

SAVING INVESTMENT CORRELATIONS AND CAPITAL MOBILITY: EVIDENCE FROM TRANSITION ECONOMIES

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—Abstract—

One of the arguments in open economies is the high and positive correlation between national savings and domestic investment in the long run due to significant barriers to capital mobility. However, recent developments in open economy macroeconomics predict that there might be short run divergence in the saving and investment indicating the existence of capital mobility. In this study, saving and investment relationship for the 14 Latin American countries; Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Mexico, Panama, Peru, Uruguay and Venezuela was analyzed by panel cointegration methods. Also, the degree of capital mobility was investigated by Panel Mean Group estimation through employing error correction model. Results have confirmed the predictions about the behavior of saving and investment; even though they move together in the long run, there is also a moderate level of capital mobility in the short run. The presence of capital mobility implicated that Feldstein-Horioka puzzle is not valid for these 14 Latin American countries in 1977-2011 period. Indeed, empirical findings are consistent with the developments seen in the financial markets since 1980s.

Key Words: *Capital Mobility, Saving, Investment, Cointegration*

JEL Classification: C23, E20, F21

1. INTRODUCTION

Saving and investment are two significant macroeconomic variables that are closely related with one of the main problems of economics; growth. The growth rate of the economy depends on the amount of the investments made in the past together with the improvements in the productivity of those investments. Investment requires funds obtained in the form of national or international

savings. The question here is the how much of the investment is financed through the national savings. One of the arguments in open economies is the high and positive correlation between national savings and domestic investment due to significant barriers to capital mobility. The mobility of capital is important to allow an efficient allocation of capital because it can be directed to the investment where there is highest possible return. Capital is said to be mobile for a country if its flows of capital can enter and leave the country without a restriction and this mobility has been increasing for most of the countries with the elimination of regulations, integration of financial markets and liberalization measures in the last decades.

In examining the relation of national saving and investment, Feldstein and Horioka (1980) found empirical evidence against the capital mobility for the Organization of Economic Cooperation and Development (OECD) countries by estimating the following equation where i is the ratio of domestic investment to GDP and s is the ratio of national saving to GDP;

$$i_i = \alpha + \beta s_i + \varepsilon_i \quad (1)$$

They assessed β as the saving retention coefficient and argued that the value of β determines the degree of capital mobility; values close to one indicate the strong correlation between saving and investment which means that domestic investment is largely determined by the national savings; values close to zero indicate the capital mobility which means that domestic investment can be financed by foreign savings. They examined the data of 16 OECD countries for 1960-1974 period and were unable to reject the hypothesis that saving retention coefficient is one.

The findings of Feldstein and Horioka (1980) had been debated extensively since they contradicted with the open economy macroeconomics and other empirical evidence that capital was mobile across industrial countries. Coakley, Kulasi and Smith (1996) argued that β captures only the long run solvency constraint in the Feldstein- Horioka equation and domestic saving and investment can diverge from their long run equilibrium paths according to new open economy macroeconomic models as Blanchard and Fisher (1989) and Jansen (1996) argues. In the national income identity, difference between saving and investment equals to the net exports. Since a country cannot have negative net exports and become debtor in the long run permanently due to satisfying solvency condition and intertemporal budget constraint, its savings and investments have to be correlated in the long run (Sinn, 1992). Thus, rather than indicating any degree of capital mobility, relation of saving and investment is a long run phenomena and cointegration between

these series does not necessarily mean that there is low capital mobility. However, saving and investment behaviors can differ in the short run because of temporary imbalances in the current accounts. Hence, as Jansen and Schulze (1996) argued, rather than solvency concept, empirical studies have to focus on the short run relationship of saving and investment for measuring the degree of capital mobility with the following Vector Error Correction (VEC) model:

$$\Delta i_{it} = \alpha + \beta \Delta s_{it} + \gamma (s_{i,t-1} - i_{i,t-1}) + \delta s_{i,t-1} + \varepsilon_{it} \quad (2)$$

where $i = 1, \dots, n$ denotes countries, $t = 1, \dots, T$ denotes time periods, γ is the error correction coefficient that shows the speed of adjustment and β is the short term coefficient that measures the capital mobility. Significance of the γ term is necessary to validate the usage of error correction model. However, when this coefficient is 1, it means that there are no deviations from the long run relation of saving and investment and capital is immobile. Also, if there are barriers to capital mobility, short run shock in the saving must be reflected by a change in the investment in the same direction, which requires a positive and significant β coefficient. In this study, equation 2 was estimated following the Jansen and Schulze (1996) structure with panel error correction model by Pooled Mean Group (PMG) estimation method.

After introducing the subject theoretically, the next section of the study presents a brief literature about capital mobility studies for Latin American countries. Third section includes data description, methodology and empirical results while the last section concludes.

2. LITERATURE REVIEW

In the economics literature, although there is a plenty of empirical studies for the developed countries for capital mobility, there are not much research about the subject for developing countries. OECD countries are especially taken attention regarding with the study of Feldstein Horioka (1980). Studies that concerned with the developing countries, especially the Latin American and Caribbean countries presented mixed results about the relation of national saving and investment or degree of capital mobility. Sinha and Sinha (1998) found that saving and investment for four of the 10 Latin American countries have a long-run relationship. Rensselaer and Copeland (2000) searched for the differences in saving and investment relationship in short run and long run for a group of 15 Latin American countries between 1972 and 1996. They specified an error correction model for each country separately and resulted with the short term

coefficients ranged from -0.17 to 1.08; error correction term ranged from 0.12 to 1.31. Payne and Kumazawa (2006) analyzed the saving and investment relationship in 1980-2003 period for 47 developing countries that includes 19 Latin American countries. They found the saving retention coefficient significantly as 0.348 for Latin American country group by Mean Group (MG) estimator. Rocha (2009) examined the degree of capital mobility for 12 Latin American countries by MG estimator and found the short run coefficient as 0.25 but error correction term as -0.38. Murthy (2009) analyzed the capital mobility in 14 Latin American and Caribbean countries for the period of 1960-2002 and found the saving retention coefficient as 0.48 by Fully Modified Ordinary Least Squares (FMOLS) method.

3. DATA, METHODOLOGY AND EMPIRICAL RESULTS

3.1. Data

In this study, saving and investment relationship for the 1977-2011 periods in 14 Latin American countries was analyzed by panel method with 484 observations. Sample of countries includes Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Mexico, Panama, Peru, Uruguay and Venezuela. Data consist of 35 years annually for each country and were taken from the World Bank's World Development Indicators. Data are in the form of current United States dollar; gross fixed capital formation was used for investment, gross saving was used for saving. Other countries in the region with GDP lower than hundred billion dollars were not included in the sample to obtain homogeneity across the countries analyzed. Although the data for some of the countries were available for older periods, starting date was chosen as 1977 in which saving, investment and GDP data for most of the sample was present. I_{it} represents the ratio of investment to GDP; S_{it} represents the ratio of saving to GDP.

3.2. Methodology and Empirical Results

3.2.1. Unit Root Tests

It is necessary to determine the order of integration before using cointegration techniques. For this purpose; Levin, Lin and Chu (2002) test, Breitung (2000) test, Im, Pesaran and Shin (2003) test and Fisher type tests (Augmented Dickey Fuller and Phillips Perron tests) were used, which are being used intensively in panel studies. While the Levin, Lin and Chu (LLC) test depends on pooled data, the Im, Pesaran and Shin (IPS) test is obtained as an average of Augmented Dickey Fuller

(ADF) statistics. It allows for heterogeneity both in intercept and slopes terms for the cross section units and solves the serial correlation problem. Fisher tests are based on a combination of the p -values of the test-statistics for a unit root in each cross sectional unit. Both IPS and Fisher type tests combine information based on individual unit root tests and relax the restrictive assumption of the common unit root in LLC and Breitung tests. According to the results in Table 1 where * and ** denote the rejection of the unit root hypothesis with 5 and 1 percent levels of significance respectively, both saving and investment are stationary.

Table 1: Unit Root Test Results

	Saving		Investment	
	Intercept	Intercept and trend	Intercept	Intercept and trend
LLC	-2.68**	-3.30**	-3.66**	-5.31**
IPS	-3.75**	-3.32**	-4.09**	-3.50**
ADF	58.86**	55.78**	63.95**	59.31**
PP	63.73**	58.98**	67.79**	36.06
Breitung	-	-1.57*	-	-2.11*

3.2.2. Cointegration Tests

Panel cointegration tests were applied after the specification of order of integration for the saving and investment series. Kao (1999) test (as homogeneous test which assumes equality of all coefficients) and Pedroni (1999) test (as heterogeneous test which allows the coefficients to differ across countries under the alternative hypothesis) were used to test for the null hypothesis of no cointegration. Pedroni (1999) test is the most popular among panel cointegration tests. Pedroni (1999) takes into account heterogeneity by using specific parameters which are allowed to vary across individual members of the sample. Results of the Pedroni test in Table 2, where * and ** denote the rejection of the null hypothesis of no cointegration in 5 and 1 percent levels of significance respectively (together with the result of Kao test as -7.16**) have shown that saving and investment series are cointegrated and have a long run relationship,

Table 2: Pedroni Cointegration Test Results

Within dimension Test statistics:		Between dimension Test statistics:	
Panel v -statistic	-2.78**	Group ρ -statistic	-1.77**
Panel ρ -statistic	-3.51**	Group PP-statistic	-3.62**
Panel PP-statistic	-3.87**	Group ADF-statistic	-3.79*
Panel ADF-statistic	-4.20**		

Results of this paper have confirmed the predictions about the behavior of saving and investment; even though they move together in the long run, there is also a moderate level of capital mobility in the short run. According to the PMG estimation results, coefficient of error correction term (γ) was found as 0.27 and short run coefficient (β) was found as 0.31. Rejecting the hypothesis of the error correction term to be equal to the zero supported the idea that there is a long run relationship between saving and investment. Furthermore, rejecting the hypothesis of the error correction term to be equal to the unity, together with the positive and significant short term coefficient, supported the idea that there exists capital mobility. However, relative smallness of the short run coefficient indicated the moderate degree of capital mobility in these countries.

The presence of capital mobility implicated that Feldstein-Horioka puzzle is not valid for these 14 Latin American countries in 1977-2011 period. Indeed, empirical findings are consistent with the developments seen in the financial markets since 1980s like technological improvements, deregulation and the globalization of these markets.

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