	14,321
Italy	48	11,664	Romania	36	10,040
Denmark	37	8,957	Germany	34	11,560
Belgium	34	11,355	Slovakia	28	6,793
Finland	31	6,170	India	21	3,921
Austria	30	5,553	Italy	17	5,859
Ireland	29	8,834	France	13	4,204

Table 1. Top 10 origin (left) and destination (right) countries

Industry (NACE code)	Number of cases	Number of jobs restructured
27 – Manufacture of electrical equipment	119	35,858
29 – Manufacture of motor vehicles, trailers and semi-trailers	98	30,210
26 – Manufacture of computer, electronic and optical products	80	26,918
28 – Manufacture of machinery and equipment n.e.c	55	15,308
10 – Manufacture of food products	39	9,910
32 – Other manufacturing	30	7,608
20 – Manufacture of chemicals and chemical products	28	5,518
25 – Manufacture of fabricated metal products, except machinery and equipment	25	4,808
22 – Manufacture of rubber and plastic products	24	5,033
21 – Manufacture of basic pharmaceutical products and pharmaceutical preparations	22	5,631

Table 2. Top 10 affected industries

3.2 Data analyses

Three analyses were carried out: (1) "flat-step" based multiple structural change test, (2) network analysis and (3) gravity model. The objectives were respectively (1) to identify possible temporal discontinuities in the intensity of offshoring processes, (2) to analyze the geographical evolution of offshoring flows (RQa) and (3) to identify the evolution of location drivers (RQb).

3.2.1 Multiple structural change test. Usually, inter-temporal studies are characterized by a certain arbitrariness due to subjective choices of the transition points. To solve this problem, one of the most important statistical solutions is the "flat-step" based multiple structural change test (Bai and Perron, 2003) that identifies a set of transition points, which minimize the sums of squared residuals in each interval.

We adopted this statistical technique twice. First, we analyzed the number of offshoring cases and jobs restructured to identify the different offshoring phases. Second, we analyzed the annual growth rate of the global GDP (as a proxy for development opportunities and wealth of the whole economy – Alhorr *et al.*, 2012) and the annual number of industrial robot installations (as a proxy for technological innovation diffusion in manufacturing – De Backer *et al.*, 2018) to understand the changes in the "surrounding context" (see Table A1 in Appendix for data sources). The reasoning underpinning our approach is that firm choices are embedded in a series of contingent factors and such factors evolve over time, both in terms of changing and emerging conditions.

Previous adoption of the structural change test can be found in econometrics (Önel, 2005), biology (Denoël and Ficetola, 2007) and climate (Mariani, 2006) studies. Our paper adopts this approach in OM for the first time.

3.2.2 Network analysis. Network analysis has been used to study data that can be represented with a graph. Application fields of this technique include management, economics and sociology. We used network analysis to provide a geographic perspective of offshoring highlighting the countries more able to attract offshoring flows. We considered the in-degree (number of incoming connections) of each country and drew some graphs where nodes represent involved countries, while arrows are the jobs transferred. The tail of the arrow is the origin country while the tip is the destination. The size of each arrow is proportional to the number of jobs offshored.

3.2.3 Gravity models. Given the nature of the data included in our dataset, namely flows of jobs moved from origin to destination country, we employed a gravity model approach.

Gravity models are based on the analogy with Newton's gravitation law to explain international trades. They have been employed to study trade flows (using as masses origin and destination country GDPs) (Martínez-Zarzoso and Nowak-Lehmann, 2003), migration (using as masses origin and destination country populations) (Gallardo-Sejas *et al.*, 2006) and tourism demand (using as masses origin and destination country GDPs per capita) (Morley *et al.*, 2014).

The general log-linearized equation of a gravity model is (Morley *et al.*, 2014):

$$\log\left(\frac{F_{OD}}{M_O M_D}\right) = \alpha + \beta_1 \log(V_{OD}) + \beta_2 \log(D_{OD}) + \varepsilon_{OD} \tag{1}$$

where F_{OD} is the flow between origin (O) and destination (D) country; M_O and M_D are the economic masses of origin and destination country; α is a constant; V_{OD} is a generic explanatory variable between origin and destination country; D_{OD} is the distance between origin and destination country; β_1 and β_2 are parameters to be estimated; ε_{OD} is a normal error term.

We adopted gravity models to analyze the determinants of offshoring choices using as dependent variable $\frac{F_{OD}}{M_O M_D}$, where F_{OD} is the number of jobs moved from origin (O) to destination (D) country in each period identified by the structural change test, M_O and M_D are the labor force of origin (O) and destination (D) country.

To introduce the independent variables, two considerations are necessary. First, several scholars have stressed the importance of using country-level data (macro-economic indicators) to investigate the drivers/motivations of internationalization/offshoring choices (linking them to the dimensions of the OLI paradigm): Buckley *et al.* (2007, 2012) relied on macro-economic indicators to identify the determinants of Chinese and Indian foreign direct investments; Ellram *et al.* (2013) resorted to a country-level approach to shed light on American firms' location choices; Di Mauro *et al.* (2018) found that the majority of offshoring motivations lie above firm-level and are related to country characteristics; Barbieri *et al.* (2019) highlighted the usefulness of country-level variables to understand location choices of second degree; Abele *et al.* (2008) argued that companies generally base their choices on location-specific characteristics (e.g. labor cost). Second, while many possible offshoring/internationalization drivers/motivations exist, they can essentially be traced back to three main categories: efficiency-, resource- and market-seeking (i.e. the three dimensions of the Dunning's OLI paradigm) (Barbieri *et al.*, 2019; Ancarani *et al.*, 2015; Ellram *et al.*, 2013). Accordingly, we resorted to a set of independent macro-economic variables associated to these three dimensions (see Table A1 in Appendix for data sources):

(1) $LabCost_{OD}$: the difference between destination D and origin O country in the average hourly labor cost. Scholars have generally identified labor cost as one of the main drivers for efficiency-seeking (e.g. Babieri *et al.*, 2019). Hence, we included $LabCost_{OD}$ as a proxy for efficiency-seeking motivations.

(2) Ore_{OD}: the difference between destination D and origin O country in the ratio of ore and metal exports to merchandise exports. Building on the dictates of internationalization theory (which assert the importance of having access to scarce natural resources), Buckley *et al.* (2007, 2012) adopted this variable to consider the (natural) resource-seeking dimension of the OLI paradigm. Consistently, we included Ore_{OD} as a proxy for (natural) resource-seeking motivations.

(3) $Gerd_{OD}$: the difference between destination D and origin O country in the gross domestic expenditure on R&D per capita. Extant research has often resorted to country R&D expenses to account for (technology/knowledge) resource-seeking (e.g. Hattari and Rajan, 2010; Barbieri *et al.*, 2019). Consistently we adopted $Gerd_{OD}$ as a proxy for (technology/knowledge) resource-seeking motivations.

(4) $GDPppp_{OD}$: the difference between destination D and origin O country in the gross domestic product per capita at purchasing power parity. Buckley *et al.* (2007, 2012) adopted this variable to consider the market-seeking location advantage of the OLI paradigm. Consistently, we included $GDPppp_{OD}$ as a proxy for market-seeking motivations.

As for the control variables, some industries may relocate their activities more often than others (Gereffi, 1999; Abele *et al.*, 2008) or may have specific requirements (Fredriksson and Jonsson, 2019). We therefore included dummy variables (1-digit NACE code) related to the different industries.

Finally, since results are robust to both inclusion and exclusion of the distance term, we decided to not include this variable. This approach is in line with extant research (e.g. Metulini, 2013; Jensen and Pedersen, 2011) and allows us to be consistent with the categorization of offshoring drivers proposed in the literature review section.

4. Findings

4.1 Transition points (multiple structural change test)

To identify the different phases crossed by the offshoring phenomenon, we ran multiple structural change tests for two variables: number of cases recorded, and number of jobs restructured. The tests highlight the same transition points (2006–2009) for both variables (Figure 1). Therefore, we split the dataset into three periods:

(1) First period: 2002–2006, 253 cases.

(2) Second period: 2007–2009, 168 cases.

(3) Third period: 2010 onwards, 223 cases.

Moving to the contextual variables (growth rate of global GDP, annual number of industrial robot installations), the identified transition points were very close to those observed for offshoring-related ones (number of cases, number of restructured jobs): 2007 and 2009 for the GDP growth and 2010 for the number of industrial robots.

These findings show that offshoring practices mirror the surrounding context and, in particular, that different offshoring trends depend on the interplay between changed (general economic situation) and new conditions (e.g. new technology diffusion).

4.2 Geography (network analysis)

To understand whether and how offshoring geography changed over the years, we drew three different graphs, one for each period previously identified (Figure 2); nodes represent the countries involved, while arrows represent the jobs relocated from one country to another.

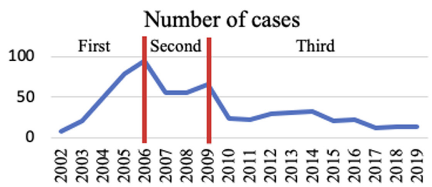
Results show a progressive change in the preferred destinations with marked differences between the first (2002–2006) and third (2010 onwards) periods. We observe a clear downsizing of some countries over time, primarily Romania and Hungary. Meanwhile, China has lost positions to Poland.

We then calculated the median distance of the relocations for each period, highlighting that companies are moving their facilities to locations closer to their origin country. Given the not normal nature of the data, we followed Siegel and Castellan (1988) suggestions and adopted the Kruskal-Wallis test to analyse the significance of the difference among the three median distances ($p < 0.001$).

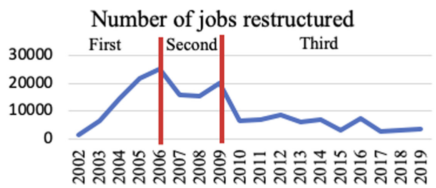
4.3 Drivers (gravity model)

To analyze the changes in (the relative importance of) offshoring drivers, we ran three gravity models (Table 3), one for each period previously identified.

In the *first period* (Model 1), we notice a strong significance of labor cost ($LabCost_{OD} = -1.67, p < 0.01$). We can deduce that in this phase firms' location choices are mainly oriented to cost savings and companies tend to offshore to countries characterized by low labor costs.

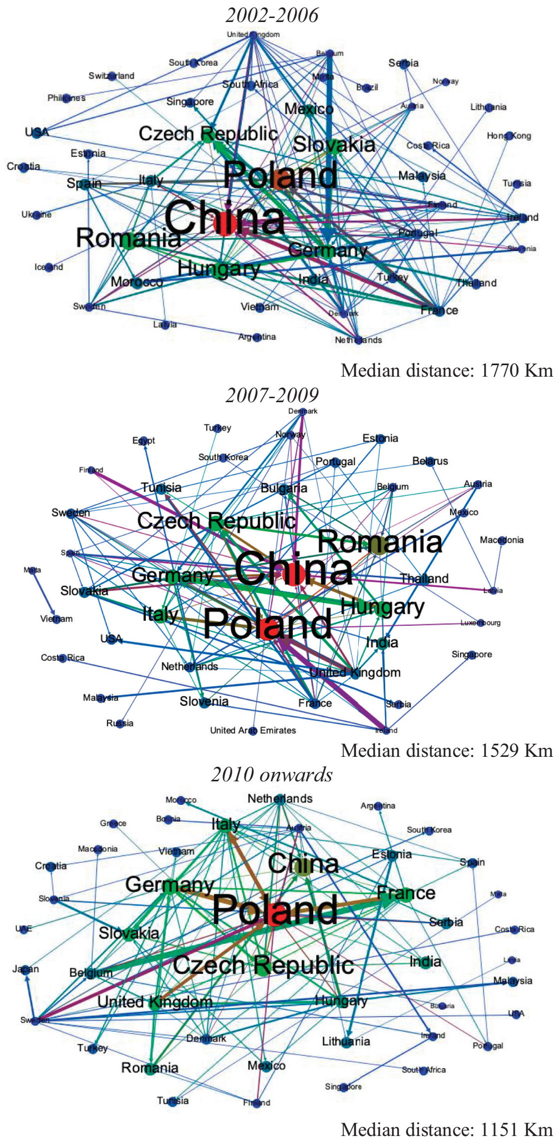


Variable	Discontinuity year(s)	P-value
Number of cases	2006-2009	0.01



Variable	Discontinuity year(s)	P-value
Number of jobs restructured	2006-2009	0.001

Figure 1.
Temporal trends and discontinuity analysis



Note(s): nodes have different colours and sizes:

- Red and big: countries most involved in the phenomena
- Green and medium: countries in an intermediate situation
- Blue and small: marginal countries

To make the graph clearer we choose to make the colours faded

Figure 2.
Network analysis

In the *second period* (Model 2), cost savings ($LabCost_{OD} = -1.18, p < 0.05$) are still relevant but lose some significance, while the GDP per capita becomes significant ($GDPppp_{OD} = 1.15$, $p < 0.01$). A possible interpretation is that companies begin to revise their strategies, adding to the mere search for cost savings also the search for new markets.

Table 3.
Statistical models

Dependent variable = F_{OD}	Model 1 (n = 253) (2002–2006)	Model 2 (n = 168) (2007–2009)	Model 3 (n = 223) (2010 onwards)
Independent variables			
Constant	−1.31 × 10^(1)±1.72 × 10^(−1) ***	−1.29 × 10^(1)±1.87 × 10^(−1)***	−1.28 × 10^(1)±1.85 × 10^(−1)***
$LabCost_{OD}$	−1.67 × 10^(−1)±5.84 × 10^(−2)**	−1.18 × 10^(−1)±5.02 × 10^(−2)*	−6.30 × 10^(−2)±5.35 × 10^(−2)
Ore_{OD}	−3.31 × 10^(−1)±2.27 × 10^(−1)	−1.01 × 10^(−2)±1.29 × 10^(−1)	2.02 × 10^(−1)±2.41 × 10^(−1)
$Gerd_{OD}$	6.14 × 10^(−4)±1.45 × 10^(−3)	−2.32 × 10^(−3)±1.41 × 10^(−3)	4.02 × 10^(−3)±1.49 × 10^(−3)**
$GDPppp_{OD}$	−6.53 × 10^(−5)±6.93 × 10^(−5)	1.15 × 10^(−4)±3.97 × 10^(−5)**	1.12 × 10^(−4)±5.13 × 10^(−5)*
Dummy			
Industry	Included	Included	Included

Note(s): $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.0001$

In the *third period* (Model 3), labor cost loses its significance, while the technological variable (gross domestic expenditure on R&D per capita) becomes significant ($Gerd_{OD} = 4.02$, $p < 0.01$). This makes clear that the determinants of location choices have changed and, nowadays, companies are more attracted by technological aspects. The GDP per capita is still significant ($GDPppp_{OD} = 1.12$, $p < 0.05$), indicating that market-seeking is always important in firms' strategies.

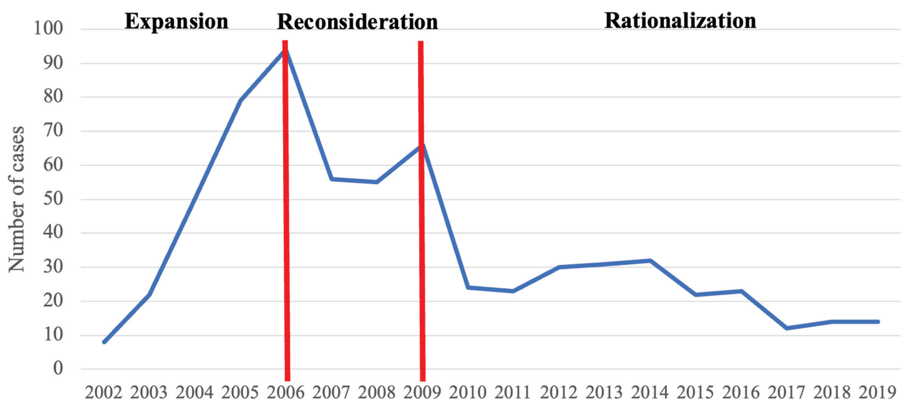
5. Discussion

Our analyses highlight that offshoring has crossed three different phases (Figure 3). In the following paragraphs, we will try to contextualize the three periods to provide an interpretation.

5.1 Expansion phase (2002–2006)

Consistently with extant research (e.g. MacCarthy and Atthirawong, 2003; Hong, 2008) our findings show that in the early 2000s, the strong globalization process and the trade liberalization (e.g. China's admission into the WTO – 2001) gave an important boost to the relocations of production activities to developing countries. This period was characterized by economic growth (World GDP increased by 4% per year), especially in the emerging countries where an industrial manufacturing base was developing. These countries were able, on the one hand, to offer interesting offshoring opportunities to the West, and on the other hand to offer products at very competitive prices. The main concern for European manufacturers was therefore to respond to the new low-cost Asian entrants that were broadening global competition dynamics. To meet the increased rivalry, European firms tried to improve efficiency and reduce costs by looking for new locations where to move their manufacturing activities (Di Mauro *et al.*, 2018).

Relocation opportunities were greatly enhanced when the so-called "Eastern-block" joined the EU. Its admission provided firms several opportunities to reduce production costs while



Phase:	Expansion	Reconsideration	Rationalization
Period:	2002 – 2006	2007 – 2009	2010 onwards
Context:	Economic growth	Disrupted economy	Stagnating economy Diffusion of new manufacturing technologies
Intensity:	Fast growth	Drastic change	Reduction and stabilization
Geography:	Low-cost countries	Less "East" and more "West"	Re-discovery of proximity
Driver(s):	Cost	Cost and market opportunities	Market opportunities and technology

Figure 3.
Three phases of offshoring

avoiding customs and duties (UNCTAD, 2005). According to Bevan and Estrin (2004), the prospect to relocate to Eastern EU member countries was considered a low-risk strategy as EU membership required external validation of the quality of economic management and institutional development thus resulting in macroeconomic and political stability.

In this phase, we observe therefore the strong involvement of countries such as Romania, Hungary, Slovakia, Poland and Czech Republic in the global location dynamics (Figure 2).

5.2 Reconsideration phase (2007–2009)

The financial crisis had severe impacts on relocation activities. Between 2006 and 2007, the number of cases decreased by almost 50% (Figure 3).

Other studies confirm this trend and offer similar explanations. Kinkel (2012) and Fratocchi *et al.* (2016), in particular, highlight that during the economic downturn firms tried to exploit their production capacity at home, rather than producing in foreign countries. These choices allowed companies the required flexibility to deal with decreasing demand and to survive in a rapidly changing context. Besides, the proximity between different production phases had a positive impact on cost, innovation capability and time to market (Berger, 2013).

Economic uncertainty can also clarify the rising interest in market-seeking motivations (Table 3). On the one hand, Europe was facing one of its most serious crises with GDP experiencing negative growth rates (e.g. −5% in 2009). On the other, Asian countries (China above all) showed large expansion potential with GDP growth rates close to double digits figures (e.g. China 9% in 2009). Hence, companies sought outlets in new markets by establishing or consolidating the production bases there. Many managers dedicated their attention even more than before to the trade potential beckoning in these high growth emerging economies and were required to tailor their competitive strategies to the changing environment. The global competition dynamics shifted from efficiency-seeking to the combined research for efficiency and market advantages (Kinkel *et al.*, 2014).

5.3 Rationalization phase (2010 onwards)

The internationalization processes took a new turn both in terms of intensity and drivers of the offshoring phenomenon. These outcomes are probably related to the diffusion of the new manufacturing technologies of Industry 4.0 (that we accounted for by considering the number of annual installations of industrial robots); a twofold explanation can be given. On the one hand, the increase in productivity resulting from the adoption of such technologies (Ghobakhloo and Azar, 2018), combined with the increase of labor costs in some foreign locations (e.g. China) (Wu and Zhang, 2014; Wiesmann *et al.*, 2017), reduced low-cost countries attractiveness and strengthened the consideration for technologically advanced locations (World Bank, 2020), as also confirmed by our results (Table 3). On the other, by allowing firms to be competitive also producing in developed (high-cost) countries, such technologies helped companies to overcome quality, operational capability and flexibility problems they experienced in their activities abroad (Moretto *et al.*, 2020; Patrucco *et al.*, 2016; Steven *et al.*, 2014) (due to the need to adapt production processes to the limited skills of the staff in developing contexts – Abele *et al.*, 2008). Moreover, from a technology-transfer perspective, relocating activities in more developed contexts could open the doors to bidirectional learning and upgrading (e.g. Sapsed and Salter, 2008).

Location choices are also associated with state regulations and legislations (e.g. Nordås, 2020; Kleibert, 2014). A further contribution to the diffusion of these new technologies (and to strengthen the interest in technologically advanced countries) comes, therefore, from the policies enacted by European governments to reattract/revitalize the manufacturing industry (e.g. “Platform Industrie 4.0” in Germany, “Industrie du Futur” in France, “High-Value Manufacturing Catapult” in the United Kingdom – European Commission, 2020) as they all share the willingness to help firms to recover their international competitiveness by investing in innovation, digitization and adoption of Industry 4.0 related technologies (Fratocchi *et al.*, 2014; Wan *et al.*, 2019). As a result, Europe has become the area with the highest robot per worker density, while many countries of the initial offshoring phases (e.g. China) are lagging behind (IFR, 2018). In this period, governmental efforts toward manufacturing digitalization, together with the increased companies' awareness of the issues resulting from abroad productions, also marked the appearance of new location strategies like reshoring (Ellram *et al.*, 2013) and right-shoring (Tate and Bals, 2017).

As for the surrounding economic context, crisis recovery was still dampened. World global GDP settled at an average growth rate of 2% (1% in Europe), which was much lower than the pre-crisis period. Moreover, several countries that were previously showing double-digit growth potential (and that were representing important markets for European firms) experienced a reduction in their growth rates (e.g. China moved from 10% in 2010 to 5% in 2019). Consistently with the previous phase, in a period characterized by economic stagnation, market-related drivers remained an important motivation for firms in pursuing their location strategies, as evidenced by both our results (Table 3) and recent studies on the topic (Johansson and Olhager, 2018).

In the new global context, some developed countries regained competitiveness (Figure 2). In this perspective, we can understand why Poland is still one of the preferred offshoring destinations. The World Economic Forum (2018) classified it as one of the readiest countries for Industry 4.0 adoption, together with Sweden, France, the United Kingdom and Germany. Unlike other Eastern countries (Romania, Bulgaria and Hungary) that offered low-cost location advantages, Poland was able to evolve investing in industrial policies (e.g. the Morawiecki Plan, the Operational Programme Digital Poland) to offset labor costs rise with technology and productivity improvements (European Commission, 2020); for instance, while in 2018 worldwide growth rate of robot installations was 6%, in Poland this rate reached 40%.

5.4 Summary and future projections

In summary, our longitudinal analyses answer the research question by showing that geography and drivers of offshoring have shifted over time mirroring the changes in the surrounding context. Today, offshoring decisions should consider different boundary conditions compared with those of the *expansion phase* both in terms of the general economic situation and the diffusion of new manufacturing technologies. Our study, therefore, supports statements of previous research that offshoring decisions are sensitive to the time aspect (Andersson and Mattsson, 2006) and more specifically shows that the point in time matters in offshoring choices as firms are embedded in a context that evolves over time affecting available alternatives and their characteristics. To understand firm's location choices, it is thereby necessary to ground them in these contextual factors and explore the interlink between evolving (changed and emerging) conditions and resulting choices. Accordingly, we argue that this concept should be considered and further developed in offshoring/internationalization literature.

Following the above reasoning, it is worth discussing some events that may alter firm's location choices in the years to come. First, the US President Trump's political agenda "America First" resulted in a trade and tech war between US and China with limitations to the free exchange of goods and bans to some high-tech Chinese companies. Due to the interconnected nature of US and Chinese economies, these policies are considered a threat to the general growth and might also prevent worldwide investors to conduct projects abroad (Goulard, 2020). Moreover, many observers think that US-China tensions will continue even with the recent election of Joseph Biden as US president. Second, the come into force of the Brexit is likely to impact companies and supply chains. Some studies highlight a potential decrease of foreign direct investment in the UK (Cieślik and Ryan, 2020) and possible relocations of firms' plants from the UK to the continental Europe (Bailey *et al.*, 2020). Finally, the COVID-19 pandemic forced many countries to impose social distancing rules as well as stay-at-home measures (World Health Organization, 2020). This pandemic had disruptive consequences on many industrial sectors and is expected to affect future offshoring decisions with more regional, centralized and redundant production networks (Strange, 2020).

While both our findings and extant research (e.g. Colotla *et al.*, 2003; Vereecke *et al.*, 2008; Boffelli and Johansson, 2020) highlight that firms' location choices are dynamic phenomena, the widely adopted modelling which builds on TCE and RBV is static and overlooks this evolutionary (time-dependent) nature (Madhani, 2010). These theories are, therefore, useful to understand the location dynamics of a single phase (TCE – *expansion*; TCE and RBV – *reconsideration*; RBV – *rationalization*) or some specific location decisions, but become less helpful when the researcher is interested in understanding why the entire phenomenon moved from a phase to the subsequent one with different characteristics. Hence, a holistic view and a complete understanding can only be achieved with the adoption of theoretical approaches capable to capture the temporal dimension and, in particular, the continual interplay between contextual changes and resulting location decisions. In this perspective, an interesting example is the dynamic capabilities theory that has been used by a few offshoring studies (e.g. Stephan *et al.*, 2008; Mudambi and Venzin, 2010) and could be used in a more extensive way. Also, the learning process defined in the relational-based view could be widened to explain not only offshoring-related relationships (Vivek *et al.*, 2009) but the whole firm's offshoring strategy. Even more promising seems the co-evolutionary organizational theory, which postulates a mutual continuous and interactive influence of firms and their environments during the evolutionary process. This theory – that according to a recent review (Abatecola *et al.*, 2020) has been used only in one study (Lewin and Volberda, 2011) – could explain both the continuous revision of offshoring choices (due to the changes in the surrounding context) and the evolution of the offshoring phenomenon as a whole. According to this theoretical perspective, companies influence contexts in which they operate and are influenced by them. The evolution of companies and contexts can therefore lead to revise offshoring choices (as well as to structural changes of the offshoring phenomenon). Finally, as also advocated by other studies (Doh, 2005; Ellram *et al.*, 2013), there is probably no single theory able to fully account for the multifaced aspects of the offshoring phenomenon. This should suggest the adoption of a more dynamic approach to the OLI "location advantage," not only because pursued drivers change (Vereecke *et al.*, 2008), but also because location advantages provided by different countries evolve over time due to changes in the surrounding context.

6. Conclusions

6.1 Contribution to theory

Our study contributes to offshoring literature in at least four significant ways.

First, we are the first to adopt a systematic, empirical and quantitative approach to analyze the evolution of the manufacturing offshoring considering both the phenomenon itself and the triggering contextual changes. With such examinations we widened the knowledge on the topic and, in particular, we showed that offshoring intensity has significantly decreased over time and that the relevance of the pursued drivers has changed mirroring the shifts in the surrounding background. Specifically, in the early 2000s offshoring strategies were targeted mainly at efficiency-seeking motivations, while the current uncertainty of the general economic situation and the availability of new manufacturing technologies made companies more interested in market- and technology-seeking strategies. In doing this, our contribution is also one of the first to consider previous calls (e.g. Barbieri *et al.*, 2018) for more research on the role of new manufacturing technologies (Industry 4.0) in modifying firms' location strategies.

Second, while some studies (e.g. Colotla *et al.*, 2003; Vereecke *et al.*, 2008) already highlighted the dynamic nature of firms' choices, we extended their findings by testing the importance of considering the point in time in offshoring decisions. In particular, we were able to offer a richer perspective of the internationalization process and to highlight how the (changed and emerging) contextual factors triggering firms' location strategies differ considering different points in time. This answers to a precise call of previous internationalization research which stated that (1) "*there has been little conceptual development–and no systematic evaluations–of temporal concepts*" (Hilmersson *et al.*, 2017), (2) "*empirically, we have not achieved enough in terms of longitudinal studies. The time dimension to internationalisation has been neglected and that is a loss of opportunity to understand the cycles over time as influenced by the broader external economic environment*" (McAuley, 2010) and (3) the *point in time* at which the internationalization decisions take place is underestimated (Andersson and Mattsson, 2006).

Third, by showing the evolving nature of the offshoring phenomenon, we suggest scholars (interested in conducting longitudinal investigations) to resort to dynamic theoretical approaches able to account for the role of one of the most important contingencies: the temporal dimension (and the resulting continual interplay between the evolution of firm's strategies and the changes in the surrounding context).

Finally, we adopted a methodological approach to identify the transition points that has never been used in OM. This method – called "flat-step" based multiple structural change test – could be used by future OM contributions to analyze both the evolution of manufacturing practices over time and the changes in the variables defining the contextual characteristics.

6.2 Contribution to practice and policy

The longitudinal approach has shown that offshoring drivers and geography have shifted over the years mirroring the changes in the surrounding context. Currently, this practice is used to reach new markets and new technologies, but in the future, the phenomenon could change again.

According to Abele *et al.* (2008) the identification of the most important location factors is the crucial step to define the ideal place for firm's activities. Hence, by pointing out the variation of the relative importance of the main offshoring drivers, our study suggests managers that different surrounding contexts should result in different location strategies. Moreover, by highlighting the evolving nature of the offshoring phenomenon we also warn them on the need to adopt a dynamic approach to internationalization, planning processes and building capabilities to shift/change facilities location and maintain the required flexibility to deal with a constantly evolving global background. The offshoring decisions should be periodically re-verified, checking whether the current offshore manufacturing locations are still optimal, or need to be revised. Together with the possible development of the most important location factors, companies should also consider the potential effects of some recent events and trends like the US-China trade war, Brexit, and COVID-19. In this perspective, our findings highlight the necessity to pursue the company strategy beyond single movements evaluating the costs and benefits resulting from the initial decision together with the (potential) sunk costs of transferring the production to another location.

Furthermore, the identification and comprehension of offshoring drivers and motivations provide important information on why a particular country has changed (or maintained) its position within the global manufacturing dynamics. This might help policymakers to find tools and ad-hoc solutions to strengthen the manufacturing base and to re-attract offshored firms. Our results support the idea that investing in country attractiveness in terms of efficiency and productivity (e.g. technological infrastructure and Industry 4.0 policies) strengthens the country's ability to (re)attract investments.

6.3 Limitations and future research

Our findings should be viewed in light of some limitations.

First, we used secondary data based on publicly known relocation initiatives. This imposed some restrictions in the analyzed offshoring events (only medium to large events) and in the considered variables. While these limitations apply to most studies based on secondary data (e.g. Wan *et al.*, 2019) and our dataset was collected by an authoritative institution, future research should try to validate and expand our findings using primary sources (e.g. surveys).

Second, Europe has always played a central role in firms' location decisions (Barbieri *et al.*, 2019), making it the ideal place for our study. However, excluding flows coming from extra-EU countries causes information loss. Future research should test and generalize our findings also including other geographical contexts.

Third, the ERM considers only corporate restructurings of a certain size (larger than 100 jobs). This might lead to an underrepresentation of SMEs when compared to large companies. Future research could carry out specific investigations on the evolution of SMEs' offshoring.

Finally, some recent sociopolitical phenomena could affect firms' location choices in the next years. While it is now too early to assess their long-term impact, future studies should analyze whether they will lead to the continuation of the current *rationalization* phase or to a further (fourth) offshoring phase, with specific characteristics.

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Appendix

Variable	Source	URL
GDPgrowth	World Bank	https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG
Robots	IFR	https://ifr.org/worldrobotics/
$Gerd_{OD}$	Eurostat	http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_e_gerdtot&lang=en
$LabCost_{OD}$	Eurostat	http://ec.europa.eu/eurostat/tgm/table.do?tab=tableandinit=1&language=en&pcode=tps00173&plugin=1
$GDPppp_{OD}$	World Bank	https://data.worldbank.org/indicator/ny.gdp.pcap.pp.cd
Ore_{OD}	World Bank	https://data.worldbank.org/indicator/TX.VAL.MMTL.ZS.UN
M_O	World Bank	https://data.worldbank.org/indicator/SL.TLF.TOTL.IN
M_D	World Bank	https://data.worldbank.org/indicator/SL.TLF.TOTL.IN

Note(s): The values of the variables included in the gravity model are referred to the central year of each period: 2004 for the first, 2008 for the second and 2014 for the third

Table A1.
Data sources

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