DEMOGRAPHIC STRUCTURE AND PRIVATE SAVINGS IN SELECTED COUNTRIES OF THE OCEANIA REGION

AZMAT GANI* and JEHAD YASIN**

Abstract

This paper tests the life cycle hypothesis that private saving rises with a higher percentage of population working and falls by higher percentages among the young and the retired, using the case of selected Pacific Island countries. Our results provide strong empirical evidence that age structure is a prime determinant of national savings. The results reveal a statistically significant and positive relationship between national savings ratio and the percentage of working population groups. The research also revealed a statistically significant and negative relationship between national savings and percentage of retired population. Policy makers need to set up measures that improve the economic welfare of the working age population, such as instituting and enforcing minimum wage laws, encouraging compulsory savings for private and public sector workers, adjusting wages to inflation on a consistent and regular basis, providing tax rebates to low-income earners and those providing care for the elderly family members and improving the private sector business environment so as to facilitate the absorption of more working age population.

Keywords: Life cycle hypothesis, savings, population and age.

JEL Classification: O16, O56.

1. INTRODUCTION

This study investigates the relationship between savings behavior and age dependency for four Pacific Island countries: Fiji, Papua New Guinea, Tonga and Vanuatu. While savings rate vary slightly among the countries in the Pacific, on average, Pacific Island countries are saving less than other economies

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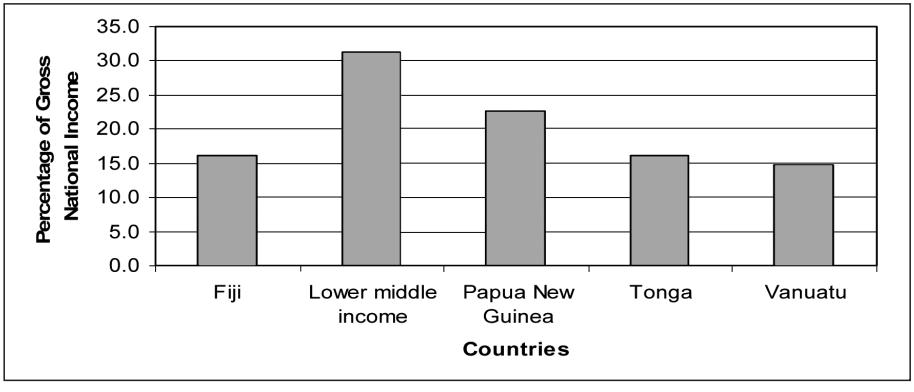
with similar levels of development, as measured by per capita incomes, that is, the lower middle-income economies. For example, between 1982 and 2005, gross national savings as a percentage of gross national income for the average of the lower-middle-income economies world-wide was just over 30 percent compared to 16.2 percent in Fiji; 22.7 percent in Papua New Guinea; 16.1 percent in Tonga; and 14.7 percent in Vanuatu (Figure 1). In terms of the long-term trends, these countries savings rates do not look impressive either (Figures 2 to 5) with one country (Tonga) even experiencing a downward trend in savings. The low level of savings in the Pacific is a cause of policy concern and, therefore, calls for further investigation. Given the global financial crisis, the effects of which have certainly been transmitted to the Pacific countries, low levels of savings as illustrated in Figures 1 to 5 can impact capital flows, domestic investment and the sustainability of exchange rates. The short-run improvements in savings rates look quite bleak, as economic growth (for 2010) is expected to contract by 0.5 percent in Fiji and grow by 0.5 percent in Tonga (Asian Development Bank, 2010). The downturn in the world economy and Pacific Island countries' major trading partners, together with rises in fuel and food prices do not indicate any strong prospects of improvements in Pacific Island countries' savings patterns.

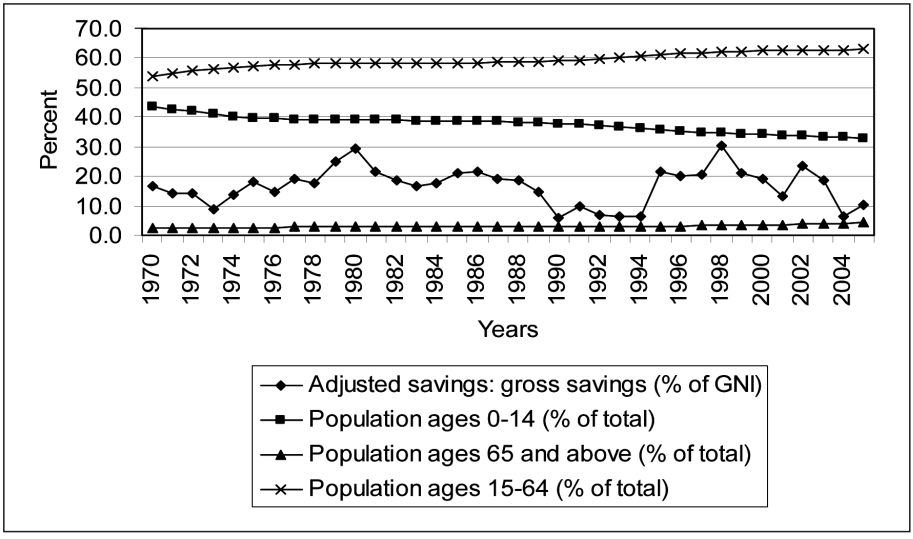
Figure 1: Average Annual Savings Rate in Selected Pacific Island Countries: 1982-2005



Source of data for Figure 1: World Bank (2008).

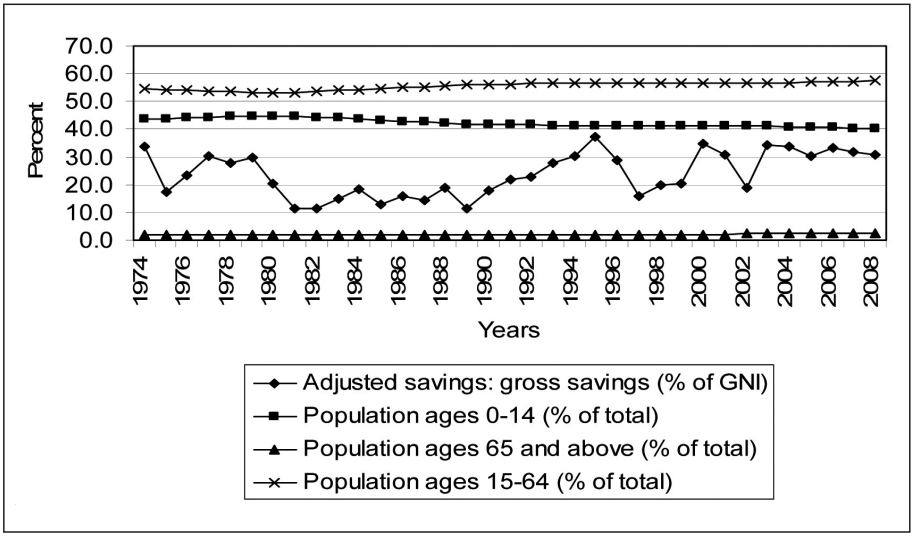
Theoretically, demographic factors, among others, can have potential effects on national savings. One theory that provides an explanation for the links between demographic factors and national savings is the life-cycle hy-

Figure 2: Trends in Private Savings and Population Groupings in Fiji



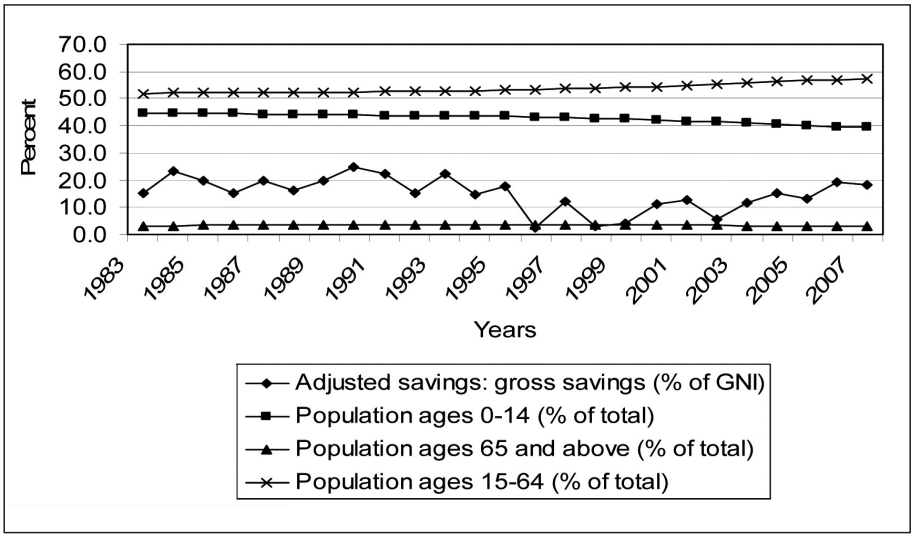
Source of data for Figure 2: World Bank (2008).

Figure 3: Private Savings and Population Groupings in Papua Nuova Guinea



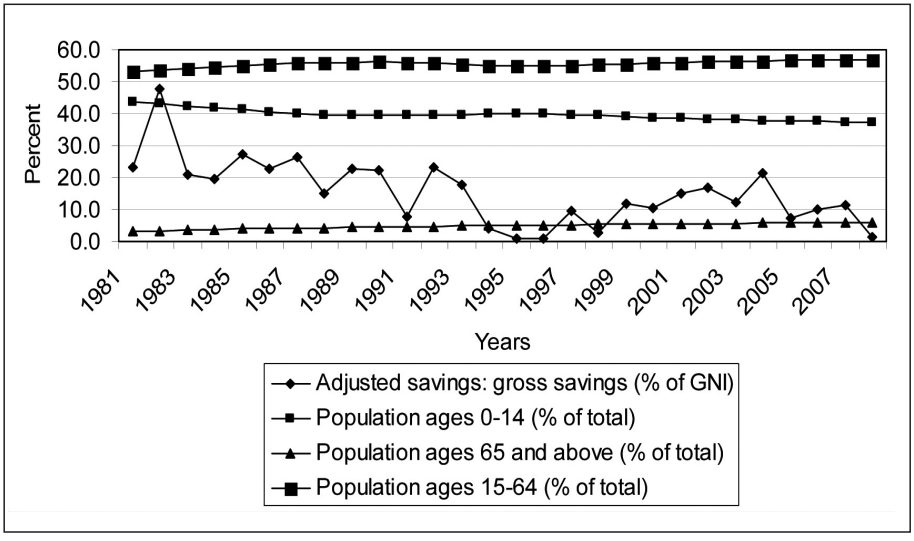
Source of data for Figure 3: World Bank (2008).

Figure 4: Private Savings Rate and Population Groupings in Vanuatu



Source of data for Figure 4: World Bank (2008).

Figure 5: Private Savings Rate and Population Groupings in Tonga



Source of data for Figure 5: World Bank (2008).

pothesis. According to Modigliani's (1966 and 1970) life-cycle hypothesis, the working (middle age) group is considered to be the catalyst for fueling economic growth through savings. Another implication of the life-cycle hypothesis is that the young and the old are the least likely to save. Thus, these theoretical implications require empirical testing with country cases from different regions of the world to gauge the behavior of savings with greater strength and meaning. Hence, the purpose of this paper is to examine the response to savings of three population groups: namely, the young (15 years of age or younger); the working population (age 15-64 years) and the aging group (65 years and older) using annual time series data for the Pacific Island countries depicted in Figure 1. In doing so, the empirical relationship is examined using pooled, as well as country-specific, regression analysis. The next section provides a brief discussion of the literature. Section three discusses the data. Section four presents the empirical results. Section five concludes.

2. LITERATURE REVIEW

The life-cycle hypothesis (for example, Modigliani, 1966 and 1970) unfolds the importance of demographic structure to levels of savings. The core feature of this hypothesis is that if a high proportion of the population is of working age, then the economy should have a high rate of saving, as workers provide for their retirement. Conversely, when the workers reach retirement age and "dis-save", then the aggregate savings rate should decline (Mason, Bayoumi and Samiei, 1998). Thus, the life-cycle hypothesis implies that private saving rises with a higher percentage of working population, and falls with a higher percentage of the youth and aging population. The hypothesis also contends that factors like the elderly dependency ratio, declining fertility rates, life expectancy, and income levels are all possible determinants of private saving (Yasin, 2008). Modigliani (1970), Graham (1983), and Masson and Tryon (1990) note that higher proportions of the young and elderly in relation to persons of working age – dependency ratios – are associated with lower saving rates. Past literature (reviewed below) has demonstrated that the life-cycle model is well able to explain the demographic factors in determining national savings. Most studies examining the savings patterns in different countries around the globe are empirical in nature, tackling savings issues largely from a macroeconomic perspective.

Corbo and Schmidt-Hebbel (1991) have examined the effect of fiscal policy on savings. In their study on public policies and saving in developing countries, Corbo and Schmidt-Hebbel (1991) show that cutting expenditure is a

more effective way of increasing national savings and raising taxes. Ostry and Reinhart (1992) have investigated the relationship between terms of trade shock and private savings. Their empirical findings confirm a positive correlation between terms of trade shock and savings. The influence of income on savings has been examined by Carroll and Weil (1994) and Edwards (1995). These authors' findings consistently indicate that the level of per capita income positively affects savings rates, with the impact of income on savings typically found to be greater in developing than in industrial countries.

Mei (1999) emphasizes the importance of the dependency ratio as a key inhibitor of national saving in the U.S. A larger workforce promotes national output; a higher dependency ratio increases aggregate consumption and thus depresses national saving (Guest and McDonald, 1998). In addition, higher income levels are usually associated with the rising saving rates, although Masson (1998) reports that such a relationship exists only up to a certain income threshold, above which the saving rate tends to fall.

Attanasio, Picci and Scorcu (2000) focus on the dynamic relationship between national saving, investment and growth. These authors' study was based on annual time-series data for a large cross-section of countries. Their empirical findings consistently confirmed that Granger-causes saving, although the effects appeared to be quantitatively weak. Deaton and Paxson (2000) examined the connection between income growth and saving but from a microeconomic perspective. These authors assess the association between savings and growth using household data and find that the observed correlation between both variables can be explained largely as the effect of income growth on savings if individual household members determine their consumption on the basis of their respective life time income profiles. Bandiera, Caprio, Honohan and Schiantarelli (2000) assessed the impact of saving on domestic financial liberalization. These authors examined the impact of financial sector reforms on private savings. Their analysis of different episodes of financial liberalization did not show a systematic direct effect on savings rate, with negative outcomes emerging for Republic of Korea and Mexico, positive outcomes for Ghana and Turkey and negligible results for the rest of the sample countries.

In general, the drivers of savings are well reviewed in Loayza, Schmidt-Hebbel and Serven (2000) and Masson, Bayoumi and Samiei (1998). Loayza, Schmidt-Hebel and Serven (2000) provide a thorough review of the current state of knowledge on the determinants of saving rates as part of the World Bank Research Project, "Saving across the World." These authors argue that "as the recent turmoil in the international financial markets (referring to the East Asian experience of 1997-98) illustrates, low saving and high current ac-

count deficits can exacerbate the likelihood, and adverse effects, of capital flow reversals." Mayson, Bayoumi and Samiei (1998) examined the determinants of private saving behavior for a large sample of industrial and developing countries. Their empirical findings revealed that demographics and growth are important determinants of private saving rates, and that interest rates and terms of trade have positive, but less robust, effects. Elbadawi and Mwega (2000) analysed the determinants of private savings in Sub-Saharan Africa showing that causality runs from growth to investment (and perhaps to private savings), whereas a rise in savings rate Granger-causes an increase in investment.

Available literature provides evidence of the growing importance of demographic factors in explaining the savings rates in different countries and regions. In the post 2000 period research on this issue has continued to generate useful debates on the importance of savings to national economic welfare. In examining the impact of population aging on financial markets in developing countries, Poterba (2004) argued that the income earned during the individual's prime working stage exerts the highest impact on the saving rate. Bulir and Swiston (2006) examine the factors influencing Mexico's private saving rate. Their cross-country analysis suggested that Mexico's greater reliance on external saving, its relatively high population dependency ratio, and its less developed financial system have been the main factors holding back private saving. Kim and Lee (2007) analyzed the empirical relationships among demographic changes, savings and current account balances in East Asia. Their results, based on the Vector-Auto Regressive model, revealed that an increase in dependency rate, especially the elderly dependency rate, significantly lowered saving rates and subsequently worsened current account balances. More recently, Hashimoto and Tabata (2010), using a small open two sector overlapping generations model, showed that population aging induces a shift in labour from non-health care sector and lowers per capita income growth rate. Macunovich (2010) describes an empirical relation concerning changes in the age structure of population arguing that the 15-24 age group is one of the key age groups, with increases in this age group exerting strong positive effects on GDP growth, and negative effects on current account balance and gross capital formation.

3. DATA

The data utilized in this study is obtained from the World Development Indicators CD ROM (World Bank, 2008) and span the annual period 1990-2005 for the pooled model, and varies for the country-specific models. Four

countries are used in the pooled as well as the country-specific estimations; Fiji, Papua New Guinea, Tonga and Vanuatu. Data availability is one of the main reasons for selecting these countries of the several island states that form the Pacific Island Group. For each country, the variables of interest are: gross domestic savings as a percentage of gross national income; percentage of population of 15 years of age and younger (designated as children); percentage of population 65 years of age and older (designated as retired); and the percentage of population between 15 and 64 years of age (designated as working group).

The justification for the choice of these variables relates to the theoretical contentions of the life-cycle model. In essence, the life-cycle model of Modigliani (1966, 1970) suggests that a country should experience a high rate of national saving if a large proportion of its population is of working age, since workers provide for their retirement. Conversely, when workers reach retirement age and begin dis-saving, aggregate savings rate should decline (Mason, Bayoumi and Samiei, 1998). Thus, the ''Life-Cycle'' hypothesis implies that private savings rise with a higher percentage of working population, and fall with a higher percentage of young and/or aging population. The hypothesis also contends that factors such as the elderly dependency ratio, declining fertility rates, life expectancy, and income levels are all possible determinants of private savings (Yasin, 2008). Modigliani (1970) and Masson and Tryon (1990) also argue that higher proportions of the young and elderly in relation to persons of working age – dependency ratios – are associated with lower saving rates.

4. EMPIRICAL FINDINGS AND DISCUSSION

The estimation methodology here follows the pooled analysis of annual data for the period 1990-2005 for the four countries as well as country-specific analysis. In essence, the model combines the assumptions about the cross-sectional observations with those made when dealing with time-series data. This method subjects the entire data to two transformations: the first to eliminate the possible autoregression, and second, to eliminate hetroscedasticity. The pooled model is estimated with the assumptions of the possibility of cross-sectional dependence as well as cross-sectional independence of the error terms and the results are reported accordingly. The results of the pooled regression are reported in Tables 1 and 2 while the results of country-specific analysis are reported in Tables 3 and 4. We begin our discussion of the pooled analysis of the data as reported in Tables 1 and 2.

Table 1: Pooled estimation results: Model I

Variables	Cross-sectional dependence	Cross-sectional independence
Constant	0.048 (0.855)	0.029 (0.280)
Δ*Log Children*	1.022 (7.615)*	0.891 (4.174)*
Δ*Log Retired*	-1.361 (10.430)*	-1.159 (5.027)*
Δ*Log Savings*$_{(t-1)}$	-0.331 (4.537)*	-0.384 (3.730)*
Number of observations	64	64
Sample years	1990-2005	1990-2005
Adjusted R-square	0.69	0.38

* Indicates statistically significant at the 1 percent level.
t-statistics are in parentheses.

Table 2: Pooled estimation results: Model II.

Variables	Cross-sectional dependence	Cross-sectional independence
Constant	0.063 (0.448)	0.031 (0.267)
Δ*Log Working*	0.526 (3.747)*	0.399 (2.086)**
Δ*Log Savings*$_{(t-1)}$	-0.226 (2.030)**	-0.257 (2.193)**
Number of observations	64	64
Sample years	1990-2005	1990-2005
Adjusted R-square	0.24	0.13

* and ** indicates statistically significant at the 1 and 5 percent levels respectively.
t-statistics are in parentheses.

The main objective of this study is to test the validity of the life-cycle hypothesis in the case of the four Pacific countries. In particular, the empirical formulation was designed to see if the national savings ratio rises significantly with a growth in the percentage of the working population and, moreover, whether the national saving ratio decreases as a result of an increase in the percentage of children and of those classified as retired in the population. Based on the pooled analysis of the data, the empirical results suggest the presence of a positive relationship between the relative percentage of working population and the national savings rate in the four Pacific countries examined (Table 2). The coefficient of the working age population is, as per our *a priori* expectation, positive and statistically significant at the 1 percent level. An attempt was also made to test the effect of the working age population on national savings on a country-specific basis, the results of which are pre-

Table 3: Regress results: Model I

Variables	Countries			
	Fiji	Papua New Guinea	Tonga	Vanuatu
Constant	0.097 (0.954)	0.018 (0.324)	4.407 (0.902)	0.049 (0.351)
Δ*Log Children*	2.786 (1.684)***	0.607 (0.549)	170.98 (1.249)	0.885 (0.187)
Δ*Log Retired*	-6.329 (1.301)	0.620 (0.174)	-340.93 (1.210)	-0.705 (0.060)
Δ*Log Savings*$_{(t-1)}$	-0.126 (1.127)	-0.195 (2.518)**	-0.326 (1.598)	-0.285 (1.634)
Number of observations	36	35	19	25
Sample years	1970-2005	1974-2008	1990-2008	1983-2007
Adjusted R-square	0.57	0.80	0.30	0.39
F-statistics	16.2	45.3	3.6	6.1
Durbin Watson	2.20	2.02	1.55	2.64

** and *** indicates statistically significant at the 5 and 10 percent levels respectively.
t-statistics are in parentheses.

Table 4: Regression results: Model II

Variables	Countries			
	Fiji	Papua New Guinea	Tonga	Vanuatu
Constant	-0.009 (0.142)	0.015 (0.293)	-0.926 (0.423)	0.041 (0.293)
Δ*Log Working*	0.706 (6.688)*	0.877 (11.480)*	5.754 (2.434)**	0.679 (3.925)*
Δ*Log Savings*$_{(t-1)}$	-0.128 (1.137)	-0.192 (2.508)**	-0.539 (1.755)***	-0.288 (1.852)***
Number of observations	36	35	19	25
Sample years	1970-2005	1974-2008	1990-2008	1983-2007
Adjusted R-square	0.56	0.80	0.28	0.42
F-statistics	23.1	69.8	4.6	9.6
Durbin Watson	2.23	2.03	1.81	2.65

** and *** indicates statistically significant at the 5 and 10 percent levels respectively.
t-statistics are in parentheses.

sented in Table 4. Again, the coefficient for working age population is positive and statistically significant in all four countries and consistent with our *a priori* expectations. The findings of the working age variable in the pooled, as well as the country-specific regressions, is consistent with the implication of the life-cycle hypothesis that national saving rate rises with a larger working population.

As to the percent of children in the population, the empirical results, both from the pooled and country-specific regressions, show a positive effect. Past studies involving non-Pacific countries have shown a negative relationship (for example, Yasin, 2008). However, past studies have used countries with large population bases with a relatively large percent of children in the population.

Regarding the nature of the relationship between the percentage of retired persons in the population and national saving, our results, using the pooled model, reveal a negative relationship. The coefficient retired is negative and statistically significant at the 1 percent level (Table 1). Our findings for the retired population variable for the Pacific countries is consistent with the life cycle hypothesis, which stated that as a population ages, it has a regressive effect on national saving.

5. CONCLUSION

The purpose of this paper is to examine the response of savings to three population groups: namely, the young (15 years of age or younger); the working population (age 15-64 years) and the retired group (aged 65 years and older), using annual time-series data for four Pacific Island countries. In doing so, the empirical relationship is examined using pooled as well as country-specific regression analysis. Our results, deduced from annual pooled data over the period 1990-2005, are consistent with the implications of the life cycle hypothesis, particularly for the working and retired population groups. Our findings based on the pooled as well as country-specific analysis of the data showed a positive and statistically significant relationship between the percentage of working population and the national saving rate in the four Pacific countries examined. The findings of our study suggest that the larger the working ratio in the population, the higher the national saving ratio will be. Also, consistent with the life-cycle hypothesis, our empirical analysis reveals that the retired proportion in the population is negatively correlated with saving. Taken together, these results imply that the prospective demographic structures in these countries contain valuable information for predicting future trends in national saving.

The central implication based on the findings of this research is that policy makers should target variables that influence national savings, that is, the working age population and the retired population. The working age population can contribute more towards savings through measures that target

their income and expenditures. In particular, informal sector and seasonal workers are lowly paid. Governments can raise the savings level for this group of workers through instituting minimum wage laws and enforcing such laws more effectively. While some countries have minimum wage laws in place, they are not enforced, particularly in the informal as well as private sectors. Lack of income earning opportunities, together with the high unemployment levels experienced by most of the Pacific Island countries allow employers, particularly in the private sector, to hire workers at below market wage levels. Minimum wages will ensure satisfactory returns, give some relief to working population and contribute to their savings.

Pacific Island countries are net importers, and as a result import inflation too. Workers' wages also need to be regularly adjusted to rising inflation. While wage adjustments in response to inflation do take place among the public sector workers, the private sector does not necessarily practice upward wages adjustments for the working population. Adjusting wages in response to inflation on a regular and consistent basis would produce positive outcomes for the working population, and could positively contribute towards improving their savings levels.

Compulsory savings scheme for public and private sector workers, as well as tightening existing laws that relate to compulsory savings through national pension funds is another area to target. While public sector workers in many countries are subject to compulsory savings where part of their earnings are automatically deducted and contributed to national superannuation funds, private sector and informal sector workers are less fortunate. In many cases, there is an absence of employer and employee contributions to national savings plans for the workers. Governments need to have compulsory savings schemes in place for all workers through appropriate legislations and proper enforcement of existing regulations.

Tax rebates to low-income earners and those providing care for elderly family members could also be used to provide additional impetus to those of working age as far as their savings are concerned. Governments need to provide tax rebates particularly to low-income earners and those workers with elderly dependents. One of the cultural aspects of Pacific Island communities is that elderly and non-working population is largely cared for by immediate family members and dependents, which reduces the burden of welfare dependency on the government. Thus, governments can reward such workers with tax rebates and additional welfare assistance.

Pacific Island countries are also recipients of rising levels of worker remittances. However, there is a widespread absence of mechanisms that would allow worker remittances to be set aside as part of savings. Together

with financial institutions, governments could facilitate savings schemes where part of workers' remittances could be diverted into savings funds that would directly benefit the remitters in future.

The private sector in the Pacific Island countries also employs a significant workforce. However, reforms within the private sector, particularly relating to their business environment, would be an essential step towards aiding workers to save more, as well as absorbing more working age population. In particular, the cost of doing business is considered to be high in many countries, and government efforts to lower the cost of doing business through cutting back on bureaucratic procedures, fees and improving public sector efficiency would allow the private sector to lower their costs, reward workers and absorb more working aged population.

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Résumé

Cet article teste l'hypothèse du cycle de vie, selon laquelle l'épargne privée augmente avec un pourcentage plus élevé chez la population active et diminue avec des pourcentages plus élevés chez les jeunes et les retraités. On utilise le cas de certains pays insulaires du Pacifique. Nos résultats apportent de solides preuves empiriques que la structure de l'âge est un facteur déterminant de l'épargne nationale. Les résultats révèlent une relation statistiquement significative et positive entre taux d'épargne nationale et le pourcentage de groupes de la population active. L'étude a également révélé un lien statistiquement significatif et négatif entre l'épargne nationale et le pourcentage de retraités. Les conclusions de cette étude ont certainement des implications au niveau des politiques. Les décideurs politiques doivent mettre en place des mesures qui améliorent le bien-être économique de la population en âge de travailler, comme l'instauration et l'application de lois sur le salaire minimum, encourager l'épargne obligatoire pour les travailleurs du secteur privé et public, l'ajustement des salaires à l'inflation sur une base constante et régulière, offrir des remboursements fiscaux aux personnes à faible revenu et ceux qui dispensent des soins pour les personnes âgées de la famille et améliorer l'environnement des entreprises du secteur privé afin de faciliter l'absorption de la population en âge de travailler.

Mots clés : hypothèse du cycle de vie, épargne, population et âge.

Classification JEL : O16, O56.