

SOVEREIGN DEBT, AGING POPULATIONS, AND ECONOMIC GROWTH: DIFFERENCES BETWEEN OECD AND LESS DEVELOPED NATIONS

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ABSTRACT

This paper examines whether there is any linkage between high levels of sovereign debt and the size of the elderly population. It is primarily a descriptive study which utilizes simple correlations and regressions. One might expect, based on precepts of prudent management of finances, that nations with large populations of elderly would have lower sovereign debt relative to GDP. However, our results show that the opposite appears to be more prevalent among OECD nations. We find a positive and significant correlation between the percentage of people 65 and older and the sovereign debt/GDP ratio. On the other hand, there is no significant relationship among non-OECD countries which are generally less developed. We then analyze whether economic performance among countries is related to sovereign debt levels and measures of the elderly population. We find that economic growth tends to be lower in nations with a higher percentage of elderly. This statistically significant correlation applies to both OECD and non-OECD countries. A negative relationship also applied to sovereign debt burdens and economic growth. However, that negative correlation was significant only with the OECD nations.

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KEYWORDS: Sovereign Debt, Aging, Economic Growth

INTRODUCTION

The fact that the percentage of retired people has been growing in the developed world has been known for years, but have governments been financially diligent in managing public funds given the expected challenges? Government leaders in developed nations understand that ample public funds must be available for increased numbers of retirees. They know that excessive sovereign debt, coupled with unfunded pensions and other retirement benefits, will lead to financial distress, possible defaults of obligations, and subsequent economic hardship. Yet, it is very common for governments to make decisions that are financially dangerous. At the same time, less developed countries have had rapid economic growth in recent years and life expectancy has been increasing in those nations. Therefore, those countries are also experiencing increases in the size of their elderly population. In this paper we update and extend previous research on whether there are significant correlations between sovereign debt burdens and the extent of aging among developed countries as well as less developed nations. If, in fact, governments were pursuing high sovereign debt policies, and given their obligations to the aged, do we observe negative consequences such as weaker economic growth? Following this introductory section, we present a review of recent literature on the subject area of our paper. Next Data and Methodology examines the sources and scope of the data utilized in the study, along with the methodology applied in deriving the results. The Results section details the various hypotheses we tested, the findings of those tests, and the implications and importance of those findings. Concluding Comments summarizes the previous sections and the significance of our results. Those comments also discuss limitations of the findings and areas of inquiry for future research.

LITERATURE REVIEW

Challenges Posed by Government Obligations in the United States

There are many studies and research papers which examine issues relating to financial distress in the public sector. Each year the Social Security Administration provides a projection estimating when various Social Security trust funds are scheduled to be depleted [See Social Security Administration (2013)]. Some of these dates are in the relatively near future. For example, the Disability Income fund has incurred continued deficits for years and is expected to be depleted by 2016. The numbers of recipients of disability income grew by approximately 50% from 5.9 million in 2003 to 8.9 million individuals in 2013. (See Social Security Statistical Tables, 2013)

The impact of the Affordable Healthcare Act has made it more difficult to assess the financial status of programs such as Medicare. Future decisions on doctor and hospital reimbursements are uncertain and the total magnitude of unfunded benefits is unclear. However, while estimates of the unfunded short-fall may vary, they are placed in double digits of trillions of dollars. In recent years the Treasury debt of the United States has grown rapidly, and in August 2014 the total was approximately \$17.7 trillion (compared to a GDP of \$17.3 trillion in the second quarter of 2014). Although the federal deficit has been falling, Treasury debt still increased by over \$900 billion between August 11, 2013 and August 13, 2014. (Treasury debt increases have been greater than the federal deficit because of borrowing due to other items in addition to that deficit.) A source of government financial problems on the state and local level relates to financial inadequacy of state and local retirement funds. According to one study, the actuarial gap between benefits and revenues for states amounts to over \$1 trillion [See Pew Center study (2010)].

Healy, Hess, and Nicholson (2012) report that the projections for unfunded state, county and local retirement benefits range from a low of \$730 billion to as high as \$4.4 trillion. This sizable financial gap does not include \$2.7 trillion of bonds and short term securities issued by state and local governments as of 2009 [See U.S. Census report (2011)]. Debt obligations, as well as unfunded retirement benefits, are also causing governments on the federal state and local level to cut back on services even though they are not in current danger of defaulting. On a regular basis one can read news reports on topics such as reduction of funds available from the federal government or lack of money for education and other services in states and localities. [See Davey and Walsh (2013).] In addition, several local governments have defaulted on their debt obligations. Some of the notable examples are Detroit, Michigan, Harrisburg, Pennsylvania, and Jefferson County, Alabama.

Global Studies on Aging and Economic Performance

Bloom, Canning and Sevilla (2002) and Johnson (2004) look at population projections and discuss a variety of issues including economic growth, pension systems, world trade and capital flows. Potential policy responses by governments in both developed and underdeveloped countries are discussed in detail. Some papers on the impact of demographic changes are principally concerned with financial implications including stock market returns. [See Randall and Suk (2012).] England (2002) examines the effect of global aging on pension funds and how the demand for different asset classes will change in the future. Jackson (2002) has written that in Japan and the major countries of Europe public retirement systems are quite generous. Retirees generally rely on government support to a greater degree than retirees in the United States, where many individuals have retirement funds outside of the Social Security system. Therefore, the retirees in Europe are particularly vulnerable to governments which have mismanaged their finances and accumulated unsustainable levels of sovereign debt. Greece has been one of the nations whose retirees have been particularly adversely affected by their government's mismanagement of finances [Dendrinou (2014)]. This paper extends previous international studies in several ways. It makes the contribution of explicitly linking the sovereign debt management issue with the challenges of an aging population.

Specifically, do countries with high levels of older people tend to have relatively high or relatively low public debt burdens? Are the findings contingent on whether the sample consists of relatively more developed (OECD) nations or less developed (non-OECD) countries? Our study also adds to previous research in its use of a very recent set of data that span through the year 2012.

DATA AND METHODOLOGY

The paper commences with an analysis of whether the ratio of sovereign debt to GDP (D/GDP) in a country is correlated to the percentage of population who are 65 and older (Pop65). Tests are performed with international data that examine whether there is a significant correlation. The data in the study come from the OECD and the World Bank and the statistics are summarized in Table 1. Of the 34 OECD nations, 2 were excluded, Luxemburg and Iceland, due to their very small populations (each well under 1 million). One might observe that in Table 1 the “count” or number of observations in the non-OECD countries differs depending on which variable is listed. For example Debt/GDP has 29 observations while population 65 or older has 161. The major factor for such differences is that fewer countries reported statistics for certain data-categories than for other categories to the World Bank (our source of the data). As a result the number of observations in the non-OECD tests was constrained and contingent on the basis of which variables appeared in the tests. The statistics utilized by the study are quite recent. Specifically:

Percent of population 65 or older: the most recent number available for 2010-2012.

Sovereign debt as a percent of GDP: 2012.

Real GDP growth: cumulative percentage change during the 10 years from the end of 2003 to the end of 2012.

Table 1 Descriptive Statistics

Variable	OECD Government Debt as % of GDP ¹ (2012)	Non-OECD Government Debt as % of GDP ¹ (2011)	OECD Population Ages 65 and Above (%) (2010-2012)	Non-OECD Population Ages 65 and Above (%) (2012)	OECD Cumulative GDP Growth ² (2003-2012)	Non-OECD Cumulative GDP Growth ² (2004-2012)
Mean	76.12	45.48	15.40	6.28	21.02	44.75
Median	68.45	43.54	16.49	4.71	17.77	40.95
Standard Deviation	44.00	25.51	3.87	4.16	14.06	24.84
Minimum	12.20	9.31	6.28	0.36	-0.46	-6.53
Maximum	214.07	113.25	23.87	18.92	50.59	130.68
Count	32	29	32	161	32	135

Central government debt. Debt is the entire stock of direct government fixed-term contractual obligations to others outstanding on a particular date. It includes domestic and foreign liabilities such as currency and money deposits, securities other than shares, and loans. (Source: World Bank) Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2000 U.S. dollars. (Source: World Bank)

Note: Two OECD nations, Iceland and Luxembourg, were excluded because their populations were under one million. The summary of data presented in Table 1 provides a useful perspective. In general, OECD countries have higher ratios of elderly population and higher Debt/GDP. However, with respect to total GDP growth, the non-OECD nations had superior performance.

RESULTS

While the statistical methodology utilized in the analysis is relatively simple, it is quite adequate in providing useful results. Since there is no well-established theory that D/GDP and Pop65 are correlated,

the purpose of the first set of tests is to determine if there is any significant relationship. To examine this question the following least-squares regression equation is utilized:

$$D/GDP = a_0 + a_1 \text{ Pop65} + e \tag{1}$$

a_0 and a_1 are constants and e is the disturbance term. We then observe whether the a_1 coefficient is statistically significant. A significant positive sign would provide evidence that governments with relatively larger elderly populations have accumulated high levels of sovereign debt, placing their country in a more risky financial position. A significant negative sign would provide support that governments are, in general, being prudent in managing national debt in light of their financial obligations to the elderly. It is also possible that there is no significant relationship in which case there is no evidence to support a general conclusion. The findings of the test are shown in Table 2.

Table 2: Debt / GDP the Dependent Variable Measures Government Debt as % of GDP. The Data Are from the OECD and World Bank

Variable	OECD (2012)	Non-OECD (2011)	World
Constant terms	-20.84 (-0.76)	48.28 (4.49)***	19.56 (1.67)*
% of 65 or older	6.30 (3.65)***	-0.30 (-0.29)	3.36 (3.88)***
Adj-R ²	0.28	-0.03	0.19
F-stat	13.30 (0.00)***	0.08 (0.77)	15.03 (0.00)***
Observations	32	29	61

, **, * significant at the 10%, 5% and 1% level, respectively.*

The tests with OECD countries show that a very strong positive statistical relationship, significant at the 1% level, exists between the 2 variables. The adjusted R² was also quite high, at 28%. These findings are consistent with the hypothesis that governments have not been good stewards of the finances of their nations. In the context of the percentage of people over 65, there is evidence to believe that many governments have placed their nations in a vulnerable position with regard to financing their sovereign debt. The default of Greece in 2012 and lingering (although much less severe in 2014) financial and economic problems in Portugal, Spain and Italy, are consistent with this observation [See Brat and Zampano (2014)]. In contrast, there is no significant correlation between sovereign debt and aging among the non-OECD nations. One can hypothesize several possible reasons for the divergence of the results. Since they have less developed capital markets, they have not been able to borrow as much as OECD countries and their elderly burden is not as great. Moreover, a different set of economic and cultural forces may be impacting those countries. The third set of results in Table 2 is based on a combined sample of the OECD and non-OECD countries. In those results, we again observe a significant positive correlation between the percentage of elderly and the sovereign debt burden. The strong results relating to the OECD countries appear to dominate the findings.

Economic Implications

Given that there is a positive relationship between D/GDP and Pop65, what might be some of the economic consequences? Higher debt levels can increase the tax burden on a nation. According to conventional macroeconomic theory, consumption is a function of after-tax national income (and other variables which include the ability to borrow). Investment spending is also linked to taxes since investors are concerned about the level of future after tax cash flows generated by those investments. Therefore, either the imposition or even the imminent expectation that higher taxes would be enacted can adversely affect both consumption and investment. [Reinhart and Rogoff (2009)]

If D/GDP reaches excessive levels, the scenarios that have plagued citizens in places such as Greece and Detroit might ensue. Governments would have difficulty obtaining borrowed funds to pay for basic government services. Consumers and small businesses in distressed countries would also find that borrowed funds would be less available for them and there would be further downward pressure on their consumption and investment. An additional complicating factor is the banking system which holds substantial quantities of sovereign debt. If the debt is in danger of default, the banks are also placed in jeopardy. The analysis of Reinhart and Rogoff (2009) provides an in-depth discussion of linkages between banking crises and sovereign debt crises based on many cases that have occurred over the past 200 years.

If the financial system experiences losses, the reduction in bank capital may impair the ability of financial institutions to make loans. In other words, regulators will not allow such lending if capital ratios fall below required minimums. This scenario was a major factor in the recession of 2008-2009 and subsequently, in the weak recovery. [See Kowalik (2011)]. Aging alone can have an adverse effect on economic performance. A relatively large population of older and retired people would likely be associated with a relatively smaller labor force. Although some older people are working, they may be more subject to health issues that would reduce their productivity and the amount of work that they perform. In addition, higher taxes might be required to pay for government pension and medical benefits allocated to support those who have retired. Furthermore, since retired people would tend to liquidate rather than accumulate financial assets, there could be less saving and capital formation available to generate economic growth. The purpose of the second set of tests is to examine some of the above issues. Is the combination of high debt coupled with a sizable population of older people associated with negative economic growth? To investigate this question, the following model was utilized:

$$\text{GDP Growth} = b_0 + b_1 \text{ Pop65} + b_2 \text{ D/GDP} + e \tag{2}$$

In those regressions b_0 , b_1 , and b_2 are the regression constants, and e is the disturbance term.

Table 3A: 10-Year Cumulative GDP Growth of the OECD Countries the Dependent Variable Measures Cumulative Real GDP Growth over the Past 10 Years (2003-2012). The Data Are From Oecd.Org (2013). Two Independent Variables Are Included

Variable	Model 1	Model 2	Model 3
Constant terms	0.63 (8.46)***	0.34 (8.31)***	0.65 (6.79)***
% of 65 or older (Average of 2000 and 2012)	-2.83 (-5.78)***		-2.43 (-3.50)***
Debt / GDP (Average of 2007-2012)		-0.21 (-4.08)***	-0.11 (-2.31)**
Adj-R ²	0.51	0.36	0.55
F-stat	33.45 (0.00)***	16.69 (0.00)***	17.96 (0.00)***
Observations	32	29	29

*, **, *** significant at the 10%, 5% and 1% level, respectively.

Table 3B: 9-Year Cumulative GDP Growth of Non-OECD Countries the Dependent Variable Measures Cumulative Real GDP Growth over the Past 9 Years (2004-2012). The Data Are From World Bank (2013). Two Independent Variables Are Included

Variable	Model 1	Model 2	Model 3
constant terms	54.00 (14.88)***	51.09 (9.24)***	63.70 (8.30)***
% of 65 or older (average of 2004-2012)	-1.59 (-2.96)***		-1.43 (-2.22)**
debt / gdp (average of 2004-2011)		-0.14 (-1.52)	-0.14 (-1.66)
adj-r ²	0.05	0.05	0.17
f-stat	8.74 (0.00)***	2.31 (0.14)	3.79 (0.04)**
observations	135	28	28

*, **, *** Significant At The 10%, 5% And 1% Level, Respectively.

Tables 3A and 3B contain the results of 3 regressions in which the 10-year annual GDP growth from the beginning of 2003 to the end of 2012 is the dependent variable. The use of a 10-year period eliminates some of the statistical noise inherent in shorter time periods. This is especially true given the economic turbulence over the past decade. There have been wide swings at different times for different nations attributable to various financial crises from 2007 into 2012. In Model 1 of Table 3A (OECD countries) Pop65 is the sole explanatory variable, and it is statistically significant at the 1% level. The sign, as expected, is negative and suggests that larger numbers of older people, due to more retirees and the other factors cited earlier, may be acting as a drag on economic growth.

In Model 2 D/GDP is the explanatory variable and it, too, is significant and has the expected negative sign. The stresses of higher taxes and possible financial crises associated with excessive sovereign debt may be hindering the generation of economic growth. In Model 3 both Pop65 and D/GDP are utilized as explanatory variables. Both variables have the expected negative sign and both are significant. The results are also interesting because multicollinearity among the 2 explanatory variables could have affected the results reducing or eliminating the observed significance of one of the variables.

In Table 3B the same statistical tests are performed with the non-OECD countries. In this set of results only the percentage of elderly population was significantly negatively correlated with economic growth. While there was also a negative correlation with D/GDP and growth, it was not significant. As noted in the discussion of Table 2, with less borrowed funds, sovereign debt may not be a major issue in non-OECD nations and other factors may be far more important in determining their growth rates. For example, investment in education is often cited as one of the main ingredients in the rapid growth of China and Korea. Other developing countries which neglected the education of their population were likely hampered in their efforts to generate growth.

CONCLUDING COMMENTS

This paper examines whether there is any linkage between high levels of sovereign debt and the size of the elderly population. It is primarily a descriptive study which utilizes simple correlations and regressions. One might expect, based on precepts of prudent management of finances, that nations with large populations of elderly would have lower sovereign debt relative to GDP. However, our results show that the opposite appears to be more prevalent among OECD nations. We find a positive and significant correlation between the percentage of people 65 and older and the sovereign debt/GDP ratio. On the other hand, there is no significant relationship among non-OECD countries which are generally less developed. We then analyze whether economic performance among countries is related to sovereign debt levels and measures of the elderly population. We find that economic growth tends to be lower in nations with a higher percentage of elderly. This statistically significant correlation applies to both OECD and non-OECD countries. A

negative relationship also applied to sovereign debt burdens and economic growth. However, that negative correlation was significant only with the OECD nations. Among the limitations of the paper is that other potential variables that might influence growth were not included and could potentially affect some of the findings that we report. Other relevant variables might include measures of regulation, tax policies, and indexes of corruption and property rights as driving forces in economic performance. Future research could include an examination of the impact of such variables. While sovereign debt has grown more slowly in recent years, the ratios continue to remain high in many European countries and in Japan. Similarly, the aging of their populations and low fertility rates indicate that slow population growth is likely to continue for some time. Based on correlations presented in this paper, it would seem that those countries will continue to encounter challenges that both impede economic growth, and diminish the benefits that retirees are scheduled to receive [See Brat and Zampano (2014)].

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