

# INTERNATIONAL CAPITAL MOBILITY: REGIONAL VS. GLOBAL PERSPECTIVE #

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## Abstract

This paper examines the role of regional vs. global savings in financing domestic investment in order to shed light on the role of financial globalization and regionalism in capital markets. The regression results based on six regions with 141 countries show that although the role of foreign (global or regional) saving has generally increased over time, there are regional differences: domestic saving is the major source of investment financing in North America with an increasing role of regional saving over time, while regional saving is the main source in Europe. Global saving plays a significant role in the Latin American and Sub-Saharan countries where domestic and regional financial markets are not well developed. In Asia-Pacific, both regional and global savings play an equally important role. Regionalism such as financial and monetary cooperation is likely to have increased the role of regional saving, especially in Europe and Asia-Pacific.

Keywords: saving-investment correlation; capital mobility; regional saving; global saving

JEL Classification: F21, F62

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## **1. Introduction**

In the last two decades, we have observed a sharp increase in international capital flows. This increase is partly due to liberalization of financial accounts in emerging markets, which leads to large capital flows between advanced and emerging markets. A recent development in financial technology has also contributed to the surge in international capital flows into emerging economies. In principle, an increase in international capital mobility can provide significant benefits: for example, allocating world-wide saving into the most productive place and providing an opportunity for each country to share country specific risks by trading state-contingent assets across countries. However, volatile international capital flows have often been blamed for the main source of excess volatility in financial markets, causing various problems such as financial and currency crises.

Meanwhile, one continuing trend in the world economy is the advancement in regionalism. Various types of trade agreements such as free trade area and trade union have a long tradition of being formed on a regional basis: EU, NAFTA, MERCOSUR, and CEEAC are all regionally based trade agreements. The established monetary union such as the EMU and ongoing discussion on monetary integration in other regions are also regionally based in many cases. In addition, many regions have established organization and institutions for regional economic cooperation.<sup>1</sup> Repeated crises in emerging markets and recent global financial crisis further facilitate regional financial

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<sup>1</sup> Some examples are AU (African Union), Andean Community, CSME (Caricom Single Market and Economy), APEC (The Asia Pacific Economic Cooperation), and BIMSTEC (Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation).

and monetary cooperation. Since a number of financial crises and economic downturns in emerging markets have partly initiated from capital flows from advanced economies, some countries start to promote regional financial integration and to create regional mechanisms for financial cooperation.<sup>2</sup>

This paper analyzes the role of regional vs. global capital markets in providing benefits of international capital mobility, in particular an efficient allocation of saving in domestic investment. We investigate how much domestic investment is financed by regional vs. global savings using a worldwide dataset in various periods. That is, we examine whether the relative role of regional vs. global capital markets varies across regions and time. In addition, we analyze whether the role of regional capital market has increased and substituted the global capital market over time. This study can shed light on various issues in international financial architecture and the effects of regionalism.

The implication of efficient allocation of worldwide saving (on investment) has been widely analyzed in past studies, starting from Feldstein and Horioka (1980). When capital is mobile internationally, capital can move freely across countries to seek for the most productive investment opportunity. In such a case, domestic investment is likely to be correlated with foreign saving or international capital flows, instead of domestic saving. A number of subsequent studies have investigated the relationship between

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<sup>2</sup> For example, Asian countries established CMIM (Chiang-Mai Initiative Multilateral) and ABMI (Asian Bond Market Initiative) to reduce the possibility of future crises. Latin American countries progressed various regional monetary and financial cooperation, including the Latin American Integration Association's clearing system for intraregional payments and the Latin American Reserve Fund. Emerging European countries established the European Bank Coordination "Vienna" Initiative, which is a framework for safeguarding the financial stability.

domestic saving and investment.<sup>3</sup> However, few previous studies have investigated the relative role of regional vs. global capital markets (or saving) in financing domestic investment. This paper develops an empirical method to analyze this issue and apply it to comprehensive dataset covering 141 countries.<sup>4</sup>

Estimation results reveal an increasing role of regional saving in investment financing over time, in particular in Europe, Asia-Pacific and North America. Domestic saving is still the major source of investment financing in North America, while regional saving is the most important source in Europe. In three regions with emerging countries, namely, MENA, Sub-Saharan, and especially Latin America, global saving is the most important source of investment financing. In Asia-Pacific, both regional and global savings are important with a more important role played by regional saving.

The rest of the paper is as follows. Section 2 discusses the empirical methodology. Section 3 discusses the data. Section 4 reports the empirical results including sub-period analysis. Section 5 concludes the paper.

## **2. Empirical Model**

While the original Feldstein-Horioka saving investment correlation puzzle is based on a cross-sectional regression analysis, we start from the following time-series based saving-investment regression that is widely used by studies in a panel regression setup.

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<sup>3</sup> For example, Feldstein (1983), Dooley, Frankel, and Mathieson (1987), Golub (1990), Tesar (1991), Taylor (1994), Obstfeld (1995), Kim (2001), Murphy (1984), Bayoumi (1989), Kim, Kim, and Wang (2007), among many others.

<sup>4</sup> Kim et al. (2014) applied the methodology developed in this paper to investigate the regional vs. global savings issue in East Asia.

$$\Delta I_{it} = \alpha_i + \beta \Delta S_{it} + \varepsilon_{it} \quad (1)$$

where  $I$  is (log of) domestic investment,  $S$  is (log of) domestic saving, the subscript  $i$  indicates country, and the subscript  $t$  indicates time.

The coefficient  $\beta$  represents how much domestic saving is related to domestic investment, named as the “saving retention coefficient” in the previous studies. Under perfect international capital mobility, a simple theoretical model suggests that investment decision is independent of savings decision, so  $\beta$  should be close to zero. On the other hand, investment should be equal to saving in a closed economy, so domestic saving and investment should be perfectly correlated and  $\beta$  should be close to 1. Therefore, some studies interpret a low value of  $\beta$  as a high degree of capital mobility.

The coefficient  $\beta$  can also represent how much domestic investment is financed by domestic saving. A small (or large)  $\beta$  suggests that only a small (or large) fraction of domestic investment is financed by domestic saving. If domestic investment is not fully financed by domestic saving, a fraction of domestic investment is likely to be financed by foreign saving, which implies a non-zero degree of international capital mobility. In the following regression, this interpretation is explicitly extended in order to evaluate the relative role of regional versus global capital markets (or saving) in financing domestic investment.

Based on equation (1), regional and global savings are added as explanatory variables as follows:

$$\Delta I_{it} = \alpha_i + \beta \Delta S_{it} + \gamma \Delta S_{it}^R + \delta \Delta S_{it}^G + \varepsilon_{it} \quad (2)$$

where  $S^R$  is (log of) regional aggregate (excluding own economy) saving and  $S^G$  is (log of) global aggregate (excluding own region) saving.

The regression shows how much domestic investment is related to domestic, regional, and global savings. While  $\beta$  can be interpreted as the usual saving retention coefficient,  $\gamma$  and  $\delta$  can be interpreted as how much domestic investment is financed by regional and global savings, implying the relative role of regional and global capital markets that contribute to financing domestic investment, respectively. Further, following the interpretation that a low  $\beta$  implies a high degree of international capital mobility, we can interpret a high  $\gamma$  (high  $\delta$ ) as a high degree of regional (global) capital mobility.<sup>5</sup>

### 3. Data

We use the annual world data from 1980 to 2011 for investment and saving (141 countries total) using the Penn World Table ver. 8.0. We divide the data into six regions based on the region classification by the United Nations: Asia-Pacific, Latin America, North America, Europe, MENA and Sub-Saharan Africa (see Appendix 1 for more details). We use the following data set in the Penn World Table: real GDP (series name:

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<sup>5</sup> One potential problem in interpreting the estimated  $\beta$  as an inverse of the degree of international capital mobility is that causality does not always flow from saving to investment. That is, changes in investment may affect changes in saving. Furthermore, a structural shock may affect saving and investment simultaneously. This problem can exist for interpretation of  $\gamma$  and  $\delta$  in equations (2) and (3) as a measure of relative regional versus global capital mobility. However, one can still interpret the coefficients  $\beta$ ,  $\gamma$  and  $\delta$  as simple relationship between savings and investment. The estimated  $\beta$  shows how domestic savings and investment are correlated and can provide some information on the low bound of the degree of international capital mobility.

CGDPo), share of investment (series name: *csh\_i*), consumption (series name: *csh\_c*) and government spending (series name: *csh\_g*). Saving is constructed as  $S = GDP - C - G$ . For each country, regional saving data is constructed by summing up savings of all countries in the region excluding own country, and global saving data is the sum of savings of all countries in the world excluding the region that the country belongs to. For regression, we construct the first differenced data by taking percentage changes of the variables instead of logs.<sup>6</sup>

Table 1 describes the main properties of savings and investment rates in six regions. The savings and investment rates for the Asia Pacific region are 27.3% and 25.1%, respectively. These rates are the highest among all regions. Latin America has the lowest savings and investment rates. They are 3.4% and 17.3%, respectively. It is also interesting that investment rate is far higher than savings rate in Latin America, where the savings rate keeps decreasing over time and shows a negative number in 2000s. Sub-Saharan region shows a similar property as the Latin America except that the Sub-Saharan savings rate increases over time.

In order to run panel regression, we first check the stationarity of the data. We consider two widely used panel unit root tests: Levin, Lin and Chu (2002) and Im, Pesaran and Shin (2003). Levin, Lin and Chu (2002) assume a common unit root process, while Im, Pesaran and Shin (2003) assume a heterogeneous unit root process. Table 2 reports the test results. Both test results show that we cannot reject the null hypothesis of a unit root for the level data, while the first-differenced (percentage difference) data

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<sup>6</sup> Since some countries have negative savings, we use percentage changes instead of taking log differences.

appear to be stationary. Therefore, we use the first differenced data for all empirical regressions.

Since the panel data tend to exhibit cross-sectional correlations, we therefore test whether cross-sectional correlation is an issue for our data set. To do so, various test statistics are employed such as the log-likelihood ratio (LR) test, the Akaike information criterion (AIC), the Bayesian information criterion (BIC) and the Hannan-Quinn information criterion (HQIC). Rejecting the null of homoscedasticity implies that a generalized least squares (GLS) specification is more efficient than a typical least squares (LS) estimation. Table 3 reports the test results and the information criteria from the two model specifications, the pooled data and the fixed effects models. Irrespective of the model specification, the LR test results reject the null of homoscedasticity, implying that the error terms are not spherical and the GLS specification is more favored by the data. The complementary tests using various information criteria also prefer the GLS specification over the LS specification, reinforcing the LR test results. Therefore, we take account of heteroscedasticity with cross-sectional correlations by using a feasible GLS specification for estimation.

## **4. Estimation Results**

### **4.1. Results from the Whole Sample Period**

Table 4 reports the GLS estimation results of both pooled data and fixed effects models for the whole sample period in each region. Both tests provide similar results, so



we focus on the results from the fixed effects regression in this section. In sum, the role of domestic, regional, and global savings is different across regions.

First, the coefficient on own saving (OS) is significant in all regions except for Sub-Saharan region, but the size is quite small. Other than the North American region, the coefficient is less than 0.1. In North America, the coefficient is around 0.7, which suggests that the role of domestic saving in financing domestic investments is quite large in North America. But other regions show a minimal role of domestic saving, in particular Latin America and Sub-Saharan regions.

Second, regional saving (RS) has a significant role in investment financing in Europe, North America and Asia-Pacific. The estimated coefficient on regional saving in Europe is the highest (0.64), while it is lower in North America (0.37) and Asia-Pacific (0.39). Regional saving has small effects (less than 0.1) in the other three regions. Global saving (GS) has a significant role in Latin America, MENA, Sub-Saharan and Asia-Pacific. The estimated coefficient on global saving in Latin America is quite large (0.93), while it ranges from 0.30 to 0.49 in MENA, Sub-Saharan and Asian Pacific. Note that both regional and global savings play an important role in Asia-Pacific.

In Table 5, we include the lagged investment to test if the dynamic specification is appropriate for the regression. However, when the lagged dependent variable is included, the GLS estimation of the pooled data or fixed effect model tends to be inconsistent and biased as argued in Nickell (1981). In addition, regressors used in this paper are possibly endogenous. Arellano and Bond (1991) argue that for models including a lagged dependent variable and one or more endogenous regressors, the generalized method of moments (GMM) procedure yields a consistent and more efficient estimator. Therefore,

we use the Arellano-Bond one- and two-step GMM estimators. In addition, to examine whether the selection of panel data transformation affects the result, we also report the result using the orthogonal deviation (OD) estimator proposed by Arellano and Bover (1995).<sup>7</sup>

For the Arellano-Bond estimator, J-statistic and serial correlation up to the first and second lags of residuals---AR(1) and AR(2)---provide important diagnostic check. All the J-test statistics for the one- and two-step difference estimators in Table 5 fail to reject the null of valid over-identifying restrictions. All the AR(1) tests aside from the two-step difference estimator for MENA reject the null of no autocorrelation and most AR(2) tests do not reject the null of no autocorrelation except for the one-step difference estimator for Europe and Latin America. Overall, the diagnostic checks suggest that GMM models are appropriately specified.

Table 5 shows that the GMM estimation results are qualitatively similar to those in GLS estimation in many cases, although the exact numbers for estimates are often different. First, except for North America, domestic saving plays only a small role. Second, in Latin America and Sub-Saharan, global saving plays a significant role. The coefficient for Latin America is the highest. The coefficient on global saving in MENA and Asia-Pacific shows a mixed significance depending on the estimation method. Third, regional saving plays an important role in Europe, Asia-Pacific and North America. The coefficient on regional saving in Europe is the highest (around 0.8), then Asia-Pacific (around 0.7) and North America (around 0.3). Fourth, both regional and global savings

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<sup>7</sup> The Arellano-Bond test transforms the data by taking a usual first difference between each observation, while the Arellano-Bover method subtracts the average of all available future variables from the current observation.

play an important role in Asia Pacific, although the coefficient on global saving is not significant in one case. The coefficient on regional saving is larger than global saving, which was not clearly found in the GLS estimation.

Overall, the estimation results suggest that domestic saving plays the most important role in investment financing in North America, while regional saving is the most important source in Europe. In three regions with emerging countries, namely, MENA, Sub-Saharan, and especially Latin America, global saving is the most important source. In Asia-Pacific, both regional and global savings are important with a more important role played by regional saving.

#### **4.2. Results from Sub-Period Analysis**

This section provides sub-period regression results to access how the role of regional and global savings changed over time. Figure 1 presents the GLS estimation results of the fixed effects model with 15 year rolling windows. The x-axis shows each sub-period, while the y-axis shows the estimated coefficient. The first panel in Figure 1 reports the results for the Asia-Pacific countries. The sub-period estimation confirms the previous finding from the whole sample that both regional and global savings play an important role in investment financing. The role of regional saving starts to increase when the Asian financial crisis period (1997) is included in the 15 year rolling window data. This may be related to various efforts of regional financial and monetary cooperation since the Asian financial crisis or an increasing role of China in providing capital in the region. The role of global saving suddenly decreases when the global

financial crisis period is included but increases again in more recent sub-periods. Global financial crisis in 2008 was originated from the US and mostly affected advanced economies, which resulted in the withdrawal of financial assets from emerging economies including emerging Asian markets. These capital outflows can explain a negative coefficient on global saving during this period.

For Europe, the role of regional saving was weak initially but has continuously increased over time. This is likely to be related to the establishment of a single currency area (eurozone) as the timing of increase in the role of regional saving coincides with the timing when euro was introduced in 1999. The role of own saving continuously decreases over time to near zero. The role of global saving has been weak all the time and even in the negative territory in the 1990s, but slightly increases in 2000s.

For the Latin American and Sub-Saharan regions, global saving plays a significant role throughout the whole sample period, while the role of regional and own savings are minimal. For Latin America, the role of global saving is strong in the 1980s and 2000s but is relatively weak during the 1990s. Financial/currency crisis of Brazil and Argentina in the 990s seems to have caused capital outflows in the region, which can explain a weak role of global savings during this period. For the Sub-Saharan region, the role of regional saving stays in the negative territory during the whole sample period, implying that there is no regional channel that can funnel regional saving to investment in this region.

For MENA, the role of global saving was initially negative but has increased over time and became positive in recent years. This may be related to recent liberalization and privatization trends in this region. Global saving seems to replace regional saving in the

region as the role of regional saving continuously decreases over time into the negative territory.

For North America, domestic saving plays a significant role throughout the whole sample period. But the role of domestic saving decreases over time while the role of regional and global savings increases over time. There seems to be a substitution effect between domestic and foreign (both regional and global) savings in this region. Regional cooperation such as NAFTA may have helped increasing the role of regional saving.

Overall, the role of global and regional savings tend to increase over time in many countries: the role of regional saving increases especially in Europe and North-America and the role of global saving increases especially in MENA. The opposite movement of regional and global savings can be frequently found: for example, in Asia-Pacific and MENA, and the first half of the sample period in Europe, North America, and Latin America. Therefore, regional and global savings are likely to be substitute with some exceptions.

In order to confirm the substituting relationship between regional and global savings, we calculate time series correlation of the three coefficients (on OS, RS and GS) from the 15 year rolling window regressions. Table 6 reports the time-series correlation from the whole sample period (18 observations for each variable) and the correlation from the first and second half in the estimation period (9 observations each). From the whole sample period, we can observe a substituting role of regional and global savings in four regions: Asia-Pacific, Latin America, MENA, and Sub-Saharan. North America shows a positive correlation between regional and global savings, which mainly comes from the second half. The substitution effects between regional and global savings are

found in both sub-periods in MENA and Sub-Saharan, only in the first half in Europe, North America, and Latin America, and only in the second half in Asia Pacific. Table 6 also shows that substituting relation between own saving and regional saving is stronger than substituting relation between own saving and global saving.

## **5. Conclusion**

International capital flows have increased substantially around the world. However, whether the increased capital flows are actually funneled through domestic investment is another question. Considering the negative effects of increased global capital flows such as global financial crisis, assessing the role of foreign capital in financing domestic investment is an important research agenda. This paper investigates the role of regional vs. global saving in financing domestic investment in six regions in the world.

We find that domestic saving is still the major source of investment financing in North America, while regional saving is the main source in Europe. In three regions with emerging countries, namely, MENA, Sub-Saharan, and especially Latin America, global saving plays the most important role. In Asia-Pacific, both regional and global savings are important with a more important role played by regional saving.

Even though most capital flows into emerging markets are from advanced economies, it is important for emerging markets to establish regional capital markets as is evidenced in the regression results. Regional capital plays a more important role in investment financing than global saving in three largest regions in the world---Europe, North America and Asia-Pacific. Monetary and financial arrangement on the regional

basis as well as regional trade agreements can help promote regional capital flows which can provide stable source for investment financing in the region.

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## **APPENDIX. Sample Countries**

This appendix shows sample countries used in the regression.

### 1. Asia Pacific (26 countries)

: Australia, Bangladesh, Bhutan, Brunei, Cambodia, China, Fiji, Hong Kong, India, Indonesia, Japan, Korea, Laos, Macao, Malaysia, Maldives, Mongolia, Nepal, New Zealand, Pakistan, Philippines, Singapore, Sri Lanka, Taiwan, Thailand, Vietnam

### 2. Europe (25 countries)

: Albania, Austria, Belgium, Bulgaria, Cyprus, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, United Kingdom

### 3. Latin America (28 countries)

: Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bermuda, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominica, Dominican Rep, Ecuador, El Salvador, Grenada, Guatemala, Honduras, Jamaica, Panama, Paraguay, Peru, St. Kitts and Nevis, St. Lucia, St. Vincent and Grenadines, Trinidad and Tobago, Uruguay, Venezuela

### 4. MENA (14 countries)

: Djibouti, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia

### 5. North America (3 countries)

: Canada, Mexico, US

### 6. Sub-Saharan Africa (45 countries)

: Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central Africa Republic, Chad, Comoros, Congo. Dem. Rep., Congo Republic of, Cote d'Ivoire, Equatorial Guinea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, South Africa, Sudan, Suriname, Swaziland, Tanzania, Togo, Uganda, Zambia, Zimbabwe

Total: 141 countries

**TABLE 1. Properties of savings and investment data**

	Asia Pacific	Europe	Latin Am America	MENA	North America	Sub-Saharan
<u>Savings/GDP</u>						
Whole sample	27.3	23.5	3.4	23.0	21.1	8.8
1980 ~ 1989	25.2	24.1	5.8	18.0	22.8	5.8
1990 ~ 1999	27.6	23.0	5.4	18.2	21.1	6.7
2000 ~ 2011	28.9	23.3	-0.2	31.0	19.8	13.1
<u>Investment/GDP</u>						
Whole sample	25.1	24.5	17.3	23.8	22.4	18.2
1980 ~ 1989	23.9	27.5	17.4	21.2	23.1	17.3
1990 ~ 1999	25.0	23.7	17.4	22.7	22.3	17.7
2000 ~ 2011	26.1	22.7	17.1	26.9	21.7	19.5

Note: Numbers are percentage points.

**TABLE 2. Panel unit root tests**

	Asia Pacific	Europe	Latina America	MENA	North America	Sub-Saharan
<i>Test 1: Levin-Lin-Chu test statistics</i>						
			<u>Level data</u>			
<i>I</i>	7.773	2.392	3.409	4.311	-0.377	8.992
<i>OS</i>	3.462	0.264	3.307	3.387	-0.515	2.792
<i>RS</i>	16.155	7.358	2.463	11.119	-0.898	22.204
<i>GS</i>	12.009	12.206	12.752	8.958	4.676	16.146
			<u>Differenced data</u>			
$\Delta I$	-15.776***	-13.280***	-19.020***	-5.803***	-9.096***	-18.213***
$\Delta OS$	-11.234***	-12.175***	-16.034***	-10.170***	-6.820***	-28.958***
$\Delta RS$	0.950	-10.170***	-32.265***	-16.618***	-6.781***	-35.357***
$\Delta GS$	-23.144***	-22.558***	-23.575***	-16.652***	-6.868***	-29.841***
<i>Test 2: Im-Pesaran-Shin test statistics</i>						
			<u>Level data</u>			
<i>I</i>	8.498	4.452	4.561	6.101	0.978	10.028
<i>OS</i>	5.912	3.067	3.078	4.226	0.461	2.201
<i>RS</i>	17.756	9.495	5.114	13.810	0.235	22.134
<i>GS</i>	17.705	17.797	18.670	13.150	6.607	23.651
			<u>Differenced data</u>			
$\Delta I$	-13.741***	-12.944***	-16.974***	-6.750***	-7.656***	-17.281***
$\Delta OS$	-11.424***	-13.139***	-12.723***	-12.006***	-4.855***	-22.805***
$\Delta RS$	-7.631***	-21.913***	-31.159***	-18.719***	-5.060***	-31.259***
$\Delta GS$	-20.287***	-19.755***	-20.985***	-14.820***	-6.609***	-26.553***

Notes: 1. \*\*\*, \*\* and \* denote 1%, 5% and 10% significance level, respectively.

2. I: investment, OS: own savings, RS: regional savings, GS: global savings.

3. Test statistics are calculated with an intercept term only. Test statistics when including both intercept and linear trend terms produce similar results.

4. Modified BIC is used for the lag length selection criteria.

**TABLE 3. Specification test results: GLS vs. LS**

	<i>Pooled data</i>			
	LR	AIC	BIC	HQ
Asia Pacific	1094.899***	-1.990 (-0.632)	-1.967 (-0.609)	-1.981 (-0.623)
Europe	1234.843***	-2.687 (-1.093)	-2.663 (-1.069)	-2.677 (-1.084)
Latin America	1039.454***	-1.661 (-0.463)	-1.639 (-0.441)	-1.652 (-0.455)
MENA	1009.635***	-0.523 (1.803)	-0.486 (1.840)	-0.509 (1.818)
North America	26.123***	-2.751 (-2.470)	-2.642 (-2.361)	-2.707 (-2.426)
Sub-Saharan	533.520***	0.181 (0.563)	0.196 (0.578)	0.187 (0.569)
	<i>Country Fixed effects</i>			
Asia Pacific	1150.180***	-2.035 (-0.608)	-1.866 (-0.439)	-1.970 (-0.543)
Europe	1282.274***	-2.703 (-1.048)	-2.534 (-0.880)	-2.638 (-0.983)
Latin America	1104.902***	-1.693 (-0.420)	-1.522 (-0.249)	-1.627 (-0.354)
MENA	1010.734***	-0.510 (1.819)	-0.351 (1.978)	-0.447 (1.882)
North America	26.120***	-2.708 (-2.428)	-2.545 (-2.264)	-2.642 (-2.362)
Sub-Saharan	535.047***	0.218 (0.601)	0.398 (0.782)	0.285 (0.669)

Notes: 1. \*\*\*, \*\* and \* denote 1%, 5% and 10% significance level, respectively

2. LR, AIC, BIC and HQ denote the log-likelihood ratio, the Akaike information criterion, the Bayesian information criterion and the Hannan-Quinn criterion, respectively.

3. The numbers without parenthesis indicate the information criteria from the GLS specification, while those in parenthesis indicate the information criteria from the conventional LS specification.

**TABLE 4. GLS estimation results from pooled data and fixed effects models**

	Asia Pacific	Europe	Latin America	MENA	North America	Sub-Saharan
	<i>Pooled data</i>					
<i>OS</i>	0.008*** (0.001)	0.081*** (0.008)	-0.002*** (0.000)	0.007** (0.003)	0.708*** (0.087)	0.000 (0.000)
<i>RS</i>	0.295*** (0.071)	0.639*** (0.068)	-0.001 (0.001)	0.037 (0.046)	0.366*** (0.096)	-0.004 (0.042)
<i>GS</i>	0.369*** (0.076)	0.121 (0.087)	0.955*** (0.063)	0.419* (0.222)	0.011 (0.174)	0.493*** (0.153)
	<i>Fixed Effects</i>					
<i>OS</i>	0.007*** (0.001)	0.075*** (0.007)	-0.003*** (0.000)	0.008*** (0.003)	0.707*** (0.089)	0.000 (0.000)
<i>RS</i>	0.386*** (0.058)***	0.639*** (0.058)	0.001** (0.000)	0.059* (0.033)	0.367*** (0.098)	0.005 (0.042)
<i>GS</i>	0.299*** (0.060)	0.098 (0.076)	0.930*** (0.062)	0.341** (0.161)	0.011 (0.176)	0.487*** (0.152)

- Note: 1. \*\*\*, \*\* and \* denote 1%, 5% and 10% significance level, respectively.  
2. OS, RS and GS denote own saving, regional saving, global saving and lagged investment respectively.  
3. The numbers in parentheses denote cross-section robust standard errors.

**TABLE 5. Estimation results from dynamic panel GMM**

	Asia Pacific	Europe	Latin America	MENA	North America	Sub-Saharan
<i>AB one-step difference GMM</i>						
<i>OS</i>	0.005** (0.002)	0.048*** (0.014)	-0.002 (0.002)	0.059* (0.036)	0.665*** (0.096)	0.000 (0.000)
<i>RS</i>	0.749*** (0.249)	0.800*** (0.189)	0.002 (0.009)	-0.024 (0.259)	0.350*** (0.130)	-0.105 (0.077)
<i>GS</i>	0.231 (0.252)	0.015 (0.254)	0.904*** (0.175)	0.483 (1.105)	0.116 (0.225)	0.443* (0.265)
<i>LINV</i>	-0.130*** (0.047)	0.129*** (0.046)	0.011 (0.054)	-0.050 (0.061)	-0.040 (0.067)	-0.077*** (0.028)
<i>J-stat</i>	404.192 (0.161)	382.735 (0.125)	294.347 (0.990)	263.494 (0.153)	95.570 (0.163)	458.309 (0.203)
<i>AR(1)</i>	-12.565***	-9.770***	-9.102***	-12.761***	-4.013***	-25.675***
<i>AR(2)</i>	0.754	-4.434***	-1.850*	4.561	-0.418	-1.123
<i>AB two-step difference GMM</i>						
<i>OS</i>	0.005*** (0.000)	0.029* (0.016)	-0.001 (0.003)	0.051*** (0.018)	0.693*** (0.094)	-0.001 (0.001)
<i>RS</i>	0.590*** (0.134)	0.804*** (0.058)	0.058 (0.103)	-0.035 (0.038)	0.313** (0.138)	-0.032 (0.068)
<i>GS</i>	0.328** (0.148)	0.014 (0.061)	0.835*** (0.158)	0.588*** (0.221)	-0.151 (0.259)	0.408*** (0.083)
<i>LINV</i>	-0.127*** (0.022)	0.156*** (0.034)	0.009 (0.006)	-0.058** (0.023)	-0.227*** (0.064)	-0.070*** (0.007)
<i>J-stat</i>	20.543 (0.549)	23.494 (0.318)	27.548 (0.280)	12.758 (0.237)	83.000 (0.479)	41.491 (0.449)
<i>AR(1)</i>	-1.795*	-2.257**	-2.015**	-1.040	-3.442***	-4.818***
<i>AR(2)</i>	0.524	-1.236	-0.797	0.955	-1.553	-0.739
<i>AB orthogonal deviations GMM</i>						
<i>OS</i>	0.009*** (0.003)	0.034 (0.024)	0.000 (0.003)	0.058*** (0.006)	0.662*** (0.093)	0.000 (0.000)
<i>RS</i>	0.655*** (0.119)	0.797*** (0.038)	0.015 (0.017)	-0.005 (0.112)	0.315*** (0.108)	-0.076*** (0.023)
<i>GS</i>	0.317*** (0.103)	0.040 (0.053)	0.858*** (0.093)	0.284 (0.756)	0.105 (0.193)	0.598*** (0.103)
<i>LINV</i>	-0.163*** (0.034)	0.130*** (0.017)	0.016 (0.021)	-0.048*** (0.015)	-0.006 (0.064)	-0.070*** (0.004)
<i>J-stat</i>	23.250 (0.388)	23.505 (0.318)	25.615 (0.373)	12.283 (0.267)	89.457 (0.295)	41.587 (0.445)

- Note: 1. \*\*\*, \*\* and \* denote 1%, 5% and 10% significance level, respectively.  
2. OS, RS GS and LINV denote own saving, regional saving, global saving and lagged investment, respectively.  
3. The AB one- and two-step difference GMM indicates the Arellano-Bond (1991) estimator and the AB orthogonal deviations GMM denotes the Arellano-Bover (1995) estimator.  
4. The numbers in parentheses denote cross-sectional robust standard errors, while the numbers under J-stats are p-values.

**TABLE 6. Time-series correlation of own, regional and global savings**

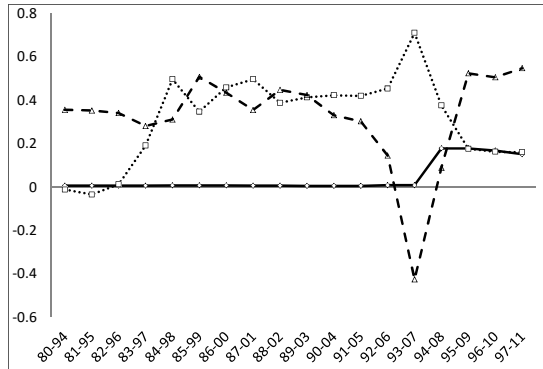
	Asia Pacific	Europe	Latin America	MENA	North America	Sub-Saharan
<u>Whole period</u>						
OS-RS	-0.24	-0.87	0.28	-0.89	-0.88	-0.36
OS-GS	0.20	0.01	0.04	0.82	-0.47	0.19
RS-GS	-0.52	0.06	-0.66	-0.96	0.34	-0.23
<u>First half (1980-2002)</u>						
OS-RS	0.58	-0.77	0.03	-0.62	-0.84	-0.51
OS-GS	0.43	0.80	0.19	0.27	0.16	-0.33
RS-GS	0.30	-0.95	-0.81	-0.73	-0.15	-0.32
<u>Second half (1987-2011)</u>						
OS-RS	-0.76	-0.83	0.58	-0.48	-0.58	-0.42
OS-GS	0.42	-0.94	0.42	0.46	-0.89	0.34
RS-GS	-0.90	0.72	0.87	-0.96	0.70	-0.03

Note: 1. Correlation is calculated from the coefficients derived from the 15 year rolling window regressions.  
2. OS, RS and GS denote own saving, regional saving, and global saving, respectively.

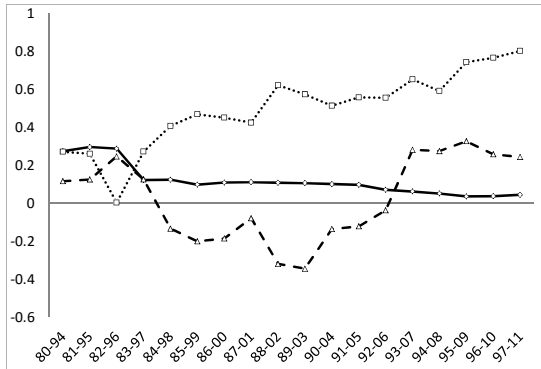


**FIGURE 1. Sub-period analysis: 15-year rolling window regression**

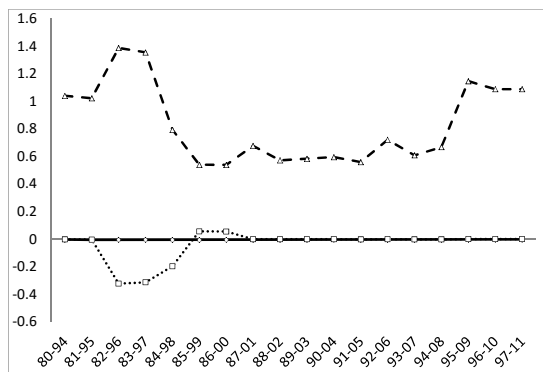
Asia Pacific



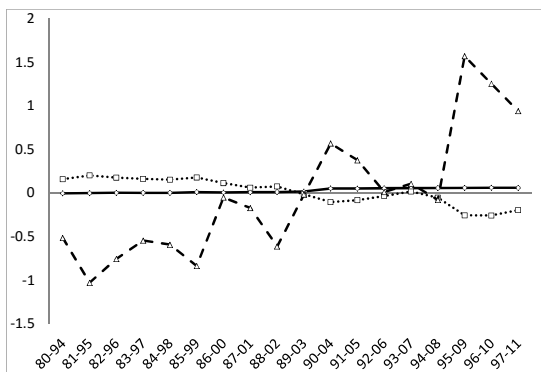
Europe



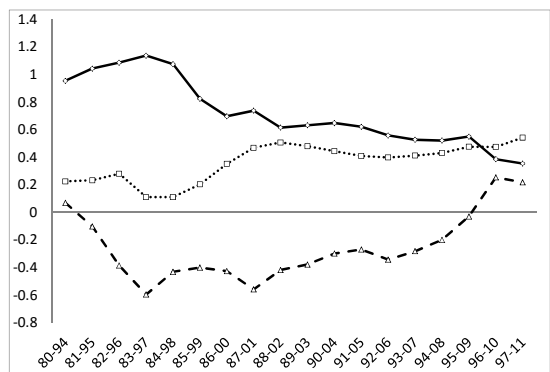
Latin America



MENA



North America



Sub-Saharan

