

The Effects of the Economic Development and Demographic Change on the National Savings in Taiwan

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Abstract

National savings are critical capital resources to the economic development of a country. However, a poor economic performance and the deterioration of demographic condition can cause a reduction of national savings in a nation. Therefore, the intention of the study is to find out the relationships between economic and demographic influences on the national saving rate in Taiwan. Especially, the speed of the increase of aging population and the decrease of birth rate in Taiwan almost overpass the world. The study of the effect of the demographic factors on the national savings in Taiwan becomes importantly necessary. The economic data and demographic data are collected from Taiwan Economic Data Center (TEDC) Taiwan Economic Statistical Databank System from 1981 to 2000. The major findings are GNP, GNP per capita, Social Security payment, government spending, and aged dependency rate have a significant relationship with the national saving rate. The GNP, Social Security payment and aged dependency rate are negatively related to the national saving rate. The GNP per capita is positively related to the national rate.

Keywords: Economic、Demographic、Dependency Rate、Savings、Aging

摘要

國民儲蓄是一個國家經濟發展的重要資金來源，但是國家經濟整體經濟表現不佳和人口結構的惡化會造成一個國家的國民儲蓄的降低。因此，本研究的目的是在於探討經濟與人口因素對國民儲蓄率關係之影響。尤其是台灣人口老化增加與出生率的減少的速度遠超越其他已開發國家，研究人口因素對台灣國民儲蓄的影響更凸顯其重要性。本研究之經濟與人口統計數據資料，來自財團法人經濟資訊推廣中心的台灣經濟統計資料庫系統。採集資料的時間為民國七十年到民國八十九年。

本研究的主要發現為國民生產毛額，每人國民生產毛額，社會安全支出以及老年人口的依賴率與國民儲蓄率有顯著的相關性。國民生產毛額，社會安全支出以及老年人口的依賴率和國民儲蓄率呈現負向關係而每人國民生產毛額和國民儲蓄率呈現正向的關係。

關鍵字:經濟、人口、依賴率、儲蓄、老化

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1. Introduction

The world has aged significantly at an unprecedented rate. The problem of the aging population, coupled with the lower birth rates, not only brings tension to the governments, but also puts huge pressure on the public around the world. The increasing aging population implies an increase of government budgets on Social Security and pension funds. In the meantime, the lower birth rates imply an increase on the burden of the working population of each household. Moreover, these problems greatly affect the saving rates and the economic development of a nation.

According to Kinsella & Velkoff (2001), the world population aged 65 and over was estimated to be 420 million people as of midyear 2000, an increase of 9.5 million since midyear 1999. In addition, they identified that 26 countries had more than 2 million elderly in 1990, and the number increased to 31 in 2000. They further projected that there will be more than 60 countries which have an aging population of more than 2 million in 2030. Andrieu (1999) estimated that the aged population of the world will reach 30% of the entire population by the year 2150.

The OECD warns that, "In the absence of specific policy adjustments, aging populations will tend to reduce the growth of living standards in the OECD as the output from any given number of workers is divided by a greater total population" (Bloom, Nandakumar, & Bhawalkar, 2001). A recent CIA report on global trends highlighted the aging issue and stated that, "The declining ratio of working people to retirees will strain social services, pensions and health systems" (Bloom, et al., 2001). Kotlikoff (1999) also indicated that demographic conditions are potentially very significant determinants of economic performance and welfare. Andrieu (1999) further suggested that it would be no exaggeration to say that demography will become the dominant force that shapes world development and dominates the international policy agenda of the 21st century.

1.1 Purpose of the Study

As savings are a critical capital resource to the economy of a nation, a study of national saving behavior may help governments and people to understand why the saving rates are increasing and why saving rate are decreasing in a certain period. The study also attempts to highlight and to understand the saving behavior and its implications for the economy as well as for the well-being of the elderly. Moreover, the objective of the study hopes to help governments to find a good way to stabilize the saving rates by understanding the economic and demographic factors that may cause the rates decreasing. Therefore, the purpose of the study is to analyze the effects of the demographic and economic influences on the national saving rate in Taiwan.

1.2 Background and Motivation

The emergence of the life-cycle theory, and the creation of the term of "dependency burden of population" were way back in the 1950s, and the subject of the saving rate and its relationship to demographic change, especially aging population and economic

development has been increasing interest in the research literatures and discussions on the economic policy-making of countries (Duisenberg & Wellink, 1993). In spite of the international popular interest on the research of the relationship between the economic and demographic factors with savings, it seems not too many papers that discussed the above-mentioned issues in Taiwan. It is the motivation of this study to attract more researches on the study of these topics.

2. Review of Literature

2.1 Theories of Saving

Life-cycle saving maintains that a major motivation for an individual to save is to smooth out consumption over time on the basis of anticipated lifetime income, and this idea is the basis for the development of the modern saving behavior theory (Aghevli et al., 1990). The life-cycle model suggests that individuals smooth their consumption over their lifetime by evaluating the changes in the household resources, as well as the expected rate of return on saving (Pickersgill, 1983). The model has short-run implications on the way consumption growth reacts to the interest rate, and is able to explain saving and dissaving behavior over the whole life-cycle (Brugiavini & Weber, 2003).

Moreover, the LCH suggests that for a well-functioning capital market, the individual consumer or household will attempt to smooth consumption expenditure over the lifetime, consuming more income in the early part of the working life, and saving in later middle age, and dissaving during retirement (Disney, 1996a). The LCH also implies that the aggregate saving rate is a population demographic profile that is expected to be negative with an overall dependency ratio; therefore, savings rates should be lower when a large percentage of the population is very young or is over the retirement age (McMorrow & Roeger, 1999).

Bequest saving is described as households accumulating wealth beyond the requirement to finance retirement consumption if the desire is to pass a part of their accumulated wealth on to future generations (Owens, 1993). The bequest saving assumes that an individual's time horizon is multigenerational, with strong ties linking current generations to their descendants, and with individuals driven to maximize not only their own utility, but also that of future generations through a bequest saving (McMorrow & Roeger, 1999). In other words, the bequest saving arises from the desire to leave assets behind for one's children and other heirs (Horioka & Watanabe, 1997; Wakabayashi & MacKellar, 1999).

Therefore, bequest saving takes for granted that people with more children should hold more assets in late life in accordance with the assumption of the bequest saving. However, Blinkder, Gorden, and Wise (1983) found that families with more children only have slightly greater assets. Hurd (1990) also suggested that people could choose consumption now, rather than leave any bequest to the next generation because they feel that the next generation may have better income to consume. Owens (1993) indicated that there is little agreement on the importance of the bequest saving, and that it is only an alternative way to

prepare for retirement; thus, bequest saving fits within the life-cycle model. Horioka, Kasuga, Yamazaki and , Watanabe (1996), and Horioka, Fujisaki, Watanabe, and Kouno (2000) also suggested that bequest saving is fully consistent with the life-cycle model.

Precautionary saving arises from uncertainties in future income and/or expenditures of the individuals. That is, even when income is evenly spread over the life-cycle, and their assets are not influenced by the fluctuation of the economy, people will save to buffer uncertainties such as unexpected losses, surges in necessary expenses, and longevity spending (Lusardi, 1998; Brugiavini & Weber, 2003). Thus, households are inclined to save more in preparation for the rainy day. Owens (1993) indicated that precautionary saving is assumed to be predicted by the life-cycle theory, because there is no way to know future income, date of death or trends of interest rates. In addition, it is difficult to judge which precautionary saving contributes to the overall level of saving because there is little agreement that uncertainty causes an increase of saving (Owens, 1993; Lusardi, 1998).

2.2 Determinants of Saving

The determinants of private saving rates are widely different based on different sample periods and countries, as well as on different model specifications and estimation techniques (Loayza, Schmidt-Hbbel, & Serven, , 2000b). Aghevli et al. (1990) indicated that major factors that influence private savings include budgetary policies, the age structure of the population, changes in the level and distribution of household income, interest rates, inflation, changes in certain relative prices, enterprise saving, and financial liberalization. Aghevli et al. (1990) further indicated that the distribution of income, the rate of population growth, and the rate of growth of per capita income may contribute to the difference in the saving behavior of the private sector in developing countries.

Hussein and Thirlwall (1999) stated that the determinants of saving include the level of per capita income, the growth of income, the dependency ratio, the distribution of income, interest rate, inflation rate, the degree of financial deepening, and government fiscal policies. The World Bank (1999) also pointed out that eight factors drive saving including income, economic growth, fiscal policy, pension reform, financial liberalization, external borrowing and foreign aid, demographics, and uncertainty. Furthermore, Loayza, Schmidt-Hbbel, and Serven (2000a) identified that private saving can be determined by non-policy factors such as persistence, income, growth, demographics, and uncertainty, as well as policy factors such as fiscal policies, pension reform, financial liberalization, external borrowing, and foreign aid.

Emmons (2000) pinpointed that several factors predicted lower private savings rates around the world, namely: low inflation rates, increased domestic credit flows to the private sector, increased public saving (government budget surpluses), and ready access to foreign borrowing (a current-account deficit).

2.3 Burden of Dependency and Saving

Coale and Hoover (1958) first coined the term “burden of dependency,” or the dependency ratio to describe those persons who are in a dependent status because of their age

(for example, too young or too old to work), and persons at ages making them eligible for productive work. Leff (1969) indicated that demographic conditions are a major determinant of aggregate savings rates, and that dependency ratios are a statistically distinct and quantitatively important influence on aggregate savings. The life-cycle model hypothesizes that an increase in the dependency ratio has a significant negative effect on the private saving rate (Dekle, 2000; Disney, 1996a). Wakabayashi and MacKellar (1999) also pointed out that households with young children will save a lower proportion of income than will households in which children are grown.

In addition, in a study of fourteen developed countries over the period of 1960-1985 using centered five-year averages and combining time and cross-section effects, Weil (1994) concluded that moving one percent of the population from the elderly age group to the working age group would reduce household saving by between 1.3 percent and 1.8 percent. Disney (1996b, p.230) indicated that an increase of the aged dependency ratio from 0.15 to 0.25 would imply a fall in the predicated household saving ratio from 0.15 to 0.05 in selected OECD countries. Wakabayashi and MacKellar (1999) also concluded that an increase in the elderly dependency ratio is a significant determinant of household saving rates.

Leff (1969) further indicated that children constitute a heavy burden for expenditure and they do not produce; therefore, it is expected that a higher dependency ratio will cause the reduction of saving, and dependency ratios have a significant negative impact on the saving ratio, and the influence on the saving rates of the aged dependency ratio was far more than the young dependency ratio. Leff (1969) also pinpointed that dependency ratios are a statistically important influence on aggregate savings ratios, and high dependency ratios and high birth rates account for the great variance of aggregate savings rates between developed and underdeveloped countries.

On the other hand, some studies pinpointed that dependency ratios have little or no effects on savings rates. By sorting from the results of different studies of the dependency ratio and the saving rate, McMorrow and Roeger (1999) found that a one percent increase in the elderly and youth dependency ratios will depress the savings rate by 0.86% and 0.61% respectively. Furthermore, in the book of "Dependency, Obligations, and Entitlements," Matras (1990) states that "the empirical evidence points to continued saving, rather than dissaving, among the elderly" (p.71). By adopting Disney's previous research method and by using data from the Survey of the Changes in Family Finances (SCFF) and the Consumer Expenditure Surveys (CES), Wachtel finds that there is relative minor effects of age structure on aggregate saving rates (as cited in Disney, 1996a, p233). Furthermore, Weil (1994) conducted a household study and found that the elderly do not generally dissave.

Masson, Bayoumi, and Samiei (1998) further supported the point of view by arguing that the size of the dependency ratio effect on saving rate is minimal, with a 7-percentage point rise in dependency ratio leading to decrease private saving by 1 percentage point of GDP. Ram (1982) replicated Leff's model by using alternative samples and time periods, and found no significant evidence that the dependency burden has a negative impact on the saving rate with 121 developing countries. Doshi (1994) found that both high-income and low-income

countries presented similar results as Leff's findings that saving ratio was negatively related to dependency ratios, but that low-income countries turned out to be statistically insignificant as to saving rates.

The following statements may be able to explain the differences why some results show a great influence and some show little or no influence on savings rates. Kelley and Schmidt (1996, p.4) stated that it should not be surprising to observe little or no impact of dependency on aggregate saving, but it does not imply that dependency effects are absent or even unimportant at the household level. In addition, Disney (1996a) noted that the effects of dependency ratio can be offset if the younger people increase their saving by expecting to live longer after retirement, and if each generation expects to increase saving with higher lifetime incomes.

2.4 Demographic Transitions and Economic Development in Taiwan

The lower fertility has tremendously impacted the population growth rate, dependency ratio, and age distribution of the nation. According to Leung, Tan, Chie, Lue, and Lee (1999), the decline in birth and death rates, and the increase of life expectancy of the population contributed to the prolongation of life in aged people in Taiwan. Between 1952 and 1995, the total fertility rate declined from 6.6 per woman to 1.8 per woman, and life expectancy increased from 56 to 72 years for men and from 56 to 78 years for women (Cornamn, Goldman, Gleib, Weinstein, & Chang, 2003). Most recently, according to the MOI report (2004), the fertility rate was 1.24% in 2003; life expectancy for men is 73, and 79 years for women.. it is believed that the country will have negative population growth rate in 2022, provided the fertility rate remains at 1.2 per woman (Hsu, 2004).

In fact, Taiwan has officially become an old society since 1993 when the total elderly population exceeded 7% (TAHR, 1997). According to United Nations report (2002), about 54% of the world's older population resides in Asia, and its pace of aging is one of fastest areas in the world. Furthermore, Zimmer, Martin & Chang (2002) indicated that Taiwan is a typical example of such a population that is experiencing transformations from young to old age structures, and faced with a multitude of health care and other policy challenges.

Moreover, although the aging problem has come to Taiwan later than it did to most Western nations, its speed is growing faster. According to statistics, the rate of population aging in Taiwan is the second highest in the world, and only Japan can match the aging speed with Taiwan (Wu, 2004). Chang (1998) further identified the serious aging problems in Taiwan by indicating that although France became an aging society as early as 1865, it took 130 years for the percentage of the population that was considered aged to rise from 7% to 14%. It took 70 years in the U.S., while in Britain and West Germany it took 45 years. Taiwan only needs about 20 years to double its elderly population. More recently, it has been estimated that Taiwan's aging population will be 20% in 2033 and that its aging speed will be number one in the world (Chung, 2004).

On the other hand, although the economic growth rate kept pace at the average rate of 6.4% per year in the 1990s (CEPD, 2001), the gross national product increased from US

\$1.67 billion to US \$313,908 million, and per capita GNP of Taiwan increased from US \$196 to US \$14,188 between 1952 and 2000 (DGBAS, 2003), the government did not adequately prepare for the issues of the increase of the aging population of Taiwan. As Macaulay (1998) commented, the budget of social welfare expenditures of Taiwan has been less than 1 percent of GDP, and the attitude of government is that the elderly can take care of themselves through their friends and relatives. Moreover, a new form of a labor retirement system took 14 years to debate, and finally passed in 2004.

In addition, Taiwan does not have a national pension program for ordinary citizens, although Labor Insurance, Government Employees' Insurance and Insurance for Private Teachers and Staff cover 54% of the population aged between 15 and 64 (Kwon, 1999). Currently, the elderly in some counties or cities in Taiwan are entitled to a pension ranging from US \$96 to US \$192, if he or she does not receive other forms of pension or subsidy from the individual local government (GIO, 2002). More recently, the Taiwan government launched a pension plan for the elderly in 2002 (GIO, 2003). To qualify for the pension, elderly people must not receive other forms of pension or subsidy from the government; their annual income can not exceed US \$14,285, and their assets (i.e. lands) can not exceed US \$142, 857 in 2001, and they must be entitled to receive US \$85 in pension benefits. The overall amount the subsidy is not enough for the average monthly living expenses of US \$270 in 2000. However, this kind of subsidies will be suspended whenever the budget is depleted.

On the other hand, the Labor Standards Law (LSL) enacted in 1984, which provides a pension program to workers between the ages of 15 and 65, has been criticized as "dreams that can be chased but never caught" (Chang, 2004). Under the law, an employee is entitled to receive a lump sum pension if he or she works in the same company for more than 15 consecutive years and reaches the age of 55, or works in the same company for 25 consecutive years.

Ironically, 99 percent of all Taiwan enterprises listed in the 1996 Company Census employ fewer than 100 members of staff (Amcham, 2003). The majority of Taiwan companies are small to mid-sized enterprises (SMEs), whose average life span is less than 14 years (Chang, 2004). Under this condition, only 1.1 million of total workers may receive a pension (TWN, 2004).

3. Methodology

3.1 Research Questions and Hypotheses

The research questions are (1)What is the relationship between economic factors and the national saving rate of Taiwan? Economic factors include GNP growth rate, GNP, general national product (GNP) per capital, money supply (M_2), inflation rate, interest rate, tax revenue, Social Security payments, and government spending, and (2)What is the relationship between demographic factors and the national saving rate of Taiwan? Demographic factors include population growth rate, age dependency ratio, young dependency ratio, and total dependency ratio. The hypotheses are as follows:

H₁: There is no statistically significant relationship between GNP growth rate and the national saving rate.

H₂: There is no statistically significant relationship between GNP and the national saving rate.

H₃: There is no statistically significant relationship between GNP per capita and the national saving rate.

H₄: There is no statistically significant relationship between money supply and the national saving rate.

H₅: There is no statistically significant relationship between inflation rate and the national saving rate.

H₆: There is no statistically significant relationship between interest rate and the national saving rate.

H₇: There is no statistically significant relationship between tax revenue and the national saving rate.

H₈: There is no statistically significant relationship between Social Security payments and the national saving rate.

H₉: There is no statistically significant relationship between government spending and the national saving rate.

H₁₀: There is no statistically significant relationship between the aged dependency rate and the national saving rate.

H₁₁: There is no statistically significant relationship between the young dependency rate and the national saving rate.

H₁₂: There is no statistically significant relationship between population growth rate and the national saving rate.

From the research questions and hypotheses listed above, two models are derived as follows in testing their influence on the national saving rate: the economic influence model, and the demographic influence model. The economic influence model includes economic variables such as gross national product growth rate, gross national product, gross national product per capita, money supply, inflation rate, interest rate, tax revenue of the government, and Social Security and government spending. The model expresses as follows:

National Saving Rate = GNP Growth Rate + GNP + GNP Per Capita + Money Supply (M₂) + Inflation Rate + Interest Rate + Tax Revenue + Social Security Payment + Government spending.

The demographic influence model includes demographic variables such as population growth rate, aged dependency rate, and youth dependency rate. The model expresses as follows:

National Saving Rate = Population Growth Rate + Aged Dependency Rate (age 65 and above) + Young Dependency (age 0-14).

3.2 Research Design

The research is designed to use a correlation study by utilizing the multiple linear regression method to examine the effects of demographic factors and economic factors on Taiwan saving rates. The dependent variable is the national saving rate and the independent variables include economic variables GNP growth rate (g), GNP, GNP per capita (GNPC), money supply (M₂), inflation rate (Inf), interest rate (Int), tax revenue (Tax), Social Security payment (SS), and government spending (GS), and demographic variables, aged dependency rate (Aged), young dependency rate (Young), and population growth rate (Pop). The designs for the regression models are as follows:

Economic Influence Model:

$$NSR = a + b_1 * g + b_2 * GNP + b_3 * GNPC + b_4 * M_2 + b_5 * Inf + b_6 * Int + b_7 * Tax + b_8 * SS + b_9 * GS \quad (1)$$

Demographic Influence Model:

$$NSR = a + b_{10} * Aged + b_{11} * Young + b_{12} * Pop \quad (2)$$

3.3 Instrumentations

Data sources were collected from Taiwan Economic Data Center (TEDC) Taiwan Economic Statistical Databanks, which are also known as AREMOS Economic Statistical Databanks (AREMOS). The TEDC is a non-profit organization established in 1987, AREMOS is one of the largest on-going, daily updated, time-series databank systems in Taiwan. The economic data was collected from 1981 to 2000 including the national saving rate, GNP growth rate, GNP, GNP per capita, money supply, inflation rate, interest rate, government spending, Social Security payments, and tax revenue. The demographic data was also collected from 1981 to 2000 including population growth rate, aged dependency rate, and young dependency rate.

3.4 Data Processing and Analysis

The study employed a multiple regression analysis, and statistical significance of the models is set at a p-value of .05. A multiple regression analysis is used to analyze the relationship between the dependent variables and the independent variables, and the objective of the analysis is to use the independent variables to best predict and explain the dependent variable in a linear relationship (Hair, Anderson, Tatham & Black., 1998). Therefore, the dependent variables are the national saving rate and the independent variables include economic, and demographic variables.

4. Hypotheses Testing and Findings

4.1 Economic Influence Model

The results of the multiple regression analysis of the economic influence model are shown in Table 2. The model shows that the adjusted R^2 is 0.759. It means that 75.9% of the

variation in the national saving rate (NSR) is explained by the variation independent variables (g, GNP, GNPC, M₂, Inf, Int, Tax, SS, and GS) in the equation. The overall of the model is statistically significant with the value of analysis of variance (ANOVA) $F(9, 70) = 28.696, p = .000$.

In the meantime, in order to examine whether the current values correlate with previous values (that is, test for autocorrelation) using time series data, the *Durbin-Watson* (DW) coefficient is also presented in Table 1. If the DW value is around 2.0, it indicates that there is no autocorrelation; if DW value is close to zero, it indicates positive autocorrelation; if DW value close to 4, it indicates negative autocorrelation (Garson, 2004). The value of DW is 2.682, so the result shows that there is no autocorrelation.

Table 1. Regression Analysis for Economic Influence Model

Model	D.F	Sum of square	Mean square	F	R ²	Adjusted R ²	Sig.	DW
Regression	9	1634.729	181.637	28.696	.787	.759	.000*	2.682
Residual	70	443.074	6.330					
Total	79	2077.804						

* $P < .05$

The results of the multiple regression of the model are presented as follows (see Table 2): g ($\beta = .054, p = .484$), GNP ($\beta = -7.233, p = .000$), GNPC ($\beta = 6.109, p = .001$), M₂ ($\beta = -.069, p = .657$), Inf ($\beta = -.181, p = .130$), Int ($\beta = -.090, p = .381$), Tax ($\beta = .112, p = .097$), SS ($\beta = -.383, p = .000$) and GS ($\beta = -.849, p = .000$). Therefore, GNP, GNPC, SS, and GS are statistically significantly related to the national saving rate, and GNP ($\beta = -7.233$) indicates the highest negative impact on the national saving rate in the model. The equation of the model can be written in accordance with the value B in unstandardized coefficients: $NSR = 73.559 + .110 * g - .002 * GNP + .030 * GNPC - .057 * M_2 - .318 * Inf - .239 * Int + .185 * Tax - 5.476 * SS - 2.378 * GS$.

Table 2. Regression Analysis for Economic Influence Model

Variables	B	SD	β	t	Sig.
Constant	73.559	4.973		14.792	.000*
G	.110	.156	.054	.704	.484
GNP	-.002	.001	-7.233	-3.791	.000*
GNPC	.030	.009	6.109	3.350	.001*
M ₂	-.057	.128	-.069	-.445	.657
Inf	-.318	.207	-.181	.762	.130
Int	.185	.272	-.090	-.881	.381
Tax	.185	.110	.112	1.680	.097
SS	-5.476	1.195	-.383	-4.584	.000*
GS	-2.378	.259	-.849	-9.170	.000*

* $P < .05$

The results of hypothesis are presented as follows:

Null Hypothesis H_1 : There is no statistically significant relationship between GNP growth rate and the national saving rate. The result shows that the significant level of GNP growth rate is .484, which is greater than p -value .05. Therefore, the null hypothesis H_1 is accepted. It indicates that there is no statistically significant relationship between GNP growth rate and the national saving rate.

Null Hypothesis H_2 : There is no statistically significant relationship between GNP and the national saving rate. The result shows that the significant level of GNP is .000, which is less than p -value .05. Therefore, the null hypothesis H_2 is rejected. It indicates that there is a statistically significant relationship between GNP and the national saving rate.

Null Hypothesis H_3 : There is no statistically significant relationship between GNP per capita and the national saving rate. The result shows that the significant level of GNP per capita is .001, which is less than p -value .05. Therefore, the null hypothesis H_3 is rejected. It indicates that there is a statistically significant relationship between GNP per capita and the national saving rate.

Null Hypothesis H_4 : There is no statistically significant relationship between money supply and the national saving rate. The result shows that the significant level of money supply is .657, which is greater than p -value .05. Therefore, the null hypothesis H_4 is accepted. It indicates that there is no statistically significant relationship between GNP per capita and the national saving rate.

Null Hypothesis H_5 : There is no statistically significant relationship between inflation rate and the national saving rate. The result of the multiple regression analysis shows that the significant level of inflation rate is .130, which is greater than p -value .05. Therefore, the null hypothesis H_5 is accepted. It indicates that there is no statistically significant relationship between inflation rate and the national saving rate.

Null Hypothesis H_6 : There is no statistically significant relationship between interest rate and the national saving rate. The result of the multiple regression analysis shows that the significant level of interest rate is .381, which is greater than p -value .05. Therefore, the null hypothesis H_6 is accepted. It indicates that there is no statistically significant relationship between real interest rate and the national saving rate.

Null Hypothesis H_7 : There is no statistically significant relationship between tax revenue and the national saving rate. The result of the multiple regression analysis shows that the significant level of tax revenue is .097, which is greater than p -value .05. Therefore, the null hypothesis H_7 is accepted. It indicates that there is no statistically significant relationship between tax revenue and the national saving rate.

Null Hypothesis H₈: There is no statistically significant relationship between the Social Security payment and the national saving rate. The result shows that the significant level of Social Security payment is .000, which is less than *p*-value .05. Therefore, the null hypothesis H₈ is rejected. It indicates that there is a statistically significant relationship between the Social Security payment and the national saving rate.

Null Hypothesis H₉: There is no statistically significant relationship between government spending and the national saving rate. The result shows that the significant level of government spending is .000, which is less than *p*-value .05. Therefore, the null hypothesis H₉ is rejected. It indicates that there is a statistically significant relationship between government spending and the national saving rate.

4.2 Demographic Influence Model

The results of the multiple regression analysis of the model show that the adjusted *R*² is 0.371 (see Table 3). It means that 37.1% of the variation in the national saving rate (NSR) is explained by the variation independent variables (aged dependent rate, young dependent rate and total population growth) in the equation. Moreover, as shown in Table 4, the value ANOVA is $F(3, 76) = 16.538, p = .000$. It indicates that the overall of the model is statistically significant and has a significant explanation of these independent variables. In order to examine whether the current values correlate with previous values (that is, test for autocorrelation) by using time series data, the *Durbin-Watson (DW)* coefficient is also computed. As shown in Table 4, the value of *DW* is 2.514. According to Garson (2004), if the *DW* value is around 2.0, it indicates that there is no autocorrelation. Therefore, no autocorrelation is found in the model.

Table 3. Regression Analysis for Demographic Influence Model

Model	D.F	Sum of square	Mean square	F	R ²	Adjusted R ²	Sig.	DW
Regression	3	820.682	273.561	16.538	.395	.371	.000*	2.514
Residual	76	1257.122	16.541					
Total	79	2077.804						

**P* < .05

Meanwhile, as shown in Table 4, the results show Aged ($\beta = -4.257, p = .001$), Young ($\beta = -3.919, p = .075$), and Pop ($\beta = -.202, p = .871$). The results indicate aged dependency rate (aged) is significantly related with the national saving rate (NSR). In addition, the aged dependent rate ($\beta = -4.257$) indicates the highest negative impact on the national saving rate in the equation. The equation of the model can be written in accordance with the value B in unstandardized coefficients: $NSR = 290.463 - 12.158 * Aged - 2.747 * Young + .001 * Pop$.

Table 4. Regression Analysis for Demographic Influence Model

Variables	B	SD	β	t	Sig.
Constant	290.463	192.731		1.507	.136
Aged	-12.158	3.578	-4.257	-3.398	.001*
Young	-2.747	1.522	-3.919	-1.805	.075
Pop	-.001	.005	-.202	-.163	.871

* $P < .05$

The results of hypothesis are presented as follows:

Null Hypothesis H_{10} : There is no statistically significant relationship between aged dependency rate and the national saving rate. The result shows that the significant level of aged dependency rate is .001, which is less than p -value .05. Therefore, the null hypothesis H_{10} is rejected. It indicates that there is a statistically significant relationship between aged dependency rate and the national saving rate.

Null Hypothesis H_{11} : There is no statistically significant relationship between the young dependency rate and national saving rate. The results of multiple regression analysis show that the significant level of young dependency is .075, which is greater than p -value .05. Therefore, the null hypothesis H_{11} is accepted. It indicates that there is no statistically significant relationship between young dependency rate and the national saving rate.

Null Hypothesis H_{12} : There is no statistically significant relationship between the population growth rate and the national saving rate. The result shows that the significant level of population growth rate is .871, which is greater than p -value .05. Therefore, the null hypothesis H_{12} is accepted. It indicates that there is no statistically significant relationship between population growth rate and the national saving rate.

5. Conclusions and Recommendations

5.1 Conclusions

In this study, GNP growth rate is supported by the hypothesis, which states that it has no significant relationship with the national saving. The result is consistent with the findings of Deaton and Paxson (1997): the economic growth rate only generates a very small influence on the national saving rate.

GNP and GNP per capita are not supported by the hypothesis, and conclude that they have a significant relationship with the national saving rate. To the researcher's surprise, the GNP was negatively related to the national saving. It takes for granted that as national income increases, so the national saving should increase. However, the GNP per capita is positively related to the national saving rate, and it is consistent with findings of Loayza et al. (2000a) and the World Bank (1999), who found per capita income is positively affected with saving rates.

Social Security payments and government spending are not supportive to the hypotheses, and it is concluded that they have a significant relationship with the national saving rate. Moreover, the results of the regression equation show that they are negative in relation to the national saving rate, and government spending has a greater impact on the national saving rate. The findings are consistent with the comments by Aghevil, et al. (1990) and Loayza, et al. (2000a, 2000b).

In the demographic influence model, the hypothesis of aged dependency rate is not supported, and concluded that it has a significant relationship with the national saving rate. The hypotheses of young dependency rate and the population growth rate are supported, and conclude that they have no significant relationship with the national saving rate. Although the hypothesis result of the young dependency rate shows non-significant, the regression results indicate it has a negative influence on the national saving, which is the same effect of the aged dependency rate. In the meantime, the results show that the aged dependency rate has a greater impact on the national saving rate than the young dependency rate. The results are consistent with the study of Leff (1969) and McMorrow and Roeger (1999).

5.2 Implications

The gross national product (GNP) is found to have the highest negative impact on the national saving rate. It implies that the more income the country earns, the more expenses the country spends. The government should be careful on spending its income in order to prevent the national saving rate from decreasing continuously. In addition, according to the findings of the research, per capita income is positively related to the national saving rate. It suggests that the main job of the government is to keep the economy grow. As the economy grows, the wealth of people will also increase.

Government spending plays an important role in the stabilization and the development of the economy. On the same token, the Social Security payment is also an essential fund to help the disabled, including the elderly, to have their basic living standard. However, both expenditures cause a negative effect on the national saving rate. Therefore, the reduction of the expenditures in government spending and Social Security payments can help to increase saving rates.

The study concludes that the impact on the national saving of the aged dependency rate is far more significant than the young dependency rate. It infers that the burden of the aging population will consume the capital resource from the national savings. In other words, the longer people live, the more burdens the country has to undertake. Likewise, children will consume less of the capital resource as long as the lower fertility rate trend has no change.

5.3 Recommendations

The study would like to give following recommendations to the public and to the government:

Aging means spending. The trend of the population aging is inevitable not only in the case of Taiwan, but also in the case of many countries. Since the effect of the aging

population is a global issue, and it means a burden on the country, the government needs to plan how to deal with the rapid increase of the aging population as soon as possible. In addition to encouraging the elderly to live with their children, the possible solution may include setting up a suitable and sound pension plan, Social Security, medical care and facilities, such as retirement homes and nursing homes to take care of them. Moreover, extending the working age, and encouraging the enterprises to adopt the aged workers can also help the elderly to support themselves.

The lower fertility rate means a shrinking population and a reducing of a working population. If a lower fertility rate is sustained, the country will soon become a smaller working population to support old people. It will cause serious economic difficulty to the country. Since the increase of the fertility rate is the most effective way to balance the issue of population aging a country, the first priority of the government should be to encourage people to have more children. The policies may include reducing taxes and offering subsidies to families who have children.

The statistical data indicates that the performance of the economy of Taiwan is not as good as that of past decades. Without the better economic performance, the government will definitely have a fiscal deficit, if the government wants to keep the expenditures in a certain budget. So, the government should make its best effort to stimulate the growth of the economy. As the economy grows, the national per capita income and household income will also increase. In turn, the overall saving rates will increase. Then, the country can have more capital to invest and more budgets to use.

Government spending in Taiwan includes six major items: general administration, education, science and culture, national defense, economic development, Social Security, and others. Under the limitation of the government budget, to find an effective way to allocate the budget on the government spending is very critical. Any increase or decrease in the budget can have a profound influence on the welfare of the elderly. This will challenge the wisdom of the policy maker.

In addition, in order to further understand the saving behavior of the nations and the households, the following suggestions are made for the future Study:

The present research only uses Taiwan as an example. A comparison of different countries would help discover what influence saving behavior has on the nations. The research may be more interested in comparing the effects of the elderly and the young dependency on the saving rates of the different nations, especially those developed countries that have a solid Social Security system. Do these issues cause the decline of overall saving rates both in developing and developed countries?

The independent variables used in both the economic model and the demographic model to test their relationship with the national saving rate can again be used to test the household saving rate. In that case, the researcher can have a whole picture to understand how these variables influence both the macro economy and the micro economy.

5.4 Research Limitations

The following limitations apply to the study. First, although there are many different factors that may influence saving rates, the study was limited to the certain designated factors from the perspective of demographic, and economic approaches which have been found in the section of literature reviews. Second, the study used economic and demographic data published by the TEDC databanks, which may not reflect the current situation. Third, the study was limited on economic and demographic effects on saving rates overtime in Taiwan that may lack of general application, since different factors may cause different effects on saving rates in different countries. Third, the study analyzed data from secondary data sources. The issues are that the secondary data is usually collected for some other purpose, which may result in problems with data accuracy (Nicoll & Beyea, 1999). Finally, the study used multiple regression models to analyze the relationship between independent variables and dependent variable that may not tell the exact cause and effect condition from the results.

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