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Saving-Investment Correlation and Capital Flows: The Philippines 1960-2014

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Abstract

With greater financial liberalization, the intrinsic link between domestic saving-investment correlation and international capital mobility is gaining increasing importance. Notwithstanding the enormous extent and significance of recent empirical investigations of this relationship from the standpoint of economic and financial policies, including efforts to explain the large variations in results observed across different countries, study periods and econometric methodologies, the Feldstein and Horioka (1980) study of domestic saving-investment correlation as an indicant of financial integration remains a core puzzle in international macroeconomic literature. This paper estimates a VECM and investigates the short-run and the long-run domestic saving-investment relationship for the Philippines. The sample period is 1960-2014. Cointegration analysis shows lack of a significant long-run relationship between domestic saving and investment-rates. Results, therefore, indicate limited effectiveness of saving policies in enhancing domestic investment in the Philippines for the period under study.

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1. Introduction

Economic theory postulates that, with greater financial integration, capital will flow from countries with low rates of return to countries offering relatively higher rates of return until its marginal productivity become equalized across countries. The link between domestic saving-investment correlation and international capital flows is well established in international macroeconomic literature. A very low saving-investment correlation would imply a near perfect capital mobility across countries, whereas a high correlation would indicate that most of the savings is invested domestically. Feldstein and Horioka (1980), who were amongst the first to examine the domestic saving-investment correlation and its implications for capital mobility and financial integration, examined the gross and net domestic saving-investment associations for a cross-section of 16 OECD countries for the sample period 1960-1974. The coefficients were estimated at 0.89 and 0.94 for gross and net saving-rate, respectively. According to their study, capital will move freely until the net-of-tax rates of return become equalized across countries. As discussed in Feldstein and Horioka (1980), some of the factors that may impede capital flow across countries include government restrictions on the export of capital, institutional rigidities, differences in tax laws across countries, specialization in investment in the home country that is influenced by existing tax laws and regulations, and potential risks associated with foreign investment. Although Murphy (1984) and Obstfeld (1986) have argued that it is possible for high domestic saving-investment correlation to be consistent with a high degree of capital mobility, the domestic saving-investment correlation has been widely accepted as a strong indicator of the level of international financial integration.

An extensive review of empirical literature on saving-investment relationship, not limited to the articles cited in the ensuing section, reveals two important results: (i) the domestic saving-investment correlation for developing economies is relatively lower than that of developed economies, and (ii) the estimated correlation coefficients for more recent sample periods is generally lower. This could be due to increased capital mobility across countries resulting from fewer government-imposed restrictions on cross-border capital flows.

Most empirical studies that have examined saving-investment correlations based on cross-sectional and panel cointegration analyses, have compared coefficient estimates across different country groups classified either by income category or by other economic factors, such as between high, middle and low income countries or between developed and developing economies. This paper focuses exclusively on the Philippines, a small developing economy in South-Asia. Figure 1 shows the trend in domestic saving-rate in the Philippines from 1960 until 2014. Figure 2 shows the domestic investment-rates in the country during the same period. While domestic savings (in proportion to GDP) appears to have marginally declined from 18.54% in 1960 to 17.37% in 2014, domestic investment (in proportion to GDP), increased from 15.43% in 1960 to about 20.47% in 2014. The difference between domestic saving and investment-rates are negative for the years 1968 and 1969, from 1980 until 1984, and from 1989 until 2014. During the period 1976-2014, the deposit rate declined from 8.5% in 1976 to 1.23% in 2014, and the lending rate from around 12% to 5.25%.

Although some studies have examined the domestic saving-investment correlation for the Philippines, the coefficient estimates and their significance have varied with econometric methodologies and study periods. Additionally, continuous financial sector reforms necessitate a re-investigation into the saving-investment correlation. This paper estimates a VECM for the period 1960-2014 and examines (i) the short-run and the long-run relationships between

domestic saving and investment-rates in the Philippines, and (ii) implications for capital mobility and financial integration for the Philippines for the sample period under study.

2. Literature Review

In what is now considered a core puzzle in international macroeconomic literature, the Feldstein and Horioka (1980) study paved the way for further investigations into the long-run saving-investment relationship. Numerous studies have examined the saving-investment correlation and the results, in general, are inconclusive. For instance, although Feldstein (1983), using an extended sample did not observe any significant difference in the estimated coefficient, Murphy (1984) reported a significantly low coefficient estimate for small economies. Dooley et al. (1987) and Chakrabarti (2006) reported low coefficient estimates for non-OECD countries relative to OECD countries. While Schmidt (2001) and Mark et al. (2005) reported long-run coefficients that are close to unity for OECD countries, Wong (1990), Mamingi (1997), Coakley et al. (1999) and Kasuga (2004) reported either weak or low correlation coefficients for developing economies. While Feldstein and Bacchetta (1991) found that a nation's saving-rate would Granger cause its investment-rate, in Schmidt (2001), the variance decompositions for different countries were reportedly low, indicating that domestic investment is determined by factors other than just the saving-rate; thus there would be limited impact of saving policies on domestic investment.

Other studies, most notably by Swamy (1971), Feldstein (1983), Amirkhalkhali and Dar (1993), Montiel (1994), Jansen (1996), Jansen and Schultz (1996), Jansen (1997), De Vita and Abbott (2002), Pelagidis and Mastroyiannis (2003), Corbin (2004), Kellerman (2005), Adedeji and Thornton (2008), Li (2010), Eslamloueyan and Jafari (2010) and Iorio and Fachin (2014) confirmed significant relationship between domestic savings and investment. Amirkhalkhali and Dar (1993) showed that the coefficient estimates are lower for developing economies relative to OECD economies. Krol (1996) and Coakley et al. (2004), using panel data, reported low and statistically insignificant coefficient estimates. More recently, Guillaumin (2009) observed stronger financial cointegration for high-income relative to middle-income countries. Adeniyi and Egwaikhide (2013) observed low saving retention coefficients for sub-Saharan African countries while Chen and Shen (2015) reported a regime shift from high to low correlation for some northern European countries.

3. Data and Model Specification

This study uses annual data on the Philippines from the World Development Indicators of the World Bank for the period 1960-2014. The variables are gross domestic saving and gross domestic investment (included in the model as percentages of GDP). Following Feldstein and Horioka (1980), the long-run domestic saving-investment relation is examined by estimating a model of the following form:

(1) $(DI)_i = a + b(DS)_i + u_i$

The suffix i denotes the country under study. DI and DS denote, respectively, gross domestic investment and gross domestic savings as percentages of GDP. The VECM representation of the model in (1) with k lags is given by:

(2) $\Delta V_t = W + BV_{t-1} + \sum_{i=1}^{k-1} \gamma_i \Delta V_{t-i} + \varepsilon_t$

In equation (2), V_t is vector of variables, W is a vector of parameters, B and γ_i are matrices of parameters, and ε_t is a vector of disturbances with mean zero and are independently and identically distributed over time. The model in (2) allows for a linear trend in the levels of the data. The VECM is estimated within the Johansen (1995) framework, i.e, if the maximum rank of the cointegrating matrix is 1, then a minimum 1^2 restriction will be imposed when determining the long-run coefficients. The unit root test is first performed in order to examine stationarity; the Johansen cointegration test is next performed with lag-length selected by the Akaike Information Criterion (AIC) in order to determine long-run relationship between the variables; the model is then estimated for short-run and long-run coefficients; lastly, the diagnostic tests are performed to examine serial autocorrelation, normality in error distribution and stability of the model.

4. The Results

4.1 Unit Root Test: The Dickey-Fuller Generalized Least Squares (DF-GLS) test proposed by Elliott, Rothenberg and Stock (1996) is believed to possess greater power properties than the traditional Augmented Dickey Fuller (ADF) test; therefore, the DF-GLS test is performed. The DF-GLS unit root test is performed for models that include lags of the first-differenced detrended variables. The maximum number of lags is determined by the Schwert (1989) criterion. The null hypothesis of a unit root is tested against the alternative of trend stationarity. The optimum lag-length is selected by the minimum of Schwartz Criterion (SC) and the Modified Akaike Information Criterion (MAIC). The results are reported in Table 1.

Table 1. Unit Root Test

	Level		
	DF-GLS	Lags	10% critical value
DI	-2.49	1	-2.89
DS	-1.27	2	-2.86
	First-Difference		
	DF-GLS	Lags	1% critical value
∆DI	-5.29*	1	-3.76
∆DS	-5.91*	1	-3.76

4.2 Cointegration Test: The results in Table 1 indicate that the variables are first-difference stationary. Since the variables are I(1), the Johansen cointegration test is performed and the results are reported in Table 2.

Table 2. Johansen Cointegration Test

Maximum Rank	Eigenvalue	Trace Statistic	5% Critical Value
0	-	15.85	15.41
1	0.22	2.53*	3.76
2	0.05	-	-

Since AIC selected a model with two lags, the cointegration test is performed with two lags. The trace statistic is less than the 5% critical value corresponding to maximum rank one; thus, the model fails to reject the null hypothesis that there is at least one long-run relationship.

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* in Table 1 indicates significance at the 1% significance level.

4.3 Short-Run and Long-Run Dynamics: Since the results indicate long-run relationship between domestic saving and investment-rates, the VECM is estimated with two lags and one rank specification. The Johansen normalization restriction is imposed on domestic investment-rate. The results are reported in Table 3 and Table 4.

Table 3. Short-Run Coefficients

	coefficient	standard error	probability
ECM_{t-1}	-0.28*	0.09	0.00
ΔDI_{t-1}	0.19	0.14	0.19
ΔDS_{t-1}	-0.001	0.18	0.99
constant	0.24	1.41	0.87

Table 4. Long-Run Coefficients

	coefficient	standard error	probability
DI	1.00	-	-
DS	0.07	0.26	0.78
constant	-30.77	-	-

Results indicate that both the short-run and the long-run effects of domestic saving-rate on investment-rate are insignificant; thus, there is lack of any significant effect of domestic saving on investment-rate. The ECM_{t-1} coefficient is negative and statistically significant, ensuring convergence toward long-run equilibrium.

The low and insignificant short-run and long-run coefficients indicate high degree of capital mobility in the Philippines. It also indicates limited effectiveness of saving policies in increasing domestic investment in the country. The high degree of capital mobility could arise due to fewer government restrictions on international capital flows. The results are similar to the findings of the previous studies that, for small developing economies, with low real GDP, the domestic saving-investment correlation is relatively lower compared to the developed economies. The weak saving-investment correlation could also possibly exist because of the prevalence of a more globalized and floating exchange rate regime since the Asian financial crisis in 1997. Post-1997, some global economic events that could possibly have affected saving and investment decisions in the Philippines could be high economic growth in the United States that was followed by severe recession due to the subprime mortgage crisis in 2007, the Russian financial crisis in 1998, the financial crisis in Iceland, Ireland and Russia in 2008, and the formation of numerous trading blocs amongst European and Asian nations to foster greater economic and financial integration.

The results are similar in lines with the findings of Murphy (1984), Dooley et al. (1987), Amirkhalkhali and Dar (1993) and Chakrabarti (2006) who reported lower saving-investment coefficient estimates for small and developing economies relative to industrial economies. Following Tesar (1993) and Chakrabarti (2006), some of the factors that may possibly give rise to a high degree of financial integration could be fiscal and monetary policies of national governments, reduced home bias in financial investments, greater mobility of financial capital relative to physical and human capital, reduced political risk in overseas investments, a change in preferences for traded and non-traded goods in consumption smoothing, and productivity shocks to non-traded goods, amongst other factors. An important determinant of the very low

* in Table 3 indicates 1% significance level.

domestic saving-investment association could be the study period itself, particularly due to the significant reduction in capital controls in recent times.

4.4 VECM Diagnostics: The results of the LM test for autocorrelation, the Jarque-Bera normality test for error distribution, and the stability test are reported in Table 5.

Table 5. VECM Diagnostics

LM	chi-square statistic	degrees of freedom	probability
Lag 1	5.97	4	0.20
Lag 2	5.63	4	0.23
Normality	chi-square statistic	degrees of freedom	probability
Jarque-Bera	2.57	2	0.28
R^2: 0.16			
VECM Unit Moduli: 1			

The LM chi-square test statistics 5.97 and 5.63 corresponding to lags 1 and 2 respectively are less than the 5% critical value 7.78 for four degrees of freedom; thus, the model fails to reject the null hypothesis of no autocorrelation at lag order. The Jarque-Bera chi-square test statistic 2.57 is less than the 5% critical value 4.61 for two degrees of freedom; the model, thus, the model fails to reject the null hypothesis of normality in error distribution. The VECM is considered stable if a model with n endogenous variables and r linearly independent cointegrating vectors imposes no more than $n - r$ unit moduli. The results indicate that the VECM has imposed just one unit moduli; the model, thus, satisfies the stability condition.

Concluding Remarks

This study has re-examined the short-run and the long-run relationships between domestic saving and investment-rates for the Philippines for the period 1960-2014. The VECM estimates indicate very low and insignificant correlation between domestic saving and investment-rates. Thus the results indicate a high degree of financial integration for the Philippines. Some potential factors for the insignificant saving-investment correlation have been discussed. Two of the most important factors to have influenced the low and weak correlation could be the size of the economy and a steady decline in government-imposed capital controls over the years. Additional factors could be a weak banking sector, difficulty in getting access to domestic credit, and the absence of a well-developed primary equity market. Based on the cointegration analysis, it can be concluded that domestic saving policies will have limited effectiveness in enhancing domestic investment in the Philippines. The government should, therefore, consider implementing alternate forms of monetary and fiscal policies to increase domestic investment and boost economic growth.

The results are consistent with previous findings and reaffirm that, for small developing economies, there is evidence of high capital mobility. The results of this study, it is expected, will serve as a strong basis for further extensions aimed at addressing more complex issues in financial markets in emerging economies with rapid global financial integration.

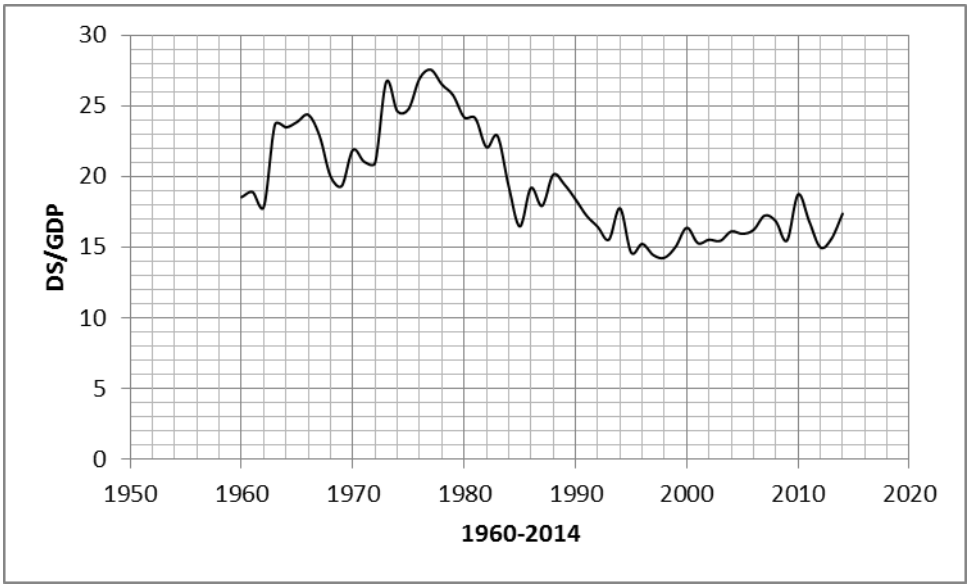

Figure 1. Domestic Saving-Rate: 1960-2014

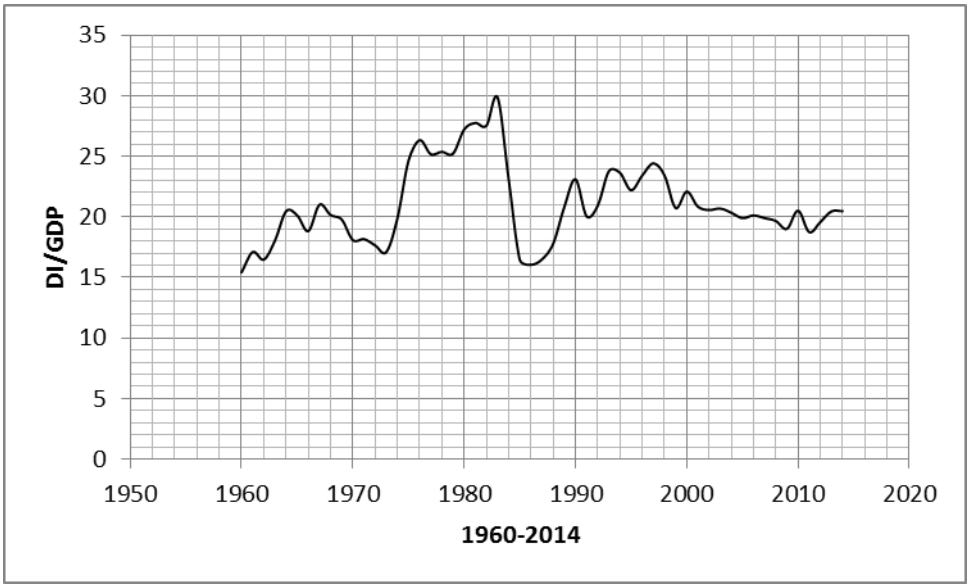

Figure 2. Domestic Investment-Rate: 1960-2014

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