On the impact of Public Debt on Saving- Investment- Current Account Dynamics

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Abstract

This paper examines the impact of public debt on the saving-investment-current account dynamics and its implications for capital mobility. To this end we apply a dynamic random coefficients model to data on seven major OECD (G7) countries over the 2000-2011 period. Our empirical results find some support for the view that capital mobility is lower in countries with larger public debt.

Key words: public debt, saving-investment-current account dynamics, capital mobility.

Introduction

The interrelationship between saving, investment and the current account has been the subject of a large literature following the Feldstein and Horioka (1980) article that examined the relationship between saving and investment to infer bout the degree of capital mobility in the long run. The Feldstein-Horioka study found a one-to-one positive relationship between investment and saving. They interpreted this result as an indicator of low mobility of long-term capital. This has been also called a "puzzle" in regard to highly integrated financial markets that should result in high capital mobility. A large number of studies have attempted to offer alternative explanations for the observed correlation between saving and investment. These studies attributed the strong saving-investment correlations to a number of factors, see for instance, Sachs (1981, 1983), Murphy (1984), and Summers (1998). Feldstein and Bacchetta (1991) re-examined the issue in light of the criticism and concluded that the strong positive saving-investment correlation is quite robust and reflects low capital mobility. Some other empirical studies also appear to suggest that the Feldstein and Horioka study is, in many ways, more robust than its critiques, see for instance, AmirKhalkhali and Dar (1993). Recent explanations for the observed saving and investment correlation have shifted their focus and sought to explain the strong correlation within the context of theoretical open-economy macro models. For instance, a persistent, positive correlation between saving and investment might alternatively reflect an intertemporal budget constraint. Another implication of such models is the distinction between short run dynamics and the long run equilibrium. From an empirical perspective this can be addressed by looking at time series econometric models that employ the error-correction mechanism, see Jansen (1996, 1998). According to Jansen, while attributing high positive correlations between saving and investment ratios to limited capital mobility might well have some validity, such correlations are also entirely consistent with intertemporal budget constraints and high capital mobility.

This paper examines the impact of public debt on the saving-investment-current account dynamics and its implications for capital mobility in the case of the seven largest OECD countries (G7) over the 2000-2011 period using an error correction model. Within this context, we also attempt to determine what implications follow for capital mobility and the validity of intertemporal budget constraints. We first estimate the aggregate and country-specific saving-investment-current account

relationship using random coefficients approach. The G7 countries are then classified into three groups on the basis of the relative size of public debt, measured as the ratio of public debt to GDP. This relationship is estimated for each of these groups, to examine how the relative size of public debt impact on the saving-investment-current account relation, and what implications follow for capital mobility and the validity of intertemporal budget constraints. The period of our analysis covers the recent financial crisis followed by the deepest post-war recession. As a result, we divide our 12-year sample into two sub-periods of 2000-2006 and 2007-2011 and estimate the model for all seven countries, in an attempt to examine the impact of the recent financial/economic crisis on the saving-investment-current account relationship.

The Data, The Model, and the Estimation Results

The sample used in this study consists of annual data for G7 countries: Canada, France, Germany, Italy, Japan, the United Kingdom (UK), and the United States (USA), covering the 2000-2011 period. The data were obtained from various issues of Economic Outlook published by Organization for Economic Cooperation and Development (OECD) and International Financial Statistics published by International Monetary Fund (IMF).

Table 1 presents averages of the relative size of public debt (PD) measured as the ratio of public debt to GDP, average ratios of private saving (S) and domestic investment (I) over the study period for each of the countries in the sample. The seven countries have been classified into three groups, depending upon the average size of public debt (as measured by PD) over the 2000-2011 period. Group I countries (Canada, USA, and Germany) display the smallest size of public debt, with PD lying in the 34-40% range. Public debt is largest in Group III countries (Italy and Japan), with PD varying in the 101-157% range. Group II countries (UK and France) constitute the median group in which PD varies in the 50-54% range. It is evident from Table 1 that average ratios of private saving (13.9-23.8%) and domestic investment (16.8-22.8%) over the 2000-2011 interval show considerable variation across the seven largest OECD countries.

Table 1
Country-wise Averages of Investment, Saving, and Public Debt Ratios, 2000-2011

Groups	Countries	Investment	Saving	Public Debt
I	Canada	21.3	23.8	33.9
	USA	18.5	14.1	39.6
	Germany	18.0	22.7	40.4
II	UK	16.8	13.9	50.4
	France	20.0	19.4	54.1
III	Italy	20.7	20.6	101.2
	Japan	22.8	23.8	156.7

In our study, we modify the error-correction model (ECM) proposed by Jansen (1996) in the following way:

$$\Delta I_{it} = \alpha_i + \beta_i \Delta S_{it} + \gamma_i CA_{it-1} + \delta_i S_{it-1} + u_{it}$$

where I, S and CA are ratios of investment (gross fixed capital formation), saving (basic saving

calculated as GDP minus private and public consumption expenditure) and current account (S - I) to GDP, respectively. Δ stands for the first difference, and the subscripts i (i=1,2,...,N) and t (t=1,2,...,T) index the countries and time periods in the sample respectively.

This is a varying or random coefficients specification that may be seen as a refinement of the stochastic law relating investment rates to its main determinants [see Pratt and Schlaifer (1984,1988)]. The β parameters measure the short-run correlation between saving and investment. The other parameters α, γ and δ have important long run implications for the saving-investment relationship. In particular, γ is the cointegrating parameter, and rejecting the hypothesis that $\gamma = 0$, would imply a long-run relationship between saving and investment. .

In studying the saving-investment-current account relationship, we estimated the above varying coefficients error correction model. This model allows us to integrate both short run and long run behavior within a single model. This is important if the model is to be given a capital mobility interpretation because the saving-investment correlation relevant for assessing capital mobility is a long run one. Further, this model with varying coefficients is a more general way of incorporating unmeasured differences in such panel data analysis.

We considered alternative random coefficients estimators of the parameters. In the first instance, the model is estimated for the entire sample by pooling over all seven countries as well as for each country using the country-specific time series data. The parameters are then permitted to vary across the three groups, classified according to public debt/GDP, and estimated for each group. Finally, the parameters are allowed to vary and estimated for each of the two sub-periods of 2000-2006 and 2007-2011. In this study, these models are estimated using Swamy and Swamy-Mehta random generalized least squares (RGLS) estimators. For more details of the RGLS estimation methods, see Swamy (1970), Swamy and Mehta (1975), and Swamy and Tavlas (1995, 2002). We discuss the results for each of these cases in turn.

Table 2
Pooled RGLS Results

Countries	**α**	**β**	**γ**	**δ**
All	2.405 (1.679)	0.892* (0.238)	0.531* (0.239)	-0.078 (0.102)
G-STAT = 112.3*				

* denote statistically significant at 5% level.

Table 2 reports the results for the pooled sample - that is, seven countries over the 2000-2011 period. At the 5 percent (or less) significance level, the RGLS estimates imply statistically significant short run as well as long run relationships between saving and investment. The implied strong relationship between I and S, which in the Feldstein-Horioka tradition is indicative of low capital mobility, could also reflect the intertemporal budget constraint. However, the failure to reject $\alpha = \delta = 0$ suggests that the current account is stationary and fluctuates around zero in the long run. Accordingly, no clear conclusion about the degree of capital mobility can be drawn. The validity of the random coefficients model is supported by a highly significant Swamy's G-statistic that follows a χ^2 distribution with k(N-1) degrees of freedom under the null hypothesis of fixed coefficients, see Swamy (1970) for more details.

To assess whether and to what extent these aggregate results mask inter-country differences, we look at the country-specific estimates of the model. These estimates are reported in Table 3. The

country-wise estimates of β are positive and statistically significant for all seven countries. As reported in Table 3, the significant estimates of short run correlation between saving and investment vary from a low of 0.37 for Canada to a high of 1.70 for USA, reflecting different types of shocks hitting these economies. The country-specific estimates of the cointegrating parameter γ, are positive for all countries but not statistically significant for Canada and France. For these two economies, therefore, we cannot say anything about capital mobility or the intertemporal budget constraint. At the same time, the country-specific estimates of δ are only statistically significant for two countries in Group III, i.e. Italy and Japan. The rejection of the hypotheses δ = 0 for the latter countries would imply that the current account is non-stationary. This is also consistent with relatively higher capital mobility. For the remaining countries in the sample, the evidence supports a stable current account and is, hence, indicative of low capital mobility or the validity of an intertemporal budget constraint. It is noteworthy that these country-specific results are somewhat informative but should be considered with caution due to the small country sample size. Accordingly, in order to find out how the relative size of public debt influences the saving-investment-current account relationship, we use the ratio of public debt to GDP over the study period to classify the seven OECD countries into three groups.

Table 3
Country-wise RGLS Results

Countries	**α**	**β**	**γ**	**δ**
Canada	1.7501	0.3669*	0.0366	-0.0656
USA	-0.2861	1.7058*	0.4693*	0.1866
Germany	2.5089	0.5004*	0.2967*	-0.1803
UK	2.5042	1.2533*	1.0445*	0.0343
France	2.4855	1.1143*	0.1241	-0.1024
Italy	4.6153*	0.8572*	0.4195*	-0.2140*
Japan	3.2583*	0.4477*	1.3233*	-0.2041*

Table 4
Group-wise RGLS Results

Groups	**α**	**β**	**γ**	**δ**
I	0.0113	0.4985*	0.0383	-0.0037
II	2.591	0.9336*	0.3637*	-0.1114
III	3.8627	0.6528*	0.5359*	-0.1835
G-STAT = 20.9*				

The group-wise RGLS results are reported in Table 4. It can be seen that the random coefficients

model is supported by the statistically significant value of the calculated G-statistic, which means that the null hypothesis of fixed coefficients across groups is rejected. The estimates of the short-run correlations are positive and statistically significant for all three groups. As far as the magnitude of impacts is concerned, the significant estimates of short run correlation between saving and investment vary from a low of 0.498 for Group I to a high of 0.934 for Group II. With regard to the cointegrating parameters, all estimates are positive but only statistically significant for groups II and III, thereby supporting the existence of a long-run relation between saving and investment for these two groups with medium and high public debt. The estimate of δ is negative and not statistically significant for all groups. The non-significant group-wise estimates of δ imply that the current account is stationary. Overall, these results provide some support for the view that capital mobility is lower in cases with larger public debt.

Conclusion

This paper examined empirically the impact of public debt on the saving-investment-current account dynamics. Within this context, we attempt to determine what implications follow for capital mobility and/or the validity of inter-temporal budget constraints. To this end, we applied a varying coefficients error correction model to data on seven major OECD countries over the 2000-2011 period. Accordingly, The G7 countries were classified into three groups on the basis of their relative size of public debt. Overall, our empirical results strongly supported the varying coefficients approach. There were differences across individual countries in terms of the nature of the public debt-saving-investment-current account relationship in the short and long run. Nevertheless, our group-wise results did provide some support for the view that capital mobility is lower in cases with larger public debt. This could imply that, the larger the size of the public debt and/or the more interventionist the government, the greater the likelihood that domestic investment and long term economic growth will be tied to the domestic saving effort. Our period-wise results appear to support the view that the recent financial/economic crisis has resulted in lower international capital mobility.

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