External Resources and Savings Rate: A Pooled Mean Group Analysis for Developing Countries

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Abstract: To examine the effect of external resources on savings dynamics, this paper employs the pooled mean group (PMG) technique to a large sample of 65 developing countries over the period of 1970 to 2009. The panel results for all the countries together suggest that approximately 33% of domestic savings are displaced by the inflow of external resources. Similar results are also found when regional panels (Sub-Saharan Africa, Asia and the Pacific, and Latin America and the Caribbean) are estimated. Additionally, foreign aid is found to have a stronger effect on domestic savings than private financial flows. All types of external flows are insignificant in determining the savings ratio in the Middle East and North Africa. These results have important implications for developing countries, in particular during the period of global recession. Specific attention to these results is necessary in developing countries to ensure a successful mobilization of domestic resources to support existing investment projects and other development programs.

Keywords: *External resources, savings rate, pooled mean group*

1. Introduction

In the era of globalization, developed and developing countries are economically connected to each other. Hence, although the recent recession originated in developed countries, such integration posed a limit to the flow of external resources from advanced economies to less-developed economies (Majid, 2009). The key channel for the transmission of the crisis across countries was through different types of external flows, including private financial flows and foreign aid. After a dramatic rise in their magnitude throughout the last decade, these flows to developing countries have significantly plummeted since the onset of the recession (Dabla-Norris *et al.*, 2010; Griffith-Jones & Ocampo, 2009). In fact, a few developing countries experienced an abrupt reversal of capital flows. Recent statistics suggest that there has been a sharp decline in the world's financial assets by \$16 trillion to \$178 trillion in 2009 (Roxburgh *et al.* 2009).

The recent phenomenon of the shrinking flow of external resources to developing countries has re-energized a long debate about the effectiveness of these flows (See, for example, Eichengreen, 2010; Lin, 2011). But the major focus is on the immediate response to the financial crisis. It is, however, important to explore the possibility of the long run displacement of domestic savings in developing countries due to the inflow of external resources. The so-called savings constraint of developing countries can be relaxed with the availability of external resources. Nevertheless, the downside is that external finances may also relax the constraint of public spending, and thus, the burden of taxation on households (Okafor & Tyrowicz, 2010). Consequently, households can increase consumption, which, by definition, reduces domestic savings. A high rate of consumption, which often becomes institutionalized, can be supported when the flow of external resources is also high. However, due to the institutionalized pattern of consumption, if developing countries fail to mobilize additional domestic resources during the period of recession, economic activities and other wider development programs may not be supported (Serieux, 2009). Thus, sustained economic growth will be hampered particularly in the time of worldwide economic slump. Hence, generating sufficient domestic savings is crucial for developing countries, so that economic activities and other development programs receive continuous support, even during the recession.

What are the dynamics of domestic savings rates in developing countries? Do external resources displace domestic savings? These questions are extremely important for policy-makers, and thus, need to be tested empirically. While consideration of the relationship between external flows and domestic savings rates has been persistent in the existing literature; they have, thus far, not produced unanimous results.

The distinction between different types of external resources is also very important to consider since it is likely that different types of flows will have different impacts on domestic savings (Mody & Murshid, 2005). First, because of the necessary future repayments of private financial flows, these resources may be allocated in the most productive opportunities, leading to a smaller displacement of domestic savings. Foreign aid, on the other hand, may show a strong negative impact on domestic savings since a part of it (in the form of grant aid) does not need to be repaid. Second, private financial flows (such as foreign direct investment, portfolio investment etc.) typically enter into the investment sector of the domestic economy. Any displacement of savings will be the result of a secondary effect of these flows. Contrary to private flows, foreign aid may directly displace domestic savings when it is directed to consumption. To that end, this paper attempts to establish a relationship between foreign financial flows and domestic savings rates in developing countries. This is done for a panel of 65 countries over the period of 1970 to 2009.

Table 1: List of the Countries in the Sample

Country	Country	Country
Algeria (MENA)	Ghana (SSA)	Pakistan (AP)
Bangladesh (AP)	Guatemala (LAC)	Papua New Guinea (AP)
Belize (LAC)	Guyana (LAC)	Paraguay (LAC)
Benin (SSA)	Haiti (LAC)	Peru (LAC)
Botswana (SSA)	Honduras (LAC)	Philippines (AP)
Burkina Faso (SSA)	Indonesia (AP)	Rwanda (SSA)
Burundi (SSA)	Jamaica (LAC)	Senegal (SSA)
Cameroon (SSA)	Jordan (MENA)	Sierra Leone (SSA)
Central African Republic (SSA)	Kenya (SSA)	Sri Lanka (AP)
Chad (SSA)	Lesotho (SSA)	Suriname (LAC)
Chile (LAC)	Liberia (SSA)	Swaziland (SSA)
Colombia (LAC)	Madagascar (SSA)	Syrian Arab Rep. (MENA)
Congo, Republic (SSA)	Malawi (SSA)	Tanzania (SSA)
Costa Rica (LAC)	Malaysia (AP)	Thailand (AP)
Cote d'Ivoire (SSA)	Mali (SSA)	Togo (SSA)
Dominican Republic (LAC)	Mauritania (SSA)	Tunisia (MENA)
Ecuador (LAC)	Mexico (LAC)	Turkey (MENA)
Egypt, Arab Rep. (MENA)	Morocco (MENA)	Uganda (SSA)
El Salvador (LAC)	Nepal (AP)	Uruguay (LAC)
Fiji (AP)	Nicaragua (LAC)	Zambia (SSA)
Gabon (SSA)	Niger (SSA)	Zimbabwe (SSA)
Gambia, The (SSA)	Nigeria (SSA)	

Notes: AP=Asia and the Pacific; LAC=Latin America and the Caribbean; MENA=Middle East and North Africa; SSA=Sub-Saharan Africa

This research first conducts a panel unit root test. Based on these results, the pooled mean group (PMG) approach is used to establish a long run relationship between external flows and domestic savings rates. Because it is important to distinguish between different types of flows (as discussed previously), this research also attempts to identify the separate effects of foreign aid and other private flows on domestic savings rates. Finally, developing countries are divided into four sub-regions (Sub-Saharan Africa, Middle East and North Africa; Asia and the Pacific, and Latin America and the Caribbean) to provide a detailed regional specific examination of the differing impacts of foreign flows and disaggregated foreign flows.

Pooled mean group technique allows for different short-run dynamics and heterogeneity across countries, and identifies a common long run coefficient for the effect of the interest variables on the domestic savings rates. Therefore, results from this investigation are unbiased from any country-specific effect. In addition to the novelty of the econometric approach, this research also contributes to the existing literature by providing detailed regional effects of foreign flows on domestic savings rates. To author knowledge, this investigation of the external financial flows-savings relationship for a large panel of 65 countries, allowing for short run dynamics and a detailed regional explanation, is unique. The rest of the paper is organized in the following manner. The next section reviews both the theoretical and the empirical literature. Section three discusses the methodology used in this paper. Section four presents the results and a discussion of the results. Finally, the last section concludes the paper.

2. Literature Review

A significant number of theoretical and empirical studies have been undertaken over the last five decades to establish a relationship between external resources and domestic savings rates. This debate started with the famous two-gap model of Chenery & Strout (1966). They argued that the domestic savings rate and insufficient foreign exchange earnings were the two most important constraints of economic growth in developing countries. External resources (especially in the form of foreign aid) may release these constraints and assist developing countries to achieve a desired rate of growth. The assumption that foreign aid supplements domestic savings was almost immediately challenged by Rahman (1967), Griffin (1970) and Griffin & Enos (1970), who argued that foreign aid would be a substitute for domestic savings as long as the world interest rate (i.e. the cost of borrowing was lower than the marginal productivity of capital. While the theoretical debate in the initial years mostly focused on the relationship between foreign aid and domestic savings, the same argument can be made for all external resources. Any inflow of external resources helps to increase the magnitude of domestic expenditures. Domestic savings may go down if private and public economic agents decide to spend the incremental resources to increase consumption (Weisskopf, 1972).

Confounding theoretical conclusions about the relationship between external financial flows and domestic savings in developing countries warranted empirical investigation. Using time series data, Weisskopf (1972) examined the relationship between foreign capital flows and domestic savings for 44 developing countries. The findings of the paper suggested that the impact of foreign capital inflows on *ex ante* savings in developing countries was negative. Therefore, foreign savings appeared to have been substituted for domestic savings, although the magnitude of coefficients varied across the countries. Quantitative evidence on cross-country analysis by Papanek (1972) did not support the negative relationship between inflows and savings. However, he argued that the true relationship between these two variables could only be found from individual country analysis. Bosworth & Collins (1999) used a panel data set for 58 developing countries over the period of 1978 to 1995 to establish a relationship between total capital flows and savings. Their overall results suggest that 20 percent of the inflow goes into higher investment, while only 14 percent goes into consumption. In other words, domestic savings in these countries went down by 14 percent from 1978 to 1995.

Although the effect of private capital flows on domestic savings seems to be smaller in developing countries, one could expect a different result for foreign aid flows. Given that a part of aid (in the form of grant aid) does not need to be repaid, and also that the borrowing cost of loans is lower than the world interest rate, these resources may simply be a substitute for domestic savings. There has been an extensive discussion on the relationship between foreign aid and domestic savings in the literature of development economics. Theoretically, if the aid-savings coefficient is found to be negative one (-1) it implies that all aid is used to displace domestic savings. In other words, any inflow of foreign aid is consumed. Serieux (2009) showed how this relationship between aid and domestic savings holds. National income (Y) can be divided into consumption (C) and domestic savings (S_D). Therefore, domestic savings can be expressed as a difference between the national income and consumption. Dividing both sides by (Y) tells us that the consumption rate (c) and the domestic savings rate (s_d) add up to +1.

$$\begin{aligned}
Y &= C + S_D \\
\Rightarrow \frac{Y}{Y} &= \frac{C}{Y} + \frac{S_D}{Y} \\
\Rightarrow 1 &= c + s_d \\
\Rightarrow 0 &= \frac{\delta c}{\delta a} + \frac{\delta s_d}{\delta a} \\
\Rightarrow \frac{\delta c}{\delta a} &= -\frac{\delta s_d}{\delta a}
\end{aligned}$$

This leads to the conclusion that the marginal effect of aid (and thus, all other financial flows) on the consumption rate and the marginal effect of aid (and thus, all other financial flows) on the savings rate move in the opposite direction. Moreover, if the value of $\delta s_d / \delta a$ is -1, it implies that $\delta c / \delta a$ is +1. In other words, all aid is used to increase consumption. Any coefficient higher than -1 simply suggests that aid was partially consumed and partially saved.

In recent years, Hansen & Tarp (2000) and Doucouliagos & Paldam (2006) reviewed a considerable number of studies that previously found significant aid-savings coefficients. 60% of these studies found a negative aid-savings relationship with a magnitude that is higher than -1. Therefore, a sizeable number of empirical studies found a displacement of domestic savings due to the flow of external resources. In other words, aid was only partially effective in developing countries.

Therefore, the existing literature seems to suggest that external resources do displace savings in developing countries. However, as it is discussed different types of financial flows should have different effects. This paper thus intends to fill the gap in the existing literature by addressing a number of important issues. First, it will be interesting to examine to what extent different types of external resources behave differently in displacing domestic savings. Second, regional investigation is also warranted, since there is significant heterogeneity across different regions of the developing world. Third, a recently developed technique: PMG will be used to answer first two questions. Results from this econometric estimation for a panel of 65 developing countries over the 50 years long period are expected to produce unbiased results from any country-specific effect. Contributions of this paper have implications for researchers and policy-makers of developing countries where effectiveness of external resources can influence the macroeconomic outcomes in the long run.

3. Empirical Estimation

The domestic savings equation: Recent empirical work has typically used some combination of permanent income and life-cycle income hypotheses to estimate the domestic savings rate. According to these models, an individual's savings (and thus consumption) is influenced not by their current level of income, but by their income expectation over the long run (Friedman, 1957; Modigliani & Brumberg, 1954). Other theoretical models, such as the habit-forming model of consumption or the subsistence-income model, provide important rationalizations to use per capita income as an explanatory variable in the savings equation (Schmidt-Hebbel & Servén, 1997). Per capita income is an important variable since many households in developing countries are unable to save because their income is just sufficient for a subsistence level of consumption. According to Ogaki et al. (1996), a rise in savings (i.e. a fall in consumption) grows with per capita income as households are released from the consumption constraint. Serieux (2011, 2009) argued that neither of these models was inconsistent with the original idea of the permanent-income hypothesis and used a savings equation which is a combination of all three hypotheses. Following Serieux (2011, 2009), this paper assumes that the domestic savings rate (i.e. domestic savings to GDP ratio) (savy) has a long run equilibrium relationship with per capita income (pcy), the dependency ratio (dep) and external flows to GDP ratio (ffy). Hence, these variables enter into the long run equation. ffy is then disaggregated into foreign aid to GDP ratio (aidy) and private financial flows to GDP ratio (pvffy). Such desegregation is made to explore the relative individual effect of different types of external resources. Both (oday) and (pvffy) also enter into the long run equation. The first difference of all these variables enters into the short run equation. Finally, the innovation in export growth (dexg) is used as a proxy of transitory income. This variable is assumed to influence (savy)

in the short run, and therefore, enters into the short run equation. (*dexg*) is calculated as the difference between the current rate of export growth and the average export growth rate of the previous three years.

The savings equation discussed above is estimated using a panel data set for 65 developing countries. The data on savings, per capita income, the dependency ratio and the innovation in exports growth are collected and calculated by the World Development Indicators (WDI) and the UNData published respectively by the World Bank and the United Nations. The data on external resources (including total financial flows, foreign aid and private capital flows) are collected from the OECD database. The dataset used in this paper covers 50 years- from 1970 to 2009. While the WDI typically provides data from 1960, statistical information on many variables for a large number of countries is not available until 1970. Some of these countries, such as Bangladesh, Gambia, Haiti, Indonesia, Jordan, Mali, Paraguay and Tanzania are included in the present dataset. Therefore, the consistency of the statistical analysis is maintained by considering the period of 1970 to 2009.

Unit Root Tests: Macroeconomic variables often exhibit cointegrating relationships among a set of $I(1)$ variables. The dataset covers 65 countries over a period of forty years. Non-stationarity of variables is a real possibility when the dataset has such a large T . To determine the level of integration between the dependent and explanatory variables, Hadri's Lagrange Multiplier (LM) test (Hadri, 2000) is employed in this research. Unlike the other panel unit root tests, the Hadri test has a null hypothesis of stationarity in the panel. The general form of the Hadri test includes a constant and a trend. The Hadri test has a very strong null hypothesis that the variable is stationary for all panels. The null of stationarity can be rejected even if just one panel contains a unit root. This research, therefore, also perform a modified Dickey-Fuller t test for a unit root for each individual panel in which the series is transformed by a generalized least square regression. Unit root results are presented in Table 2.

Table 2: Stationarity Tests for Relevant Variables

Variable	Hadri Test (null of stationarity)		Dickey-Fuller Test (null of non-stationarity)	Determination
	Level	Difference		
<i>savy</i>	136.98***	0.40	59	Mostly Non-Stationary
<i>pcy</i>	121.92***	0.32	65	Non-Stationary
<i>dep</i>	180.81***	95.43***	57	Mostly Non-Stationary
<i>dep</i>	50.35†	252.63***†	-	Non-Stationary and $I(1)$
<i>dexg</i>	-3.31	-	15	Mostly Stationary
<i>Ffy</i>	5.74***	-6.13	50	Mostly Non-Stationary
<i>oday</i>	57.01***	-6.47	60	Mostly Non-Stationary
<i>pvffy</i>	20.54***	-6.05	50	Mostly Non-Stationary

Notes:1) *** Indicates significance at the 1% level. 2) † Results from Fisher unit root test. Null hypothesis: All series are non-stationary.

In general, results from the panel unit root tests suggest that all the variables but *dexg* are non-stationary, i.e. $I(1)$. These results are also supported by detailed country specific results, suggesting that most of the variables (with the exception of *dexg*) are either non-stationary or mostly non-stationary. For the *dexg*, the null hypothesis of stationarity is not rejected in the panel unit root test. Results from the Dickey-Fuller tests indicate that the null hypothesis of non-stationarity is not rejected in only 15 out of 65 panels. Thus, this variable can be considered as mostly stationary. In the panel unit root test, the null hypothesis of stationarity is not rejected for the first difference of all but one variable, *dep*. Therefore, none of these variables (with the exception of *dep*) can be considered as $I(2)$ or higher degrees of integration. The panel unit root results for *dep* are rather disappointing.

To verify the robustness of unit root results, this paper employs the Fisher panel unit root test to determine the level of integration of both the level and first difference of the dependency ratio. This test did not reject the null of non-stationarity for the dependency ratio variable. However, the null hypothesis is rejected when

this test is applied to the first differences of this variable. We therefore conclude that the dependency ratio is an $I(1)$ variable. Das (2010) discussed why the results regarding (*dep*) are not consistent across different tests. It may be due to the fact that the variable was revised after every census (i.e. every ten years) and therefore, leads to an odd structure.

The Pooled Mean Group (PMG): Based on the results from the unit root tests, we employ a recently developed econometric approach to analyze the panel dataset: the pooled mean group (PMG) developed by Pesaran *et al* (1999). Asteriou (2009) provides a detailed derivation of the pooled mean group estimator. Using the PMG approach, the savings equation can be written in the following manner:

$$\Delta savy_{it} = \theta_i (savy_{i,t-1} - \beta'_i x_{i,t-1}) + \sum_{j=1}^{m-1} \delta'_{ij} \Delta savy_{i,t-j} + \sum_{j=1}^{n-1} \psi'_{ij} x_{i,t-j} + \sum_{j=1}^{q-1} \xi'_{ij} z_{i,t-j} + \mu_i + \varepsilon_{it}$$

Where, x_{ij} is the vector of non-stationary variables; z_{ij} is the vector of stationary variables; μ_i represents the fixed-effect; ε_{it} represents the vector of standard errors and θ_i is the error correction coefficient. β'_i represents the long run parameters, and finally, δ'_{ij} , ψ'_{ij} and ξ'_{ij} represent country specific short-run coefficient vectors. One of the advantages of using the PMG approach is that the estimated parameters are consistent and asymptotically normal for both stationary and non-stationary regressors. Moreover, PMG is the most appropriate available econometric technique for this research, since the primary focus of this paper is to establish a long-run relationship between domestic savings rates and external flows.

4. Empirical Findings and Discussion

The estimated results from the PMG estimators of the full sample of 65 countries are presented in Table 3. The impact of total external flows to GDP ratio (*ffy*) is estimated in Equation 1. This flow is then disaggregated into foreign aid to GDP ratio (*oday*) and private financial flows to GDP ratio (*pvffy*) in Equation 2. The long-run equation for the savings rate indicates a significant (at 1% level) coefficient of -0.33 for the *ffy*. In other words, on average, 33% of domestic savings is displaced by the external inflows in these countries over the period of 1970 to 2009. When total flows are disaggregated in the second equation, *oday* is found to be significant while *pvffy* is not. The long run coefficient for *oday* is -0.49, suggesting that almost half of the foreign aid is used to increase consumption in these countries. These results seem to suggest that foreign aid has a stronger influence on displacing savings rates than private capital flows. This is not surprising, given that a part of the aid does not need to be repaid, and therefore, can be used for consumption (i.e., displacement of domestic savings). The negative and significant values (both in Equation 1 and 2) of *dep* suggest that high dependency ratios are correlated with a high rate of consumption- an assumption made by the life-cycle theory. The other significant variable in the long run equations 1 and 2 is *pcy*. Short term movements of the domestic savings rates are mainly determined by *dexg*. Thus, it can be argued that both short run and long run movements of domestic savings are explained by transitory income. Finally, the error correction term in both versions of the short run equations suggest that approximately one fourth of the deviations from the long run equilibrium are corrected in the first year.

These results have important implications for developing countries. It is clear that, on average, private financial flows do not displace domestic savings significantly in developing countries. On the other hand, foreign aid flows reduce domestic savings in the long run by almost 50 per cent. Given that there is a chance of reverse flow of capital in developing countries during periods of recession; foreign aid may be the only source of external resources. However, institutionalized consumption, accommodated by aid, will leave a small amount of external resources available for investment or for supporting other development programs. Therefore, to ensure long run growth, it may be essential for policy makers to take deliberate measures to divert foreign aid into more productive investments by reducing consumption.

Table 3: PMG Estimates of the Savings Equations for 65 Developing Countries

Dependent Variable: Domestic Savings to GDP ratio		
Explanatory Variables	Equation 1: Total External Flows	Equation 2: Disaggregated External Flows
	Long-Run Coefficients	
<i>pcy</i>	-0.073*** (-3.16)	-0.073*** (-3.26)
<i>dep</i>	-0.002*** (-6.94)	-0.002*** (-6.58)
<i>ffy</i>	-0.333*** (-6.65)	-
<i>oday</i>	-	-0.489*** (-9.27)
<i>pvffy</i>	-	-0.157 (-1.49)
Short-Run Coefficients		
<i>Error correction coefficient</i>	-0.287*** (-10.12)	-0.275*** (-9.97)
Δpcy	21.821 (0.97)	26.380 (0.98)
Δdep	-0.006 (-0.73)	-0.024 (-0.97)
<i>dexg</i>	0.059*** (10.41)	0.060*** (10.26)
<i>dexg (lagged)</i>	0.004 (0.63)	-0.017 (-0.71)
Δffy	0.656 (1.01)	-
$\Delta oday$	-	8.221 (0.97)
$\Delta pvffy$	-	-2.789 (-1.01)
<i>Constant</i>	0.115*** (3.98)	0.097*** (5.65)
<i>Number of Observations</i>	2538	2538

Notes: 1) *** Indicates significance at the 1% level. 2) Figures in brackets are z-statistics. 3) First lag is included in the short run equation whenever the variable (without lag) is found to be significant.

Table 4: PMG Estimates of the Savings Equations for Sub-Saharan Africa

Dependent Variable: Domestic Savings to GDP ratio		
Explanatory Variables	Equation 1: Total External Flows	Equation 2: Disaggregated External Flows
	Long-Run Coefficients	
<i>pcy</i>	-0.517*** (-2.74)	0.437 (1.61)
<i>dep</i>	-0.004*** (-5.56)	-0.004*** (-3.96)
<i>ffy</i>	-0.371*** (-6.25)	-
<i>oday</i>	-	-0.504*** (-8.17)
<i>pvffy</i>	-	-0.308** (-2.11)
Short-Run Coefficients		
<i>Error correction coefficient</i>	-0.294*** (-6.55)	-0.276*** (-6.44)
Δpcy	47.648 (0.98)	57.310 (0.98)
Δdep	-0.011 (-0.61)	-0.049 (-0.90)
<i>Dexg</i>	0.068*** (7.34)	0.072*** (7.84)
<i>dexg (lagged)</i>	0.003 (0.23)	-0.039 (-0.77)
Δffy	1.382 (0.98)	-
$\Delta oday$	-	18.250 (1.00)
$\Delta pvffy$	-	-5.925 (-1.01)
<i>Constant</i>	0.221*** (3.51)	0.158*** (4.26)
<i>Number of Observations</i>	1160	1160

Notes: 1) *** and ** Indicate significance at the 1% and 5% level respectively. 2) Figures in brackets are z-statistics. 3) First lag is included in the short run equation whenever the variable (without lag) is found to be significant.

Table 4 presents PMG estimates for Sub-Saharan Africa. While *dep* is found to be significant in both equations, *pcy* is significant only in one version. As expected, short run movements of savings rates are determined by the *dexg*. *Ffy* tends to reduce domestic savings rates in the long run by 37%. When total flows are disaggregated, *oday* seems to have a larger effect than private capital flows. Approximately 50% of the displacement of domestic savings is explained by *oday*. This finding is consistent with the existing literature. Serieux (2011) found that foreign aid reduces the domestic savings rate by approximately 41% from 1965-2006. The small difference in magnitude between these results and Serieux (2011) may be due to the difference in time periods. Finally, the coefficient for private flows in the savings equation is -0.38 (significant at the 5% level). The average displacement rate in Sub-Saharan Africa is more than the world average. Hence, the poor resource mobilization record of Africa is validated by the present results.

Regression results for the Middle East and North Africa regions in Table 5 are rather disappointing. The only variable that is significant in both equations is *dep*. The positive sign of this variable suggests a fall in the rate of consumption (i.e. a rise in domestic savings to GDP ratio) due to external resource flows. Insignificant coefficients of the interest variables (i.e., *ffy*, *oday* and *pvffy*) simply imply that, on average, different types of external resources do not have any significant impact on displacing domestic savings rate.

Table 5: PMG Estimates of the Savings Equations for Middle East and North Africa

Dependent Variable: Domestic Savings to GDP ratio		
Explanatory Variables	Equation 1: Total External Flows	Equation 2: Disaggregated External Flows
	Long-Run Coefficients	
<i>pcy</i>	0.133 (1.51)	0.083 (1.11)
<i>dep</i>	0.001** (2.29)	0.001** (2.08)
<i>ffy</i>	0.001 (0.00)	-
<i>oday</i>	-	-0.112 (-0.72)
<i>pvffy</i>	-	0.095 (0.53)
Short-Run Coefficients		
<i>Error correction coefficient</i>	-0.312** (-2.39)	-0.320** (-2.50)
Δpcy	-0.263* (-1.74)	-0.230 (-1.46)
Δpcy (lagged)	-0.005 (-0.03)	-0.040 (-0.28)
Δdep	0.016 (1.02)	0.017 (1.19)
	-0.024	
Δdep (lagged)	(-1.39)	-0.025 (-1.60)
<i>dexg</i>	0.046*** (3.46)	0.039*** (3.07)
<i>dexg</i> (lagged)	0.009 (1.22)	0.007 (1.39)
Δffy	-0.029 (-0.75)	-
$\Delta oday$	-	0.810 (-1.33)
$\Delta pvffy$	-	-0.082 (-0.63)
<i>Constant</i>	0.001 (0.04)	0.010 (0.57)
<i>Number of Observations</i>	316	316

Notes: 1) *** and ** Indicate significance at the 1% and 5% level respectively. 2) Figures in brackets are z-statistics. 3) First lag is included in the short run equation whenever the variable (without lag) is found to be significant.

Both savings functions for Asia and the Pacific are consistent with the permanent income hypothesis, but fail to address the life-cycle hypothesis (Table 6). The total external flows to GDP ratio *ffy* produce a significant (although only at the 10% level) coefficient of -0.34 in Equation 1. In other words, approximately 34% of domestic savings are displaced by external flows in Asia and the Pacific. As expected, the long run coefficient for *oday* exhibits a negative sign, suggesting that foreign aid displaces domestic savings in Asia and the Pacific. The large magnitude of this coefficient implies that the savings ratio in this set of countries goes down by more than the amount of aid flows. The *pvffy* coefficient is insignificant. Therefore, like Sub-Saharan Africa, foreign aid has a stronger effect on savings in Asia and the Pacific region.

Table 6: PMG Estimates of the Savings Equations for Asia and the Pacific

Dependent Variable: Domestic Savings to GDP ratio		
Explanatory Variables	Equation 1: Total External Flows	Equation 2: Disaggregated External Flows
	Long-Run Coefficients	
	-0.307** (-2.06)	-0.318** (-2.27)
<i>pcy</i>	-0.001 (-1.57)	-0.001 (-1.10)
<i>dep</i>	-0.337* (-1.88)	-
<i>ffy</i>	-	-1.238*** (-5.01)
<i>oday</i>	-	0.132 (0.58)
<i>pvffy</i>		
Short-Run Coefficients		
<i>Error correction coefficient</i>	-0.294*** (-4.41)	-0.316*** (-4.13)
Δpcy	-0.473** (-2.42)	-0.474** (-2.49)
Δpcy (lagged)	-0.137 (-0.30)	-0.233 (-0.51)
Δdep	-0.003 (-0.34)	0.009 (0.77)
<i>dexg</i>	0.056*** (4.43)	0.055*** (4.75)
<i>dexg</i> (lagged)	-0.013 (-1.13)	-0.010 (-0.91)
Δffy	0.073* (1.65)	-
$\Delta oday$	-	0.028 (0.18)
$\Delta pvffy$	-	0.092 (0.59)
<i>Constant</i>	0.090*** (3.80)	0.101*** (3.75)
<i>Number of Observations</i>	395	395

Notes: 1) ***, ** and * Indicate significance at the 1%, 5% and 10% level respectively. 2) Figures in brackets are z-statistics. 3) First lag is included in the short run equation whenever the variable (without lag) is found to be significant.

Finally, Table 7 presents the PMG results for Latin America and the Caribbean. As expected, almost all of the variables are found to be strongly significant with the correct signs in both long run equations. On average, 36% of domestic savings are displaced by the external inflows in Latin America and the Caribbean over the period of 1970 to 2009. The coefficients for *oday* and *pvffy* are -0.65 and -0.46, suggesting that foreign aid has a stronger effect on domestic savings rates than private capital flows. *dexg* is the only significant variable in short run equations. These results are robust and insensitive to any change in specifications.

It is evident from the results that external resources are important in determining the displacement of domestic savings rates in developing countries. The effects of the different types of flows vary to a certain extent across different regions. In general, foreign aid tends to displace large amounts of savings as compared to private capital flows. Instead of supplementing, external resources act as a substitute for domestic savings.

Table 7: PMG Estimates of the Savings Equations for Latin America and the Caribbean

Dependent Variable: Domestic Savings to GDP ratio		
Explanatory Variables	Equation 1: Total External Flows	Equation 2: Disaggregated External Flows
	Long-Run Coefficients	
<i>pcy</i>	-0.092*** (-2.84)	-0.105*** (-2.93)
<i>dep</i>	-0.002*** (-3.87)	0.004*** (6.16)
<i>ffy</i>	-0.362*** (-2.94)	-
<i>oday</i>	-	-0.648*** (-3.59)
<i>pvffy</i>	-	-0.462** (-2.25)
Short-Run Coefficients		
<i>Error correction coefficient</i>	-0.276*** (-4.35)	-0.195*** (-3.09)
Δpcy	-0.333 (-0.75)	-0.195 (-0.59)
Δdep	-0.006 (-0.88)	-0.007 (-1.03)
<i>dexg</i>	0.052*** (4.92)	0.053*** (4.10)
<i>dexg (lagged)</i>	0.014 (1.14)	0.003 (0.24)
Δffy	0.041 (1.27)	-
$\Delta oday$	-	-0.381 (-0.91)
$\Delta pvffy$	-	-0.013 (-0.23)
<i>Constant</i>	0.095*** (4.71)	-0.031*** (-2.67)
<i>Number of Observations</i>	707	707

Notes: 1) *** and ** Indicate significance at the 1% and 5% level respectively. 2) Figures in brackets are z-statistics. 3) First lag is included in the short run equation whenever the variable (without lag) is found to be significant.

5. Conclusion

Do foreign flows influence the dynamics of the savings to GDP ratio? This question is crucial for the policy makers of developing countries, especially during a period of global recession. Given the shrinking size of financial flows, developing countries may experience a stall in the growth process if external resources are not efficiently allocated in productive sectors. Therefore, it is important to examine how foreign financial flows influence the savings dynamics in these countries. Development economists have been trying to answer this question for the last six decades, but the results are inconclusive. To find out the effect of external flows on the savings-GDP ratio, this paper employed a recently developed econometric technique (i.e. Pooled mean group approach) for a large panel of 65 developing countries from four regions of the world over the period of 1970 to 2009. Along with the general panel results, detailed regional estimates were also provided in this paper. To author knowledge, no study has ever attempted to examine this relationship for such a large pool of countries. While the focus of this paper was on the long run relationship, the PMG technique also allowed us to control for short run dynamics and heterogeneity across countries.

The overall results suggested that 33% of domestic savings are displaced by the external inflows in these countries over the period of 1970 to 2009. Therefore, almost one third of any flow in external resources is used to increased consumption. Additionally, the research also finds that foreign aid has a stronger impact on domestic savings than private financial flows. Since private financial flows enter directly into the investment sector, any displacement of domestic savings may be a secondary effect of these resources. Moreover, private financial flows must be repaid, while some of the aid (mainly in the form of grant aid, technical assistance and food aid) does not need to be repaid. Therefore, it is not surprising that the *savings displacement* effect of private financial flows is less substantial than the foreign aid.

A key objective of this research is to find out the regional effect of external resources on domestic savings. The results indicate that the relationships (in terms of both the level of significance and magnitude) between financial flows and savings vary across different regions. On average, external resources are significant in Sub-Saharan Africa, Asia and the Pacific, and Latin America and the Caribbean but insignificant in the Middle East and North Africa. The average size of the significant coefficients is approximately negative 0.33. Foreign aid is found to have a stronger effect whenever it is significant. The only region where none of these external resources are significant is the Middle East and North Africa. It appears that more than 30% of external resources have always been consumed in developing countries. Large amounts of savings are displaced by both private flows and foreign aid, particularly in Sub-Saharan Africa and in Latin America and the Caribbean. Therefore, particular attention should be given in these regions to ensure a successful mobilization of domestic resources to support existing investment projects and other development programs. The Asian experience is not much different from other developing areas. The only type of external flow that tends to displace savings is foreign aid. However, it should be noted that perhaps foreign aid is the only available resource during a recession given that there is a chance of reverse private flows. Therefore, while countries can maintain a high level of consumption during the cycle of economic boom, it is also necessary for Asian and Pacific countries to strategize to divert more of these resources into productive sectors.

Future Research Questions: Findings of this research raise some supplementary questions: 1) Do these panels relationships are evident for individual countries? 2) Does South Asia behave differently from the Pacific countries of Asia? 3) Are external resources used to increase consumption or investment in emerging newly industrialized countries (NICs) which have been experiencing significant inflow of these resources? 4) Is there any short-run dynamics of external resources and other macroeconomic variables such as savings and investment? 5) What is the ultimate effect of foreign resources in economic growth in developing countries? These questions are intriguing and hence, left for future research.

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