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Capital Inflows and Capital Outflows: Measurement, Determinants, Consequences

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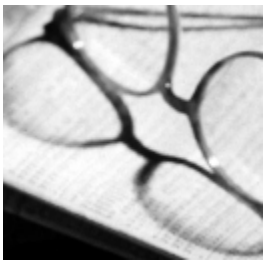


Capital inflows and outflows:
Measurement, determinants, consequences

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Abstract

This paper develops new estimates of capital outflows and is the first, to our knowledge, to analyze the determinants, consequences and inter-relationship between inflows and outflows. Given the dynamics and individual country effects, we use a panel-VAR and find that inflows and outflows are inter-related, that lower inflows/higher outflows lead to lower growth, and among other effects to a higher fiscal deficit, which feeds back to lower inflows/higher outflows. These results provide evidence of vicious and virtuous cycles. We find no strong evidence that official flows crowd-in private ones. We conclude it is particularly important for developing countries to maintain prudent policies, and especially adequate fiscal discipline, to avoid vicious and reinforce virtuous cycles.

Keywords: Capital flows, Growth, Vector-Auto-Regression, Panel.

JEL Codes: F21, F32, C32,C33

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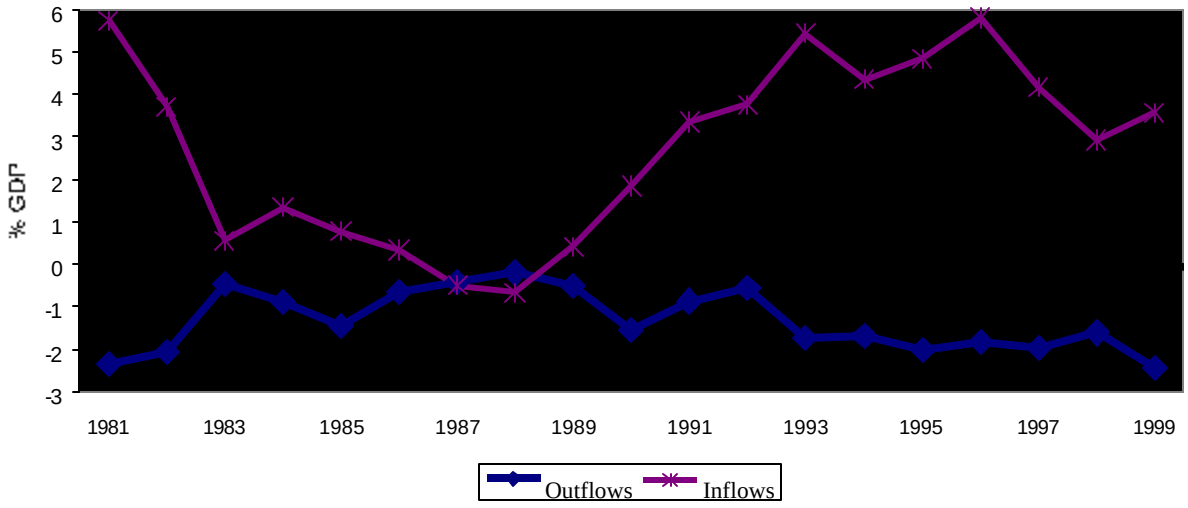
1. Introduction

Capital inflows to developing economies, i.e. the extent to which developing countries capture capital from non-residents, have been studied extensively in the recent literature. But the literature on capital outflows, i.e. the capital flows deriving from residents, remains relatively small[2]. However, capital outflows from developing countries have also been growing rapidly in the last two decades. Figure 1, plots total inflows to and total outflows from developing countries. As can be seen, average inflows to developing countries grew strongly in the early 1990's, recovering from the 1980's debt crisis period, but fell somewhat after the Asian crisis and Russian default. Outflows also fell during the early 1980's but have grown persistently till the end of the sample period. They now account for about 2.5% of GDP, roughly half the level of inflows. Therefore, both inflows and outflows form significant components of the capital available to developing countries.

[2] On inflows see, for example, Calvo et al (1993), and Bosworth and Collins (1999). Note that many papers state that they work with "net inflows". However, this normally refers to non-resident capital flowing into a country net of non-resident capital flowing out. Residents' flows are then frequently disregarded. Alternatively, some authors have attempted to use particular items of residents' flows from IMF data but this typically gives only a very partial picture and most surely grossly under estimates residents' capital flowing out of developing countries. We discuss the literature on outflows and this measurement problem below.

Figure 1: Capital Inflows and Outflows to Developing Countries



Growing outflows are to be expected, and should perhaps even be welcomed, in a world that is becoming more integrated - as evidenced by their counterpart in growing inflows. However, on closer inspection of the data we find considerable variation across countries. Outflows averaged about 2% of GDP over 1995-1999, but the cross-sectional standard deviation of outflows is as large as 4% of GDP. Further, while some middle-income countries appear to be becoming more integrated, with simultaneously increasing inflows and outflows, others have suffered increased outflows and reduced inflows. The pattern of inflows and outflows in countries that have suffered a crisis recently illustrate this experience. In Table 1 we document inflows and outflows as a percentage of GDP in six 'crisis countries'.

Table 1: Crisis Countries (all figures % of GDP)

		1994	**1995**	**1996**	**1997**
Argentina	Inflows	6.6	6.8	7.7	10.1
	Outflows	-2.5	-5.7	-4.0	-4.8
Mexico	Inflows	5.1	-1.1	3.8	3.1
	Outflows	-2.1	-4.1	-1.9	2.2
		1996	**1997**	**1998**	**1999**
Indonesia	Inflows	5.0	-0.2	-9.7	-4.1
	Outflows	0.3	-1.3	1.8	1.4
Korea, Rep.	Inflows	9.3	1.6	-2.3	4.6
	Outflows	-4.6	-4.7	-2.1	-2.3
Russian Federation	Inflows	2.7	6.8	2.4	-0.3
	Outflows	-9.6	-8.8	-10.3	-6.3
Thailand	Inflows	9.8	-6.0	-9.6	-7.2
	Outflows	-0.5	-4.1	-5.5	-1.7

In Argentina, the 1995 "Tequila" crisis is evident as an increase in outflows (more negative)[3], while inflows appear to be hardly affected[4]. Korea, during the Asian financial crisis looks quite different. In 1998 inflows became negative, as non-residents' capital withdrew, while outflows were actually lower - implying lower withdrawals of residents' capital. Mexico, on the other hand, in 1995 suffered a 'run' from both residents and non-residents. Thailand, during the Asian crisis, is similar but more dramatic with highly positive inflows, of over 9% of GDP in 1996, turning negative in 1997 and outflows increasing. For Indonesia, in the same period, outflows turn positive (capital repatriation). In the case of Russia, during the period of its sovereign debt default, there was a sharp reduction in inflows and increased outflows in 1998 and then negative inflows in 1999.

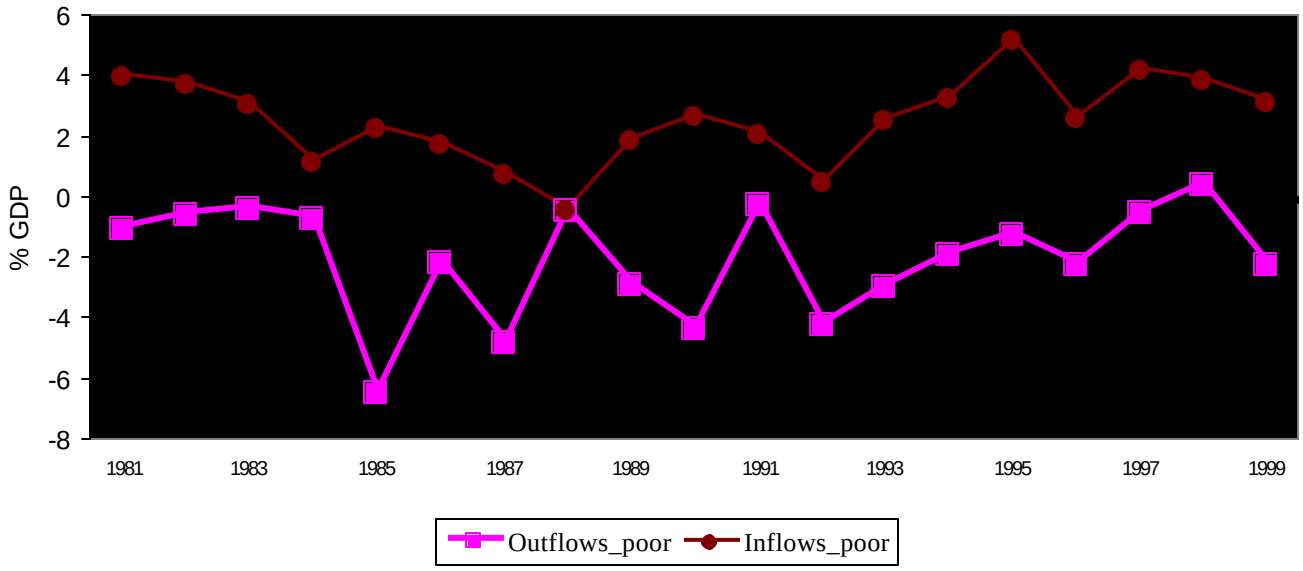
The aggregate data is dominated by a small number of middle-income countries, and if we analyze a sub-group of poor countries, there is an even more varied picture both across countries and over time[5]. While capital inflows have trended upwards, reaching 4% of GDP in 1997, they fell off somewhat in 1998-99. But more significant is the high volatility in outflows – see Figure 2. In 1990 outflows averaged over 4% of GDP, but this fell to almost zero in 1991 but again rose to about 4% of GDP again in 1992. Outflows decreased very significantly since then and indeed as an average for all poorer countries were negative in 1998 (signaling repatriation) but then rose again in 1999 to just over 2% of GDP. These averages are subject to high cross sectional variation but it is clear that any analysis of capital inflows should at the very

[3] In this discussion we adopt the convention that a movement of capital out of the country has a negative sign as in the conventional balance of payments accounting. In the empirical sections of the paper we adopt the alternative convention.
[4] In data of higher frequency than the annual data used here a different picture might of course emerge.

least control for outflows, a very important component of the total capital available in developing countries.

[5] Poor countries are defined throughout this paper as in Global Development Finance 2002 (World Bank 2002) to include mostly IDA-only countries that have a per capita income under US$1000 in 2000. This list includes 69 countries.

Figure 2: Capital Inflows and Outflows to Poor Countries



In Figure 3, we illustrate the high cross sectional variation of outflows across poor countries[6]. Note that the graph has a maximum and countries to the right of this peak had residents' capital returning – repatriation. The total annual private capital outflows for this group of 69 poor countries is about $8 billion (1995-1999 averages) but 20 countries have outflows that total over $10 billion! Of these, 69 countries, just six, account for over $2 billion of reverse outflows i.e. repatriation of residents' capital. One would expect poorer countries to be significant net private capital importers and indeed net private inflows (i.e.: private inflows net of private outflows) have been positive, especially over the 1990s. For 1995-1999 inclusive, private inflows net of private outflows were on average 3% of GDP. However, several poorer countries have net inflows below this level and some have negative net private capital inflows[7].

[6] In Figure 3 capital leaving the country is a positive number and capital repatriation by residents is negative.
[7] Here, net-inflows refers to net inflows (net non resident flows) minus net outflows (resident flows).

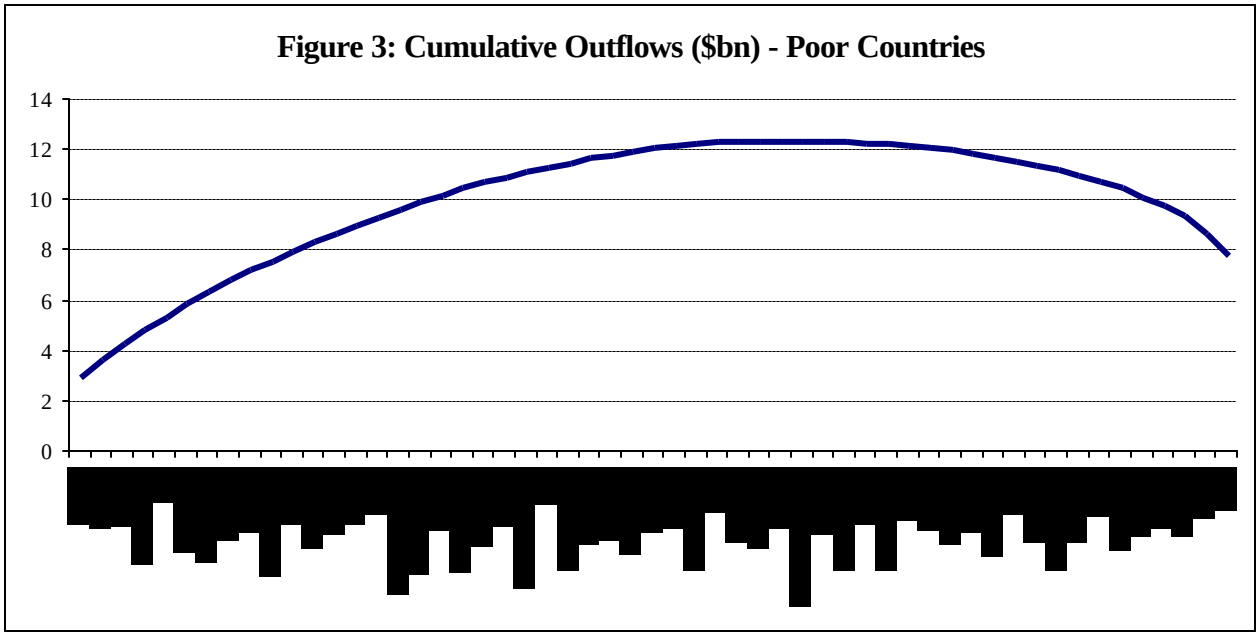


Figure 3: Cumulative Outflows ($bn) - Poor Countries
14
12
10
8
6
4
2
0

The interaction between inflows and outflows needs to be considered carefully. Since the literature has tended to focus primarily on private inflows, important elements regarding the role of outflows in the availability of private capital to developing countries have not been considered. For example, higher capital inflows in the form of acquiring existing companies in emerging countries (a form of FDI) may in themselves create higher outflows as the beneficiaries of the sales place part of the proceeds abroad, reducing the actual inflow. Similarly, inflows may be 'caused' by previous outflows or through 'round tripping' as residents attempt to circumvent domestic regulations or taxes. We know of no study to date that has attempted to analyze these interactions. Moreover, previous studies regarding the effect of inflows on macroeconomic variables that do not control for the effect of inflows on outflows (and/or vice versa) and therefore have an important missing variable may have potential misspecification and bias.

A further part of the jigsaw is the role of official flows. In poor countries, official inflows are a significant proportion of total inflows. Official flows might be substituting for private inflows. A more optimistic view is that official flows, by providing finance for inputs including the development of human capital, health, infrastructure and other basic goods may enhance the investment climate and hence may crowd-in private capital inflows and reduce capital outflows. We know of no study that analyses whether official flows crowd in or out inflows, controlling for the effect of outflows and vice versa.[8]

In this paper our aim is to analyze the role of capital inflows, outflows and official flows controlling for the interactions between them. The data we use covers the period 1981 to 1999, and while the Asian financial crisis and Russian debt default had a substantial impact on capital

[8] Ratha (2001) found that during the last two decades multilateral lending to developing countries was counter-cyclical to private inflows in the short-term and it complemented private inflows in the medium-term. But this study did not control for outflows from developing countries.

flows, the trend until this latter date remained broadly one of growing inflows and outflows. Writing in May 2002, with financial problems in Argentina, concerns in other developing countries and the effects of the Sept. 11th, 2001 terrorist attack in the USA and its aftermath, there is a now widespread concern that inflows will be more restricted to developing countries, and there is also concern that outflows will increase reflecting a 'flight to quality'. In our view, this makes it even more important to understand the role of inflows and outflows in order to comprehend the effects of such changes in capital flows on the macroeconomic performance of emerging countries.

Our strategy is to use an econometric methodology that is capable of sorting through the complex dynamic relationships between our capital flow variables and certain macroeconomic variables. Specifically, we use a panel-VAR technique that allows us to consider the relevant relationships in a simultaneous fashion while also controlling for non-observable individual country effects. In this context, we attempt to isolate the determinants of capital flows on the one-hand and on the other, the macroeconomic impact of those flows. We assess the extent of any dual 'causality' between the two or, in other words, whether there is evidence in favor of a virtuous (vicious) circle between, say, prudent (risky) macroeconomic policies and favorable (unfavorable) capital flows[9]. We also investigate what might be determining the 'individual country effects'. However, before undertaking the empirical exercise, an important issue that needs to be addressed is the measurement of the capital flow variables. While the measurement of capital inflows is non-controversial, there has been a lively discussion regarding the measurement of outflows and alternative methods have been proposed.

[9] Our notion of 'causality' here is essentially that due to Granger where within a VAR context we attempt to 'test' whether lags of one variable are significant in the prediction of another and vice versa.

The plan of the paper is then as follows. In the next section we present a discussion of the debate regarding the measurement of capital outflows and motivate the measure used in this paper. The rest of the paper is organized as follows. In section 3, we discuss some of the potential causes of capital outflows from developing countries, and examine some bivariate relationships between capital outflows and potential determinants. In section 4 we describe the econometric methodology employed to analyze the determinants and consequences of outflows and inflows. In section 5, we describe the econometric results for all developing countries and for a sub-set of poorer countries. In section 6 we analyze a set of factors that might explain the 'individual effects' included in the panel-VAR and section 7 concludes.

2. Measuring Capital Outflows

Typically, outflows have been measured indirectly, as the residual of "sources of funds" over the "uses of funds" from the balance of payments (World Bank, 1985, Morgan Guaranty 1986, Cline 1985). This is also the approach that we adopt in this paper. The sources of funds includes all identified inflows and credit items in the capital account of the balance of payments, while uses of funds are the current account deficit and increase in international reserves.

One of the shortcomings of the Residual Method is that it treats all errors and omissions in the balance of payments as capital outflows. In reality, errors and omissions may reflect unrecorded current account transactions as well (Chang et al., 1997), and also measurement and recording errors and lagged registration (Eggerstedt et al., 1993). Another shortcoming is that this measure ignores outflows taking place through export under-invoicing or import over-

invoicing (Chang, Claessens and Cumby, 1997). Estimating capital flight through trade mis-invoicing is however fraught with problems. Even if estimates of over- and under-invoicing were accurate, not all mis-invoicing represents funds used for capital flight. For example, exports may be over-invoiced to take advantage of export subsidies, and imports may be under-invoiced to reduce import tariffs (Eggerstedt et. al. 1995, Ibi Ajayi, 1997).

Alternative approaches that have been suggested consider the motives behind capital flight. For example, the "hot money measure" suggested by Cuddington (1986) attempts to separate the "speculative" or short-term components of capital outflows from "normal" outflows. Dooley's method measures only that part of capital outflows that do not generate a corresponding investment income reported to the domestic authorities (Dooley, 1986). However, motivations are highly subjective and difficult to define precisely e.g. when is speculation diversification, frequently tax evasion and avoiding appropriation risk go hand in hand - see Eggerstedt, Hall and Wijnbergen 1995, Lessard and Williamson, Collier and others 2001, Varman-Schneider 1991 for further discussion[10].

Moreover, Claessens and Naude (1993) show that the World Bank residual and the Dooley method actually produce very similar estimates of capital flight. We therefore decided to use the residual method and suggest that this remains the most robust methodology to date. By the balance of payments identity, this residual estimate yields the same figures as capital outflows calculated directly as the sum of FDI outflows, debt outflows, portfolio equity outflows,

[10] In what follows we employ estimates of capital outflows and hence sidestep the issue of stocks. One approach to arrive at a stock figure would be to simply sum the flows over various years. However that calculation ignores interest earnings. An alternative is to assume that all interest earnings on flight capital are reinvested abroad, and use the US Treasury bill rates for estimating interest earnings (see Collier et al 2001).

other outflows and debit items pertaining to residents on the capital account including errors and omissions[11]. All data are taken from IMF Balance of Payments (BoP) Statistics database.

3. On the Causes of Capital Outflows

This paper stresses the role of residents' capital as an important contribution to the total capital available to a country and makes the point that analyzing the impact of non-resident capital inflows on macroeconomic variables, at the very least, requires controlling for the movement of residents' capital. It is therefore important to understand the motives behind the movements of residents' capital. One way to think about such outflows from developing countries is that they are the result of the rational decisions of domestic residents to maximize the risk adjustment return on their investments subject to whatever restrictions or subsidies are available. Consistent with this view, the determinants behind capital outflows from developing countries can be grouped under three headings (1) investment climate, (2) discrimination between residents and foreign capital and (3) income and integration effects.[12]

[11] Where outflows here means the net flow of residents. Debit items on the capital account include errors and omissions.

[12] Several authors including Lessard and Williamson (1987) have argued that "fundamental" factors such as good economic management, natural resource endowment, demographic structure affect economic rates of return and thereby "normal" one-way outflows. Policy factors (such as taxation of investment income, price controls and financial repression) may cause financial returns to an investor to diverge from this economic rate of return and cause additional outflows. A large body of the literature on capital outflows has focused on the latter "abnormal" outflows (or capital flight), although it is difficult to differentiate these flows from outflows responding to economic fundamentals. Once again this reinforces our view that it is almost impossible to analyze outflows without simultaneously controlling for inflows.

Investment climate

Variables affecting the 'investment climate' operate directly on the risk-return trade-off.[13] Several macroeconomic variables have a direct impact on expectations of risks and returns. For example, a slowdown in the growth rate may decrease expected returns. Large fiscal deficits raise risks of future taxation and may increase perceptions of macroeconomic risk more generally and also may lead to higher borrowing costs in future; it may also result in overvaluation of the currency and raise devaluation risks. A high debt-GDP ratio raises the risks of future taxation, and also the risk of default, especially on sovereign liabilities to the residents. All these factors may then encourage outflows.[14]

A second set of variables that may increase risk perceptions of residents, reflect property rights and risks of expropriation in one form or another. Countries that have high levels of corruption, a weak rule of law and possibly lower levels of accountability may be expected to have higher levels of capital outflows (Tornell and Velasco, 1992, Collier et al., 2000, and others). More extreme cases where the risks of potential confiscation are highest include countries at war or with internal violent conflicts. Countries with weak property rights, may also suffer higher outflows, as these countries are unlikely to have deep domestic financial markets. Sicular (1998) argues that Chinese residents resorted to capital flight (and also hoarding in commodities) as they lacked private property rights and could not invest in real estate (see also Wei 2000). Finally, a larger size of government may indicate absence of investment opportunities for the private sector and be associated with higher capital outflows. It may also

[13] See Collier and others 2001, Cuddington 1986, Dornbusch 1985, Dooley 1988, Rojas-Suarez 1990, Meyer and Bastos-Marquez 1989, Sheets 1996, Lessard and Williomson (1987).

[14] See also Ajayi (1997). Ajayi also notes the reversal of capital flight in a number of severely indebted low-income countries (SILIC) such as Cote d'Ivoire, Central African Republic, Sierra Leone, Uganda, Ghana and Kenya) during the 1980s and 1990s as a results of improvements in macroeconomic environment and investment climate, lower corruption and better governance.

imply higher transaction costs for private investors, if public sector is less efficient than private sector. Several transition economies are believed to have experienced repatriation of capital outflows following the privatization of state enterprises (Loungani and Mauro 2000).

Discrimination between resident and foreign capital

This group of variables includes a set of subsidies or other forms of preferential treatment of foreign capital including tax breaks, preferential access to prime land and other inputs, explicit and implicit guarantees on foreign liabilities, and exchange controls for residents. These factors may drive residents to invest abroad and non-residents to invest domestically or create incentives for "round tripping" of resident flows.[15] Discriminatory treatment of resident capital can take the form of tax incentives to foreign investors, capital account restrictions, and subordination to nonresident claims in the event of financial crisis. Capital account opening may therefore actually reduce the incentives for capital flight in the long run, especially if it allows residents to hold foreign currency deposits onshore (Rojas-Suarez 1990). Some authors have argued that exchange controls aimed at reducing capital flight are positively associated with corruption, and thus, end up being ineffective (Loungani and Mauro 2000).

Moreover, implicit guarantees on and bailing out of external debt may raise the risks of future taxation or expropriation of residents' wealth (Khan and Haque 1985). Presence of such discriminatory treatment of resident capital relative to nonresident capital may encourage investors to deposit their wealth in a foreign bank, and then raise debt financing from the same bank for their domestic investments (Lessard and Williamson 1987).[16] Such recycling of funds need not always be in foreign currency terms, and may take the form of local currency

[15] See Dooley 1986, Khan and Haque 1985, Eaton 1987, Ize and Ortiz 1987.

denominated equities and bonds, since such securities may also carry implicit and explicit government guarantees, such as credit guarantees for government securities, commercial bank deposits and government-supported projects, and exchange rate guarantees in the form of pegged exchange rates (Dooley and Kletzer 1994).

Wealth and integration

As countries' GDP per capita rise, it is reasonable to suppose that the size of their portfolios of foreign liquid assets will also rise, leading to higher outflows. Moreover, as countries become more integrated into the world trading system (through trade in goods and services including financial services), it is also reasonable to suppose that both inflows and outflows will rise (Gordon and Levine 1988).

Apart from these obvious effects, it is also likely that higher wealth concentration may also produce larger average outflows. Given all else equal, countries with higher income inequality (a higher Gini coefficient) may experience more capital outflows. When income is in the hands of a relatively small group of individuals, it can enable these individuals to pay the implicit and explicit transaction costs associated with capital outflows. Income inequality may also increase socio-political uncertainty (Alesina and Perotti, 1996), thereby raising incentives for capital flight. A significant correlation has also been observed between natural endowments (such as diamonds or gold mines) and outflows that might be justified as diversifying through foreign savings (Goreux 2001).

Several authors argue that capital outflows may be the cause as well as an effect of financial or fiscal crises (Lessard and Williamson 1987, Collier and others 2001). Outflows may

[16] Kant (1996, 1998) found simultaneous occurrence of FDI inflows and reduction of capital flight in 14 developing countries during 1974-92. He interpreted this as an indication that capital flight is a result of domestic

increase in anticipation of future tax or a financial crisis, and may end up increasing taxes or aggravating the probability of crisis. These points naturally reinforce our view that it is essential to analyze the determinants and the effects of outflows to attempt to disentangle, if possible, the direction of 'causality'.

Many of the issues that are thought to drive capital outflows will in general also affect capital inflows. This implies that an analysis of capital inflows without taking into account the effect of outflows, will in general lead to bias in the results. As these common driving factors are also likely to vary over time, this will also in general not be corrected by a fixed effect in a typical panel analysis.

A preliminary bi-variate analysis

As a preliminary analysis, we present, in table 2 a set of bivariate relationships between capital outflows (as a share of GDP) and some of the variables identified above.[17] Obviously, these bivariate relationships do not control for effects of common determinants nor causality. We consider separately poor countries and all developing countries and present statistics for countries divided into two groups depending on each variable analyzed.

When countries are ranked by the 1999 GDP growth rates, countries in the top half of this list had lower capital outflows (cumulated over 1980-99 and divided by 1999 GDP) than countries in the bottom half. Similarly, countries with "good policies" (indicated by CPIA 1996) had less outflows. In the poor countries, the difference in outflows between better performers and others was more pronounced, perhaps indicating the greater importance of policy as a determinant of outflows. Other investment climate variables that are associated with lower

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macroeconomic mismanagement rather than policies that favor foreign capital and discriminate domestic capital.

[17] See Appendix 1 for a description of the data.

outflows are a) lower debt/GDP ratios, b) greater financial deepening (M2/GDP), and c) greater trade openness and d) greater capital account openness. Countries with higher Gini index reflecting greater wealth disparity had higher outflows.

Table 2 also shows that outflows were higher in countries with higher per capita incomes. Somewhat curiously, in the poor country group, higher per capita income was associated with lower capital outflows. This may be due to the fact that countries suffering from war or conflict in the sample tended to be poor and these countries tended to have negative savings rates (i.e., their consumption level exceeded national income) and repatriation of flight capital. Finally, countries that had exchange controls (which in some cases resulted in a positive premium in the black market over the official exchange rate) and capital account restrictions had a higher level of outflows than those without such restrictions. Thus, exchange controls did not appear to have been effective in the medium-term.

The bivariate relationships discussed above suffer from problems of endogeneity in the sense that we have no way of telling which is the cause and which is the effect. Moreover these relationships do not control for the effects of other variables. As argued earlier, dealing with these issues would require a multivariate analysis that also controls for endogeneity. However, this analysis provides some prima facie evidence for the variables that might be included in a more sophisticated analysis that we undertake in the next section.

Table 2: Cumulated outflows as share of 1999 GDP*

	All developing countries	Poor countries
Investment climate:		
CPIA 1996		
High	-19.8	-5.9
Low	-20.1	-30.3
GDP growth		
High	-17.3	-16.4
Low	-28.7	-19.7
Debt/GDP		
High	-23.9	-39.2
Low	-19	-5.1
M2/GDP (financial deepening)		
High	-20.5	-6.3
Low	-20.2	-37.7
Trade/GDP		
High	-28.2	-40.7
Low	-16.8	-7.6
Fiscal Deficit		
High	-26.2	-24.4
Low	-15.5	-5.3
Real Effective Exchange Rate		
High	-25.8	-33.4
Low	-15.5	-12.9
Income effects:		
Per capita income		
High	-20.8	-6.1
Low	-19.4	-21.2
Gini		
High	-22.1	-49.7
Low	-14.2	-6.7
Discrimination of resident capital:		
Exchange premium		
Positive	-23.4	-21.6
Zero	-17.5	-7.6
Capital account restriction		
With restriction	-20.7	Na
No restriction	-16.4	Na

* Outflows cumulated over 1980-99 period. High and low usually refer to above and below median of the concerned variable. The numbers reported are sum of cumulated outflows for countries above median (say) divided by sum of GDP of the same countries. @Almost all the poor countries have capital account restrictions.

4. A Panel VAR Approach

In previous work on capital flows, cross-sectional regressions or panels have been used to (a) consider the determinants of capital inflows and (b) to consider the effect on macroeconomic variables, such as growth, of such capital flows[18]. There are at least two significant problems with much of this work that we highlight here. First, simple regression techniques yield little evidence as to whether capital flows drive, say, growth, or if growth drives capital inflows, or both. The exogeneity of the explanatory variables is sometimes simply assumed by the researcher or, in more sophisticated analyses an attempt is made to 'control' for endogeneity with IV-style estimation. While this may be successful in correcting the regression coefficients for the surely serious endogeneity problem, it does little to sort out the potentially complex dynamic relationships that may exist between the different variables[19]. For example, if capital inflows imply higher growth that leads to a better fiscal position and lower country risk, which in turn again feed back to higher capital inflows, then these dynamics will not be captured by IV analysis.

A second problem relates to the omission of outflows. If higher inflows imply higher outflows or vice versa, or if inflows and outflows are driven by similar time-varying factors, then omitting outflows from the regression will in general lead to bias in the coefficient estimates. Moreover, a standard panel-analysis with fixed effects will not correct for these time-varying interactions.

In this paper we therefore employ a VAR modeling technique that imposes the bare minimum of assumptions regarding restrictions on the inter-temporal correlations between

[18] See for example Calvo et al (1993) and see Dooley et al (1987), Bosworth and Collins (2000) , that focus more on investment than growth, and Borensztein et al (1998) that focuses on the effect of FDI inflows on growth.

variables. However, one significant drawback of traditional VAR models is that they do not allow for individual effects that in a traditional panel would allow the researcher to 'control' for unobservable variables affecting the dependent variable. In a cross-country regression it is inevitable that there are unobservable country-specific factors and this would then be a serious deficiency to a traditional VAR.

In what follows, we then adopt a panel-VAR technique. This technique combines the advantages of the Vector Auto-Regression model, in that all variables are treated as endogenous, with the traditional advantage of a panel in that individual effects are admitted to control for non-observable other country factors. An equation is then estimated for each variable and considering the regression results and 'impulse response functions', considerable information is provided on the dynamic relations between the different variables.

Here, we describe briefly the econometric methodology. Consider the following VAR(1) in standard form with individual and year effects:

$$y_{it} = Ay_{it-1} + f_i + d_t + u_{it} \quad (1)$$

where A is a k*k matrix of coefficients, f_i is a I*1 vector of (unobserved) individual effects and d_t is an T*1 vector of time effects. In what follows we will work without the time effects as we find them to be insignificant but include the individual (country) effects that turn out to be highly significant. We assume that $E(u_{it})=0$ and $E(u'_{it}u_{it})=\Sigma$ and note this model places no restrictions on the unconditional mean and variance of y_{it}. This is very useful in our context where we have noted the significant cross sectional variance in our data.

[19] The may refers to whether the chosen instruments are valid among other issues. More sophisticated IV techniques are of course being developed that do address to some extent these issues – see Arellano (2001) for a review.

If time effects are included these are easy to deal with by simply transforming the model to one of deviations from year-specific means. However, to remove the individual effects, needs a different transformation. There are various possibilities and we employ the Helmert transformation otherwise known as 'orthogonal deviations'. The inclusion of the individual-effects, as in a panel, introduces the problem that, by virtue of including the lagged dependent variable, they are correlated with the other variables. However, the orthogonality conditions imply that all untransformed lagged regressors can be used as instruments for the transformed regressors to arrive at consistent estimates. The estimation is then done by a GMM technique in which all appropriate lags are used as instruments[20].

The VAR structure also calls for additional identification assumptions to recover the so-called structural VAR from the standard or 'empirical' form represented above. In what follows, we employ the Choleski decomposition that imposes restrictions on the contemporaneous correlations between the variables. Each element of the off diagonal of the residual variance-covariance matrix is thus restricted reducing the number of parameters to estimate to calculate the structural or primitive system. In practice this means an ordering between the variables such that in a k variable VAR the 1st variable is not affected by contemporaneous shocks in the other variables, the 2nd variable is not affected by contemporaneous shocks in variables 3 to k, the 3rd variable is not affected by contemporaneous shocks in variables 4 to k etc. There is no restriction placed on how lags of each variable affect the other variables so shocks in the other variables can of course affect the 1st (and all other) variables but with a lag. This 'ordering' means the first variable is the "most exogenous", in that the effects of the other variables on the first variable is restricted to be through at least one lag. We stress that the coefficient estimates

[20] See Love (2001) and Arellano and Bond (1999) for a general discussion.

are invariant to this ordering, but the ordering does affect the impulse response functions and we discuss this extensively below.

In our preferred specification discussed below, we assume that official flows are the "most exogenous", followed by private inflows, private outflows, the real effective exchange rate, growth and then the fiscal deficit. This implies that the capital flow variables can affect the macroeconomic variables without restriction (contemporaneously or lagged as the data dictates), but that the macroeconomic variables are restricted to affecting the capital flows variables only through a lag. Our idea is that this restriction then counts against finding a feedback relationship from the macroeconomic variables to the capital flow variables such that, if we do find such a feedback in the VAR results, we can be confident that this is a robust finding. We are in effect placing an extra 'burden of proof' on finding the macroeconomic determinants of the capital flow variables, by adopting this variable ordering.

It is slightly more problematic to interpret the results of interactions between the different capital flow variables. Here our strategy is then to try different orderings between the capital flows variables to see if the impulse response functions change significantly depending on the particular ordering adopted[21]. We also tried alternative orderings between the different macroeconomic variables to see if the interactions discovered were robust.

Finally, we split the sample and consider poor countries separately to see if we find any differences in the results for this particular sub-group. We find similar results but with less statistical 'power'. We discuss the results for 'poor' countries below.

[21] We try inflows and outflows in different orderings and also split inflows into official inflows and private inflows to investigate if there is evidence of "causality", between official inflows and other inflows or outflows.

5. Description of the Results

In this section we focus on one particular specification and discuss different specifications for comparative purposes. There was in general considerable consistency of signs between the different specifications we estimated although we found that in some specifications, with individual country effects included, some variables lost statistical significance.

Indeed, we find that many variables including M2/GDP, Openness, debt to GDP, per capita income, corruption, rule of law and other 'institutional indicators' that do not vary very much over time lose significance with the individual effects included. We therefore conclude that the effect of these variables is summarized in the individual effects. We investigate the potential interpretation of the individual effects in the following section[22].

The specification we choose to discuss in more detail has the following variables included and in this order[23]:

Capital inflows

Private capital outflows (negative=capital repatriation)

Real effective exchange rate (reer: positive=less competitive)

Growth

Fiscal Balance (deficit=negative)

[22] There is clearly an issue here as to whether these more institutional variables are picking up different aspects or, given their high correlation, they are really picking up the same thing, perhaps a more underlying concept regarding development of institutions.

[23] We note that this specification was selected essentially given the significance of the variables included. We do not report the other specifications attempted in this paper but note that to a very large degree the signs for the variables we finally include did not change across the different specifications, although different specifications did imply different degrees of significance of those variables.

With these 5 variables, we ran a panel-VAR regression for all developing countries in our sample from 1980-1999 (546 observations). The regression coefficients of the 5 equations are summarized in Table 3 and a summary of the impulse response functions are included in Table 4. This summary details any significant effect over several years at the 5% level and the sign of that effect (in no case do we find significant effects for different signs in different years for the same interaction). The actual impulse-response functions are attached in Appendix 1. (The impulse responses illustrate the effect of a one standard deviation shock to each variable on all the other variables, taking into account the knock-on effects through the system, over time). The results from this specification have a number of interesting features. In what follows we discuss the results, equation by equation, using the summaries contained in Tables 3 and 4.

Table 3: Summary Results of Panel-VAR Regression

	Inflows(t)	Private Outflows(t)	Reer(t)	Growth(t)	Fiscal Balance(t)
Inflows(t-1)	0.509	-0.049	-0.079	**0.073**	-0.092
	(6.07)	(-0.576)	(-0.510)	**(1.913)**	(1.637)
Private Outflows(t-1)	-0.029	**0.202**	0.086	**-0.043**	-0.028
	(-0.884)	**(2.150)**	(0.994)	**(-2.111)**	(-0.979)
Reer(t-1)	**-0.027**	**-0.051**	**0.555**	-0.003	**-0.033**
	(-1.957)	**(-2.246)**	**(5.601)**	(-0.349)	**(-2.166)**
Growth(t-1)	0.010	**-0.259**	**0.600**	**0.320**	0.024
	(0.126)	**(-2.321)**	**(2.049)**	**(5.757)**	(0.857)
Fiscal Balance(t-1)	0.127	**-0.119**	-0.388	**0.036**	0.115
	(5.246)	**(-2.395)**	(-1.241)	**(1.681)**	(1.059)

Table 4: Summary of Impulse Response Functions

Response of : To:	Inflows	Private Outflows	Reer	Growth	Fiscal Balance
Inflows	**+ve**	**+ve**		**+ve**	**+ve**
Private Outflows		**+ve**	**-ve**	**-ve**	**+ve**
Reer	**-ve**	**-ve**	**+ve**		**-ve**
Growth		**-ve**	**+ve**	**+ve**	**+ve**
Fiscal Balance	**+ve**	**-ve**		**+ve**	**+ve**

Inflows

Given the ordering of the variables in the VAR, inflows are assumed as the 'most exogenous' in that the identifying restrictions imply that the other variables can only affect inflows through a lag. Nevertheless we find significant feedbacks from the fiscal deficit and the real exchange rate on capital inflows. In particular we find a highly significant positive coefficient and positive impulse response that a higher fiscal surplus (lower deficit) increases capital inflows. With respect to the Reer, we find that a less competitive exchange rate implies lower capital inflows.

Private outflows

Again, despite the ordering of the variables in the VAR, we find a significant feedback from all the macroeconomic variables to private sector outflows. Tables 3 and 4 suggest that countries suffer less private outflows when growth is higher and when the fiscal surplus is higher (deficit lower). These effects are significant in the impulse response functions at the 5% level. As noted in the methodological section this feedback is present despite an ordering of the variables that in some sense counts against finding this direction of the relationship. We also find a significant effect of the real effective exchange rate such that a less competitive exchange rate implies lower outflows. Of course some countries in the sample adopted exchange rate based stabilization programs that have often been associated with strong capital repatriation. We suspect that this may be driving this particular result. The impulse response functions also show evidence that an increase in capital inflows drives higher private capital outflows. However, we find that if the order of these two variables is reversed then the direction of this effect changes. We can conclude two things from these results (1) there is a significant (lagged) feedback from

growth and the fiscal surplus to capital outflows and (2) that there is a significant (contemporaneous) relationship between capital inflows and private capital outflows although it is not possible to disentangle the 'causality' between these latter two variables.

The real effective exchange rate

We find significant effects on the real effective exchange rate (reer) from capital outflows and growth. In particular, the reer is driven to more competitive levels with higher capital outflows and to less competitive levels with higher growth. The effect of growth is with a lag and robust to the variable ordering in the VAR. The effect of private outflows is contemporaneous but also appears robust to the relative ordering of these two variables in the VAR.

Growth

The equation for growth has all the regression coefficients statistically significant, except the Reer, and with what might be thought of as the "expected signs". The coefficients illustrate the importance of capital inflows and outflows for growth. We also find that a higher fiscal surplus (lower fiscal deficit) is good for growth. These results imply the existence of virtuous/vicious cycles operating, in particular, between capital outflows, and growth. The impulse response functions show a consistent story with all of the effects noted not significant at the 5% level.

Private capital outflows, after controlling for the other variables, are bad for growth. This is evidenced by both the regression coefficients and the impulse response functions and is consistent across the alternative specifications we tried. Hence although the descriptive evidence presented shows that both inflows and outflows have been increasing over time for developing

countries, after controlling for the effect of inflows, other macroeconomic variables and individual country effects, there is evidence that higher private capital outflows are negative for growth.

We also find a significant effect of the fiscal balance on growth. The impulse response functions (see Appendix 1) show that while this is positive but not significant at lag year 1 (and the contemporaneous effect is constrained to zero in this ordering), it then becomes and remains significant until year 4 or 5. An 'investment' in good fiscal accounts then appears to pay off over several years in terms of growth, due to both a direct effect (see regression results) and its positive effect through capital outflows as we shall see below. The real effective exchange rate is negative for growth (ie: a less competitive exchange rate leads to lower growth) but in this specification this effect is not significant.

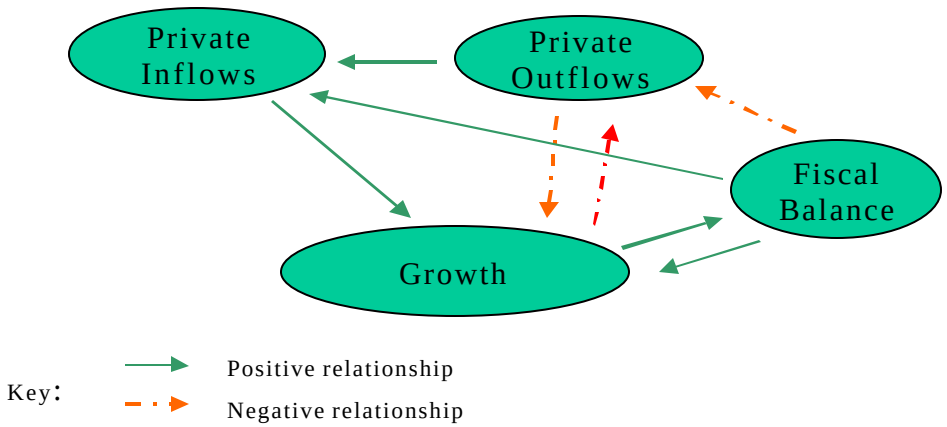
Fiscal deficit

According to the regression results we find the fiscal balance to be largely exogenous to the other variables except for the real exchange rate. However, the regression coefficients only give a very partial view in a VAR. Interestingly, the impulse response functions tell a quite different story. In particular we find a strong effect of growth on the fiscal balance in the direction that is to be expected. This was a robust result across the different specifications and alternatives we tried and appears robust to the ordering of the variables in the VAR.

According to the impulse responses we also found an effect of capital inflows and capital outflows on the fiscal balance. However, these affects disappear if we change the relative order of the variables in the VAR and hence we cannot conclude that they are robust. We stress however that the effect of the fiscal balance on the capital flow variables is robust to the ordering of the variables in the VAR as discussed above. Finally, we do find that a more competitive

exchange rate on average leads to a higher fiscal deficit as evidenced by the regression coefficients and the impulse response functions and this is a robust finding independent of the variable ordering.

Figure 4:
The Virtuous/Vicious Cycle



The results presented above demonstrate clearly the importance of both capital inflows and private capital outflows for growth. Taking into account the relevant feedback effects it is very clear that higher capital inflows and lower private capital outflows are good for growth. Moreover, the evidence suggests that private capital outflows are reduced with prudent economic management (e.g.: lower fiscal deficits) and that this also has a direct effect on growth.

There are many interactions contained in the results above. In particular, there is strong support for the existence of virtuous (and vicious) cycles. This cycle appears to act both through capital outflows and through capital inflows. We can illustrate these effects in a diagram (see Figure 4). For simplicity we focus only on inflows, private outflows, growth and the fiscal balance. We indicate in the Figure the positive and negative feedback effects. Specifically, lower private capital outflows imply higher growth which in turn feeds back directly to lower private capital outflows but also to a higher fiscal surplus (or a lower deficit) which also feeds back to lower private capital outflows. Of course, this cycle may also turn vicious in that higher private capital outflows may lead to lower growth which feeds back directly to higher private capital outflows and which feeds through to a worsened fiscal position and hence also to even higher private capital outflows. In addition we find a virtuous/vicious cycle in that higher inflows result in higher growth, a better fiscal position and hence feeding back higher inflows. This evidence in favor of the existence of virtuous/vicious cycle also supports the notion of multiple equilibria in terms of growth, fiscal balance and capital flows, as in so-called second or third generation models of balance of payments' crises.

Results for Poorer Countries

The results for poor countries follow a similar pattern as for all developing countries but with clearly less power given the fewer number of observations (156 rather than 558), and there

is also higher volatility for many of the series and hence the standard errors tend to be larger. In Table 5, we summarize the results of the impulse response functions, and in Appendix 2 we present a Table similar to Table 3 above summarizing the regression coefficients where we also include the actual impulse response functions.

Considering the impulse response functions, we find that the fiscal deficit continues to be significant for capital outflows such that a prudent fiscal position decreases outflows and also lowers growth. However, we do not find a significant effect of outflows (or inflows) on growth (even though the variable ordering is loaded in that direction). Still, the effect of outflows on growth is negative (and the effect of inflows positive) and we just do not find the coefficient in the regression nor the impulse responses significant. We also find that growth positively affects the fiscal position so there is a clear virtuous/vicious cycle present between growth and the fiscal position, and according to the point coefficient estimates there is a feedback also between outflows, growth and the fiscal position. However, as noted, this is not a strong result as the feedbacks from growth nor the fiscal position on outflows are not significant statistically.

We also find the same interaction between inflows and private outflows. This supports the view that we need to take into account these interactions when considering the determinants and effects of inflows and outflows on the macroeconomic variables but once again we cannot distinguish between the hypotheses of inflows 'causing' outflows or vice versa. We again find that these relationships are all contemporaneous in our annual data and hence it is impossible to distinguish 'causal' relations.

Table 5: Summary of Impulse Response Functions: Poor Countries

Response of: To:	Inflows	Private Outflows	Reer	Growth	Fiscal Balance
Inflows	**+ve**	**+ve**	**-ve**		**+ve**
Private Outflows		**+ve**			
Reer	**-ve**		**+ve**		**-ve**
Growth			**+ve**	**+ve**	**+ve**
Fiscal Balance	**+ve**	**-ve**		**+ve**	**+ve**

An alternative specification with official and private inflows

In addition to the above 5 variable VAR, for all countries, we also ran a 6 variable VAR separating the capital inflow variable into private inflows and official inflows using the World Bank's Global Development Finance database to estimate official inflows.[24] Here we discuss the results including all developing countries in the regression. The results are consistent with those reported above regarding the signs of the effects of the capital flow variables on macroeconomic variables, and we also find a significant feedback from the macroeconomic variables to the private capital outflows as before. However, the significance levels are generally weaker than the 5 variable VAR that we report above.

Official inflows appear as exogenous and official flows only appear to have an effect on private inflows (negative) and on the real exchange rate (negative). However, both effects are contemporaneous and not robust to the relative ordering of the variables in the VAR. This means that we cannot, for example, distinguish whether official flows are crowding out private inflows or whether higher (lower) private inflows result in lower (higher) official flows. The strong result however is that there is no evidence that official flows crowd in private inflows. (See also Ratha 2001).

6. Investigating the Individual Country Effects

The strong conclusion from the Panel-VAR is that capital inflows and outflows interact and both are important for growth and that there are vicious and virtuous cycles. We also found that the individual effects were significant and suspect that a set of variables that tend to vary

[24] IMF Balance of Payments data do not separate inflows according to private and official sources. We have, therefore, taken official flows from the World Bank's Debtor Reporting System (DRS). These flows represent concessional and non-concessional official flows received by a developing country, as reported by the country. We then subtract official inflows from total inflows to obtain private inflows.

little over time may be driving these 'dummies'. To investigate this further, we conduct a somewhat different analysis described in this section.

We note that countries can be divided into groups depending on the characteristics of average capital flows across time. For example, we can divide countries as follows:

Group A: Countries where private capital inflows and outflows are positive or where capital inflows are positive and capital outflows negative (repatriation).

Group B: Countries where private capital inflows and outflows are negative or where are inflows are negative and outflows are positive.

Group A contains countries that are either strongly importing capital or integrating into world capital markets. Group B contains countries that are undergoing a process of reverse-integration or are simply exporting capital. Now, we consider some salient characteristics of countries that tend not to vary too much over time (and hence for which we find difficulties including in the econometric work above) and which we feel might explain the 'individual effect' in the above regressions.

In particular we place countries into the above two groups for the four 5 year periods of our dataset (period 1: 1980-1984, period 2: 1985-1989, period 3: 1990-1994 and period 4: 1995-1999) and we then group countries into four different groups depending on their movements between groups across these different periods:

Countries that stayed in Group A	Countries that moved from A to B
Countries that moved from B to A	Countries that stayed in Group B

In the Table 6, we then calculate the average values of the salient characteristics for each of these groups across the three different transitions that we have: period 1 to period 2, period 2 to period 3 and period 3 to period 4.

Table 6: All Developing Countries
(Selected Indicators by Group)

	A to A	A to B	B to A	B to B
	%	(These values are expressed as % differences from A to A values)		
Debt/GDP	72.2%	68.5%	-0.4%	138.8%
M2/GDP	35.3%	-0.7%	-17.3%	-13.3%
Inflation	131.8%	16.4%	-19.7%	491.1%
Openness	76.4%	-24.3%	-20.6%	4.6%
Corruption Index	2.9	10.0%	3.0%	-8.5%
Repudiation Risk Index	3.6	5.1%	-2.6%	-11.3%

We can see from the Table that countries that moved from group A to B tended to have higher debt to GDP ratios, higher inflation and lower ratios of openness (exports plus imports divided by GDP). They also had slightly better values for the corruption and repudiation index risk indices (a higher level of the index implies less corruption and less repudiation risk) although the differences between the levels of these for countries that moved from A to B and those that stayed in A are not large and there is virtually no difference in M2/GDP. Interestingly countries moving from B to A also had lower inflation and also lower M2/GDP and lower openness.

The strongest results, however, are obtained comparing the last column – those countries that remain in Group B – and the first column - those that stay in Group A. Here we see that Group B countries have higher debt to GDP and lower M2 to GDP ratios, higher inflation and worse corruption and repudiation risk indices. The conclusion is that countries with lower debt, lower inflation, less corruption and lower contract repudiation risk are then more likely to remain in the group that benefits from residents' and non –residents' capital flowing in and less likely to be in the group suffering from that capital flowing out.

7. Conclusions

In this paper we simultaneously investigate the determinants and the consequences of both capital inflows and outflows. Our view is that cross-country panels investigating the impact of capital inflows typically suffer from two distinct problems. First, there is surely a chronic problem of endogeneity and while more advanced IV techniques can attempt to 'control' for this, these techniques tell us little about the feedbacks between the various variables. A second problem is that frequently the flows of residents (outflows) are disregarded or poorly estimated.

As inflows and outflows are related and also driven by other time varying factors this will in general lead to bias in the coefficients.

We believe that this is the first paper that attempts to disentangle these various elements. In this paper we employ a panel-VAR that imposes the bare minimum of 'structural' assumptions, allows for a set of complex dynamics and also allows us to control for individual country effects. Our empirical results support the inter-relation between inflows and outflows and the a set of complex dynamics between the capital flow and macroeconomic variables, and hence strongly support our priors.

The data displays very significant time volatility and also very significant heterogeneity across countries. Moreover, countries hit by crises appear to react quite differently, with sudden stops evident for some in inflows, whereas for others there are increased outflows. Considerable more and rigorous empirical work along the lines of our analysis is required to understand the precise nature of these related phenomena and to understand the determinants of these movements in particular circumstances.

The individual effects turned out to be significant in the panel-VAR and we believe that these 'dummies' may be explained by a set of factors that are not strongly time-varying. In particular, countries with a high degree of openness, a low debt to GDP ratio, a higher degree of monetization and lower corruption or contract repudiation tend to have higher inflows and lower outflows. With the incorporation of individual effects, these variables are not significant and we argue they are picked-up by these 'dummies'.

The average trends for capital outflows suggest that the 1990's were a fairly good period for capital flows for developing countries with inflows rising strongly and outflows rising but less strongly and outflows as a percentage of GDP for poorer countries actually declining.

However, this remark must be tempered because after the events of September 11th of 2001 and the more recent financial problems in Argentina, Turkey and elsewhere there is a strong sense that these benevolent trends might now have changed substantially.

Our econometric results give strong evidence, controlling for the interaction between these variables, that declining inflows and rising outflows adversely affect growth. Indeed a main result of our analysis is that controlling for capital inflows, and for official flows, rising capital outflows are strongly negative for growth. And moreover, while inflows appear largely driven by other factors, there is evidence for a vicious cycle between domestic macroeconomic performance and capital outflows. Lower growth implies a worsened fiscal position that again tends to feed back into higher outflows.

The existence of these potential virtuous and vicious cycles has strong implications for policy. In particular, it becomes even more important for countries to maintain prudent macroeconomic policies including, most importantly, adequate fiscal discipline. These results suggest that emerging countries will be more successful in maintaining beneficial levels of international capital flows by stressing prudent macroeconomic policies, and enjoying the benefit of a virtuous cycle of capital inflows and less outflows, than say attempting to enjoy any potential benefits from strongly rising debt (higher fiscal deficits) that might provoke outflows rising in the future and the risk of falling into the trap of a vicious cycle.

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Appendix 1

Impulse Response Functions: All Developing Countries

Key for variable names

Total inflows (%GDP) = Ingdp

Official flows (%GDP) = Ofingdp

Private inflows (%GDP) = Privingdp

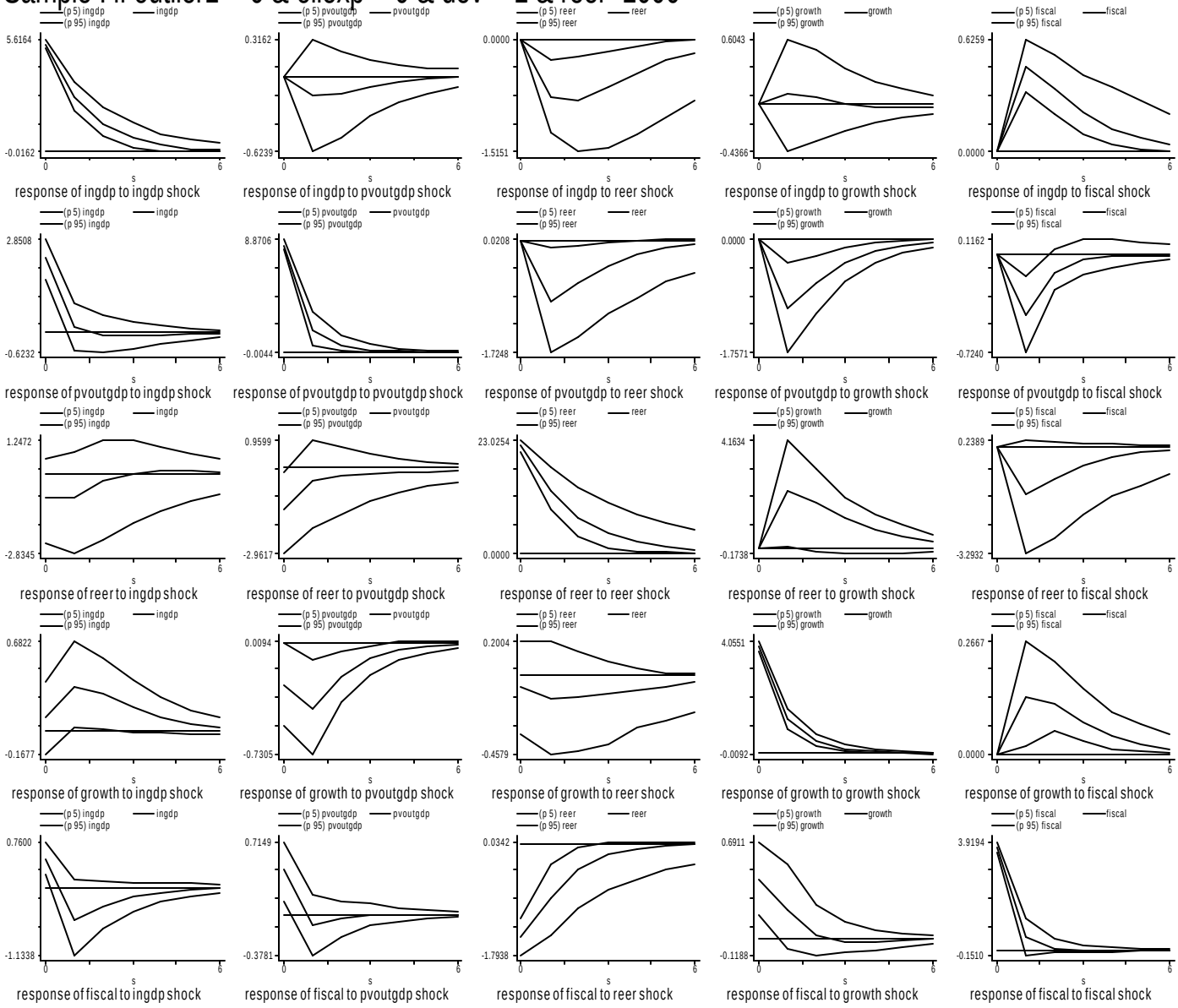
Private outflows (%GDP) = Privoutgdp

Real effective exchange rate (Index) = Reer

Growth (%) = Growth

Fiscal Balance (%GDP) =Fiscal

Impulse-responses for 1 lag VAR of ingdp pvoutgdp reer growth fiscal
Sample : if outlier1==0 & oilexp==0 & dev==1 & reer<1000



Errors are 5% on each side generated by Monte-Carlo with 500 reps

Appendix 2

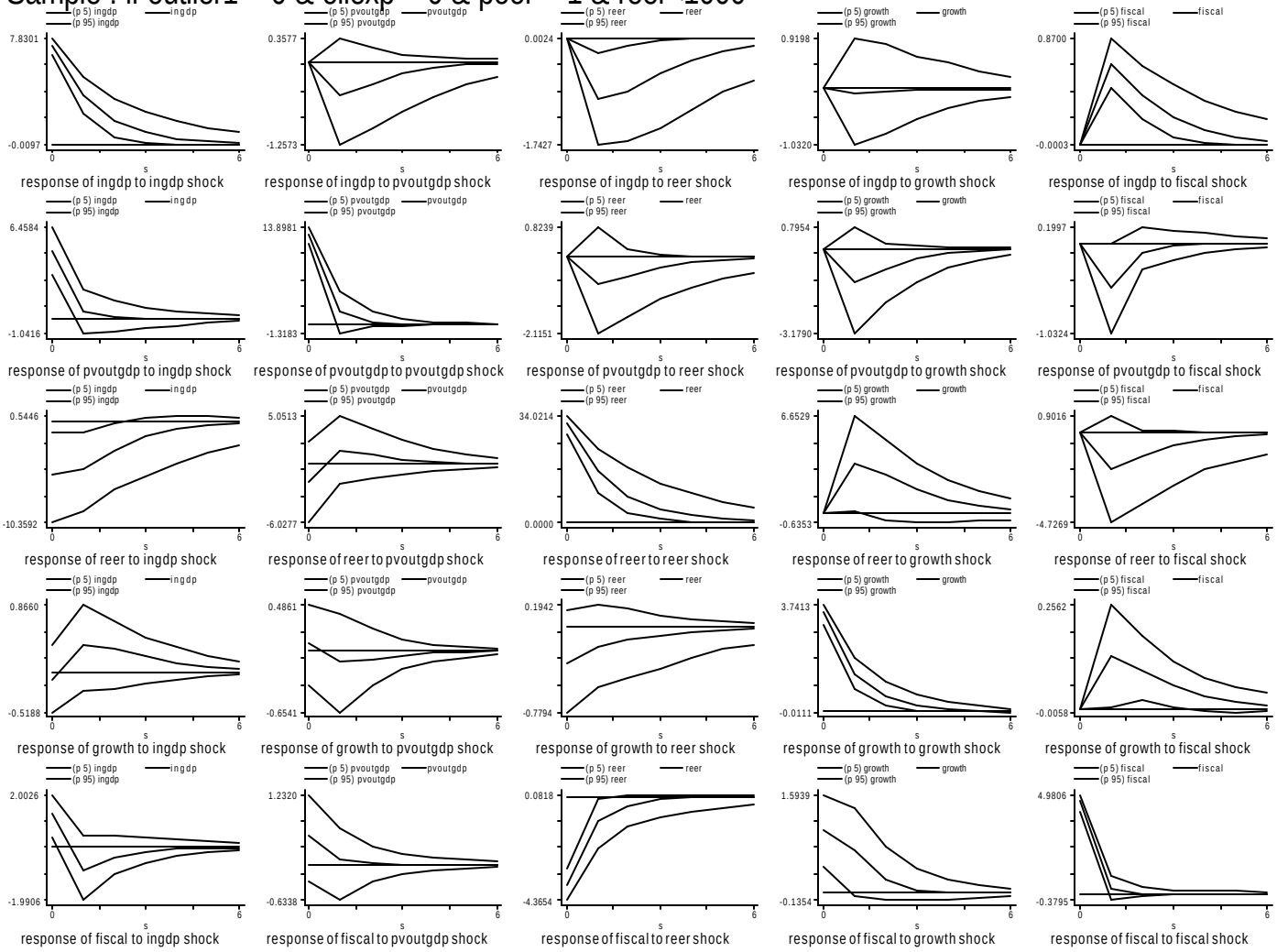
VAR Results and Impulse Response Functions for Poor Countries

(i) Regression Coefficients, Poor Countries

Summary Results of Panel-VAR Regression

	Inflows	Private Outflows	Reer	Growth	Fiscal Balance
Inflows	0.503	-0.042	**-0.362**	0.056	-0.146
	(4.116)	(-0.291)	**(-1.806)**	(1.211)	(-1.336)
Private Outflows	-0.046	0.137	**0.195**	-0.013	-0.001
	(-1.217)	(1.052)	**(1.673)**	(-0.586)	(-0.042)
Reer	-0.016	-0.040	**0.487**	0.001	-0.026
	(-1.226)	(-1.467)	**(4.444)**	(0.230)	(-1.441)
Growth	-0.070	-0.319	**1.094**	**0.371**	0.176
	(-0.425)	(-0.938)	**(1.951)**	**(3.754)**	(1.504)
Fiscal Balance	0.141	**-0.112**	-0.414	**0.028**	0.056
	(5.670)	**(-1.592)**	(-1.153)	**(1.797)**	(0.694)

(ii) Impulse Response Functions: Poor Countries



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