Taxing capital flows:
An empirical comparative analysis

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Abstract

Recent studies have analysed the impact of capital account opening on income growth, implicitly assuming that the various forms of foreign savings have similar effects. In fact, theoretical considerations suggest that the individual components of private capital inflows have different effects on growth. This paper analyses the link between income growth and private capital inflows. It presents system GMM estimates with annual observations from 1985 to 1996 for 72 countries. When full-sample results are checked for country and period changes, most of capital inflow series lose their ability to explain income growth. Bank flows stand as the sole source of foreign financing that displays a positive and robust correlation with growth.

JEL Classification: C23; F43; O16.

Keywords: Capital flows; Growth; Dynamic panel data.

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1. Introduction

Since the Mexican devaluation of 1994 and the subsequent financial crises in several emerging economies, an increasing number of studies have tried to identify the role played by capital inflows in emerging economies[1]. Rodrik and Velasco (1999) note that: "*There is a growing agreement that excessive build-up of short-term debt was a proximate cause of the recent crises*…[however] *we have little theoretical and empirical work linking short-term debt, vulnerability and crises.*" It can be added that there is no empirical work exploring the link between the different types of capital flows and growth. The purpose of this paper is to make an empirical contribution in this field.

One explanation for the lack of empirical studies linking capital flows and growth is that substantial foreign private financing to developing economies is a relatively new phenomenon –starting at the beginning of the 1990s– whereas empirical growth studies consider periods ending around 1990. The main body of empirical research on capital inflows has focused on the impact of aid on growth (Boone, 1996; Burnside and Dollar, 2000; Hansen and Tarp, 2001). But, as Figure 1 shows, during the 1990s private capital has been far more important in low and middle-income countries than aid. Aid flows represented half the total amount of capital inflows in the '80s, but their share started to decrease in 1992 when private capital soared. Without implicating that the analysis of the effects of aid is not important, focusing only on it misses what has become the major source of foreign financing for developing countries. Other empirical studies have addressed the effects of foreign direct investment on growth (see Borensztein, de Gregorio and Lee, 1998; Carkovic and Levine, 2000; and de Mello, 1999 among others) but there is scarce evidence concerning portfolio investment or bank lending. Identifying the effects of the individual components of capital inflows is important since it has straightforward policy implications, namely the imposition of capital controls or the use of incentives to attract foreign capital.

This paper presents system GMM estimates for 72 countries with annual observations from 1985 to 1996. The system GMM estimator is preferred to the standard difference GMM estimator because it has been found to have better properties when the variables are highly persistent (cf. Blundell and Bond, 1998a,b). This is essential in the context of growth regressions with annual data, where income series display a high degree of persistency. The next section briefly reviews the theoretical arguments for and against financial opening as well as the main empirical results found in the recent literature. Section 3 elaborates on the econometric approach, which is further discussed in

an appendix. Section 4 describes the data used. The main results are examined in section 5, followed by the conclusions.

2. Appraising the pros and cons of capital inflows.

On theoretical grounds, the most straightforward benefit of capital market integration is the possibility of separating the saving and investment decisions, as shown by Blanchard and Fischer (1989). Here, countries get rid of their saving-investment constraint and may achieve higher utility levels by borrowing abroad to finance domestic investment. The implication of this model is that capital poor countries may increase their growth rate by investing more, without the need of reducing consumption.

The concept of risk sharing is also one of the pillars on the rationale behind financial integration. Obstfeld (1994) develops a model in which international financial integration can lead to higher growth rates in a single-good and frictionless world. In this simple world the only exchange of assets provides an increase in welfare, through increased growth and consumption.

The literature on diffusion of technology has stressed the role of the '*international knowledge flows*'. Grossman and Helpman (1991) highlight that countries may increase their growth rate by interacting with foreign countries and thus by acquiring a greater body of knowledge. In a related line of research, Goodfriend and McDermott (1998) emphasise the role of the *familiarity* with the foreign economy in achieving income convergence. Arguably, foreign direct investment may be one of the channels behind the concept of knowledge flows or familiarity with the foreign economy and that is why an increasing number of studies have analysed the effects of FDI on economic growth.

Efficiency gains in the domestic financial system have recently become a new argument in favour of financial liberalisation. Levine (2001) argues that financial integration may ameliorate the functioning of domestic financial systems, mainly through increased competition for domestic banks and through more liquidity in the stock market. Moreover, Levine and Zervos (1998a, 1998b) provide empirical evidence showing that financial liberalisation promotes stock market liquidity and that liquidity itself spurs economic growth.

Recent theoretical works have investigated also the threats associated to financial integration. McKinnon and Pill (1997) stress that domestic banks may incur in excessive lending financed with foreign funds if moral hazard problems are present. In this case, widespread loan

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[1] For a policy-oriented discussion see Adams *et al* (1999), Fischer (1998), Reisen (1999), or the World Bank (1997).

default could require costly bailouts of the banking system. Rodrik and Velasco (1999) highlight the negative effects that short-term flows may have in the economy. In their model, if domestic banks incur in excessive short-term debt they become more prone to suffer runs. This would lead to costly asset liquidations and thus a reduction in income and welfare.

But bank inflows do not represent the only source of threats in financial integration. Razin, Sadka and Yuen (1999) develop a model with asymmetric information in which foreign direct investment may give wrong signals about the social rates of return of domestic capital. In the presence of well-developed domestic credit markets, the "bad signalling" effect may even lead to a decline of welfare in the domestic economy.

As these examples suggest, the analysis of the effects of different sorts of capital flows is already present in the theoretical literature. However, in the empirical field, studies are scarcer. As a matter of fact, the discussion has first focused on whether the labelling of capital flows provides any information about their time-series properties. Analysing autocorrelation and impulse-response functions, Claessens, Dooley and Warner (1995) conclude that the distinction between "short-term" and "long-term" inflows is meaningless. The authors point out that both flows present a similar volatility and long-term flows are as difficult to predict as the short-term ones. The same properties apply to foreign direct investment. On the other side, Sarno and Taylor (1999) estimate the relative importance of temporary and permanent components of broad categories of capital flowing from the United States into a sample of developing countries. Their analysis reveals that foreign direct investment has only permanent components, while equity flows, bond flows and official flows consist mainly of temporary components.

More recent papers have addressed the effects of capital account opening on growth. Klein and Olivei (1999) find that capital account openness –measured as the proportion of years over the period 1986-1995 free of capital account restrictions– has promoted financial deepening, but in OECD countries only. The interpretation given to these results is that, in order to take advantage of financial opening, appropriate institutions must first be in place. Moreover, Klein and Olivei find weak evidence of a link between the change in their measure of financial openness and economic growth. Edwards (2001) reaches similar conclusions, but by using Quinn's (1997) measures of capital openness[2]. According to Edwards's results, during the period 1980-1990 financial openness had a positive effect on growth only in rich countries. This evidence contrasts with the results of Arteta,

Eichengreen and Wyplosz (2001) who, studying the 1973-1992 period, find that the effects of financial openness are independent of the income level and depend more on the rule of law. However, as the authors note, their results are not robust to period changes and are driven mainly by the 1982-1987 sub-period.

The empirical macro-studies that have addressed the impact of FDI on growth also offer conflicting results. Using standard instrumental variables regressions Borensztein *et al* (1998) find that, conditional on a minimum threshold of human capital, FDI is positively correlated with economic growth. However this study fails to deal properly with the endogeneity introduced by the country-specific effect. Therefore the estimates of variables correlated with the country-specific effect are biased. Carkovic and Levine (2000) use dynamic panel data estimates to deal with the country-specific problem and find no independent impact from FDI on economic growth. This conclusion is consistent with the results obtained by micro-studies, where no effect from FDI on domestic firms' productivity is found. See Haddad and Harrison (1993) and Aitken and Harrison (1999).

The next section describes the methodology used to study the effects of the individual components of private capital inflows on economic growth.

3. New econometrics for old questions

Most of panel data studies on growth are based on five-year averages as a time unit. The primary reason for this is the lack on annual data of some of the regressors and an attempt to eliminate business cycle effects. But, as is stressed by Attanasio, Picci and Scoru (2000), the use of n-year averages is not suitable because of the lost of information that it implies and the arbitrariness of the length and the periods used for averaging. In the present context where capital flows may have long and short-term effects on growth, a model based on annual data is more appropriate. This is the only way to find out the long as well as the short-term impact of capital flows. On top of that, as discussed later, the lack of data on a longer basis for some types of capital inflows precludes regressions with five-year averages.

In the search of a relationship between different types of capital inflows and growth the following standard growth equation is used:

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[2] Quinn has coded the IMF's "Exchange arrangements and exchange restrictions" producing a capital account openness measure for a large number for countries.

$$y_{it} - y_{it-1} = - \alpha y_{it-1} + \mathbf{X}_{it} \boldsymbol{\beta} + \nu_i + \tau_t + \mu_{it}, \quad (1)$$

where y_{it} is the logarithm of income per capita in country i during year t; α is a parameter reflecting the convergence speed; $\mathbf{X}_{it}$ is a row vector of growth determinants measured at date t with associated parameter $\boldsymbol{\beta}$; ν_i is a country-specific effect; τ_t is a period specific effect common to all countries; and μ_{it} is a residual.

A preliminary examination of the data shows a strong autoregressive structure in the residual term. This is not a surprise since we are dealing with annual data and chances are that business-cycle effects propagate for more than one year. We can take into account these business-cycle effects explicitly by assuming that $\mu_{i_t} = \rho \mu_{it-1} + \varepsilon_{it}$, where $|\rho| < 1$ and where ε_{it} is a white noise. After rearranging terms, equation (1) becomes:

$$y_{it} = (1 - \alpha + \rho) y_{it-1} - \rho (1 - \alpha) y_{it-2} + \mathbf{X}_{it} \boldsymbol{\beta} - \rho \mathbf{X}_{it-1} \boldsymbol{\beta} + (1 - \rho) \nu_i + \tau_t - \rho\tau_{t-1} + \varepsilon_{it} \quad (2)$$

In long-term growth regressions, the vector $\mathbf{X}_{it}$ includes variables attempting to reflect the steady state determinants of the economy (the investment rate in human and physical capital, the openness degree to international trade, measures of domestic distortions, etc.). However, the use of annual data in a relatively short period of time makes the interpretation of the results more difficult. Moreover, most of these 'long-term' variables exhibit little variation from year to year, hence their effects is not identifiable and becomes one with the countries' specific component ν_i. Therefore, in the present context a simple dynamic model able to disentangle the effects of national and foreign saving is stressed. This is achieved by including in $\mathbf{X}_{it}$ measures of national and foreign savings (i.e. capital inflows), as well as other variables that may have an impact on growth in the short-run. An initial exploration suggests that the terms of trade change and the inflation rate perform satisfactorily in capturing these short-term effects.

As Caselli, Esquivel and Lefort (1996) have pointed out, several empirical studies neglect the consistency problems that arise from the simultaneous presence of the specific effect ν_i and the lagged dependent variable or any regressor that is correlated with the country-specific effect. This would be the case if equation (1) were estimated through fixed or random effect models, or a standard instrumental variable approach, where often the instruments are correlated with the country-specific effect. And is certainly the case in Arteta *et al* (2001) who rely essentially on OLS for

their cross-country estimates. In an influential article, Arellano and Bond (1991) settled what later has become the bible for estimating equation (2). First, the time effect τ_t is eliminated by subtracting from each variable its cross-average in period t (the same estimates would be obtained if time dummies were used, as in Arellano and Bond). Then the variables are transformed into first differences to eliminate the individual effect. The result is:

$$\Delta y_{it} = (1 - \alpha + \rho) \Delta y_{it-1} - \rho (1 - \alpha) \Delta y_{it-2} + \Delta \mathbf{X}_{it} \boldsymbol{\beta} - \rho \Delta \mathbf{X}_{it-1} \boldsymbol{\beta} + \Delta \varepsilon_{it} \qquad (3)$$

where Δ represents the first-difference operator and variables are expressed in deviations from cross-averages.

Arellano and Bond (1991) essentially propose estimating equation (3) with GMM using lagged levels of the endogenous variables as instruments. Here the selection of instruments is crucial. First, it is clear that Δy_{it-1} is correlated with the residual term. In addition, if $E(\mathbf{X}_{it} \varepsilon_{it}) \neq 0$, which is likely to happen in the present context since higher domestic growth plausibly encourages more capital inflows, both $\mathbf{X}_{it}$ and $\mathbf{X}_{it-1}$ are correlated with the residual of equation (3). Therefore, only levels of variables lagged two years or more may be used as instruments.

Blundell and Bond (1998a) show that when the variables have a strong autoregressive component their levels are weakly correlated with their first differences and so they perform poorly as instruments. In addition they report significant efficiency gains by estimating a system of equations, where the equation in levels (2) is appended to equation (3) using as additional instruments suitably lagged first differences of the variables, for the equation in levels. That is the approach followed in this paper[3]. Note that the use of the two-year lagged dependent variable in equations (2) and (3) imply that at least the first two observations will be lost.

One further caveat refers to the small number of countries. When the number of countries is small relative to the number of periods it is impossible to select the full set of lagged regressors as instruments. This creates a trade-off between the number of lags that can be used and the choice of variables whose lags can be used as instruments. In this paper the choice has been to use levels lagged two periods and first differences lagged one period of y_{it} and $\mathbf{X}_{it}$ as instruments. This allows a maximum number of variables in $\mathbf{X}_{it}$ to be represented in the set of instruments, while avoiding the

[3] I use the DPD98 program, kindly made available on the net by Arellano and Bond.

use of irrelevant earlier lags. Even so it becomes apparent that not all the variables in $\mathbf{X}_{it}$ can be used as instruments[4]. See the appendix for a more detailed discussion on these issues.

4. The problem of data sets

A standard classification of private capital inflows distinguishes between foreign direct investment (FDI), portfolio debt flows (PDF), portfolio equity flows (PEF), and bank loans (BANKS). There is essentially one source covering comprehensively these series for a large number of countries, the International Financial Statistics of the IMF. The World Bank's World Development Indicators also publishes data on capital inflows but it does not include series of portfolio flows to high-income countries. I use two different data sets for direct investment and portfolio investment, one from the IMF and the other from the WB. The WB's series on portfolio investment to rich countries are filled with IMF's data.

In addition, the BIS publishes quarterly series of its reporting countries' claims vis-à-vis all their borrowing countries in its "International Banking Statistics". The BIS data represent a major input to the Joint BIS-IMF-OECD-World Bank Statistics on debt. These statistics are broken down by country of residence of the borrower and therefore are consistent with balance of payments methodology. The BIS also publishes the "Consolidated Banking Statistics" according to residence of the final guarantor of a claim, and the maturity of the claims. However, this is not consistent with balance of payments methodology, hence only the locational statistics are used in this paper. The BIS data on bank flows is preferred to IMF's and the World Bank's data because its figures are obtained mainly from creditor sources, while the others are based on debtor sources. Corsetti, Pesenti and Roubini (1998) document considerable differences between the data published by the World Bank and the BIS on Asian countries' debt stocks during the 1990s. This is why BIS series on bank inflows is used in all the regressions presented below.

The country and period selection were determined exclusively by data availability. Comprehensive data on bank flows are available from 1984 onwards, whereas data on portfolio flows exist for most of countries from the middle 1980s to 1996. This results in 72 countries, which are listed in Table 1. Roughly one-third are low-income countries, one-third are middle-lower income and the rest are middle-upper or higher-income, according to the 1998 World Bank's classification.

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[4] The (lagged) variables from $\mathbf{X}_{it}$ that are selected as instruments are the national saving rate, the terms of trade change, and the current account. This last variable is taken as an overall measure of foreign financing. This is in addition to the

All financial inflow variables are measured as a ratio to GNP (measured in current dollars). They are net inflows, i.e. foreign investment minus capital repatriation in the case of FDI and PEF; disbursements minus principal repayments in the case of PDF; and changes in stocks adjusted by exchange rates in the case of BANKS.

Income series are GNP per capita measured at purchasing power parity from the World Development Indicators. As opposed to the bulk of existing empirical research, which employs GDP series, I opt for GNP because this is the conceptually right variable to measure the income for the citizens of a country. Indeed, we are interested in studying how capital inflows impact national citizens' income, which leads us to work with GNP rather than GDP.

The data used are summarised in Table 2. The range of income per capita in the sample is rather wide, going from $330 a year to over $28,600. Even though this variability reflects not only differences across countries but also income growth along time, these numbers give us an idea about the heterogeneity of the observations included in the sample. The unweighted average growth rate is 5.3%, showing the rapid growth that countries enjoyed during this period. Most of capital inflow series exhibit a lower variability than GNP growth or national saving rates. But from this table it is clear that World Bank and IMF series exhibit substantial differences. The largest discrepancy refers to portfolio debt flows, whose maximum value is 10.3% of GNP according to the WB and 38% (!) according to the IMF. In the case of PDF the differences arise because the IMF series include bonds, money market instruments and derivatives, whereas the World Bank series only include bonds.

Table 3 presents the correlation coefficients between World Bank and IMF data. From the table it is clear that both sources provide similar series for FDI and PEF, which exhibit correlation coefficients of 94% and 92% respectively. However, the correlation is considerably lower in the case of PDF. This reflects again the fact that World Bank and IMF series are measuring different things.

5. Empirical Results

Before presenting the econometric results, I will present some sketchy evidence. In Figure 2 are plotted the average GNP growth rate against the national saving rate, foreign saving rate (i.e. the current account) and different items of capital inflows. The numbers correspond to simple averages for each country over the period 1985-1996. From the plots it is difficult to distinguish any clear trend. Only the national saving rate, World Bank's FDI and BANKS display a recognisable positive

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lagged income level.

relationship with growth. Many countries in the sample, and especially those with low growth rate, have not received any significant portfolio investment.

Table 4 presents the five slowest and five fastest growing countries in the sample during the period 1985-1996. It becomes clearer from this table that countries with high growth rates correspond to those with faster national saving rates. One notable exception is Chile, a country with a saving rate of only 21% during these years, but placed among the most dynamic countries in the sample. On the other hand, low growing countries have benefited from a relatively high foreign saving rate, but financed mainly through official flows or foreign reserves, as can be deduced from the difference between the huge deficits in current account and the modest amount of private capital inflows. As to private inflows, the asymmetry between winners and losers is patent. Slow growing economies have not received any significant private financing, whether measured by WB, IMF or BIS data. Meanwhile, high growing countries have received an annual average of 1.7% to 1.9% of GNP in FDI, around 0.5% in portfolio investment and 1.9% in foreign banks financing. These figures would be much higher if the averages were computed only in the 1990s.

What Table 4 suggests is that countries that have received more private capital flows have grown faster. Of course, the direction of the causality cannot be deduced from this preliminary evidence. Only an econometric analysis may tell us whether there is any effect from capital inflows to growth. The next subsection carries out regressions including all the countries for the full period under analysis (1985-1996). The subsequent subsections study the stability of the results.

5.1 Full sample analysis

As a first step a simple version of equations (2) and (3) are estimated where the variables included in $\mathbf{X}_{it}$ are the national saving rate and the different measures of capital inflows, all as a ratio to GNP. In addition, two other variables, the change in the terms of trade and the inflation rate, are included as a way to capture short-term effects on economic growth.

Regression (1) in Table 5 presents the results after including the individual types of private capital inflows measured by the World Bank (except for BANKS, which are from the BIS). The first thing to note is the high level of persistency in GNP. The coefficients on lagged growth provide an estimate for ρ virtually equal to 1. This result corroborates the autoregressive formulation of equations (2) and (3).

On the other hand, the finding of a negative sign associated to the lagged saving rate may seem at odds with common sense. However this is not a new result. Attanasio *et al* (2000) and Carroll

and Weil (1994) have already found a negative correlation between income growth and lagged saving rate. Campbell (1987) has also found a negative correlation between household's savings and labour income in the US. These results have been interpreted on a "saving for a rainy day" or permanent-income hypothesis. That is, individuals anticipating an income decline save more. Besides this previous evidence, if the current saving rate is positively correlated with growth and ρ is positive, equations (2) and (3) predict a negative sign for the lagged saving rate.

Income growth presents a wide range of responses to different types of capital inflows. While foreign direct investment, and bank flows present a positive and highly significant correlation with growth, portfolio equity investment present a negative coefficient. Interestingly, the point estimates for current FDI is lower than the coefficient of current national saving (although the long-term effects of both variables are closer). These results suggest that foreign savings in the form of FDI are not more productive than national saving, and thus there are no spillover effects from FDI. This is in line with the results found in firm-level studies by Aitken and Harrison (1999) and Haddad and Harrison (1993).

Bank inflows exhibit positive and significant coefficients. The point estimate of contemporaneous bank inflows is larger than FDI's coefficient but lower than national saving's. This positive effect contrasts with the results previously obtained by Reisen and Soto (2001). In that paper bank inflows were found to have a positive effect on growth only when an interaction term of bank inflows with the domestic banks' capital to assets ratio was included (as an indicator of domestic financial health). However the measure of bank inflows in that paper is different, since it is based on consolidated (and not locational) statistics.

As to portfolio investment, the results are surprising for two reasons. First the coefficient of contemporaneous equity investment is negative. This is at odds with the theory and evidence reported elsewhere. In fact, Levine (2001) argues that stock market liberalisation promotes economic growth through its impact on the liquidity of the domestic markets. This argument is supported by previous empirical evidence by Levine and Zervos (1998a) and others, where market liquidity is found to have a positive correlation with growth. Moreover, Bekaert, Harvey and Lundblad (2001) report a positive correlation between economic growth and a dummy variable for the years in which domestic equity markets are open to foreign investors.

Second, some of the point estimates are extremely high, though their large standard errors show that the estimates are imprecise. More evidence should accompany these results before trying to interpret them. Regression (2) results from the successive elimination of the variables that are not

significant. Apart from some small variations in the coefficients, the main results do not change.

Regressions (3) and (4) replicate the previous regressions replacing World Bank's data on capital inflows by IMF data (BANKS is always taken from the BIS). While the contemporaneous effect of FDI increases slightly, its lagged coefficient increases considerably in absolute value and becomes significant. As a result the long-term effects of FDI are much smaller than in the case of regressions with World Bank data.

On the other hand, portfolio debt investment exhibits now a much smaller, but still significant, correlation with growth. The point estimates are around 0.2, which is close to the effects of national saving. The reason for this dramatic fall in the coefficient is that the World Bank and IMF series are measuring essentially two different things. As mentioned before, the IMF series on portfolio debt include bonds, money market instruments and derivatives, while World Bank series only include bonds. Therefore, the large coefficient associated to the World Bank series for portfolio debt may be interpreted as the upwards bias due to omitted variables.

The one variable whose coefficient remains extravagantly high is portfolio equity flows, with a point estimate of -1.2. However, the (negative) contemporaneous effect is partially compensated by a positive coefficient for lagged portfolio equity. As will be seen later this result is not robust to period or country changes.

The validity of the instruments used in these regressions is evaluated with two different statistics. The Sargan –or overidentifying restriction– test, which examines the hypothesis that the instruments are not correlated with the residuals. See Newey and McFadden (1994, pp. 2231) for further details on this test. A complementary test is the one proposed by Arellano and Bond (1991), which they have called the m2 test. This statistic examines the hypothesis that the residuals from equation (3) are not second-order correlated[5]. Both, the Sargan and the Arellano-Bond tests confirm the validity of the instruments used.

The importance of regressions (1) through (4) is the fact that while some components of foreign saving are positively correlated with growth, other components seem to have a negative effect on growth. This evidence is lost when we do not take into consideration the different mechanisms by which foreign savings may flow towards recipient countries. Therefore, studies that analyse the effects of capital account liberalisation alone –implicitly assuming fungibility– miss an important characteristic of the data: that capital flows are not fungible, at least from the point of view

of their effects on economic growth.

5.2 Sub-period analysis

It has been argued that the effects of financial opening have not been stable over time. Arteta *et al* (2001) find that the effects of capital account liberalisation on growth are not robust to period changes. In their study running from 1973 to 1992 the positive effect of liberalisation was driven mainly by the period 1982-1987, without a clear link between liberalisation and growth in the remaining years. These findings stress the need of checking for robustness to period changes. Our sample covers two distinguishably different periods. The first one (1985-1991) is characterised by a relative scarcity of capital inflows to developing countries (which amount for three fourths of the countries in the sample). Then, from 1992 to 1997 developing countries started to receive fresh massive capital inflows.

Table 6 presents regressions for the periods 1985-1991 (with the lost of the first two years for the reasons explained above) and 1992-1996. During the first period, none of the WB capital inflow variable is significant. Regression (5) shows the final results when non-significant variables are deleted successively. The only variable that survives to this elimination process is BANKS. The same experiment is carried out with IMF data in regression (6). This yields a coefficient for portfolio debt flows positive and significant. Bank inflows exhibit again a significant coefficient and close in size to the estimate for PDF.

As to the second period, the use of either World Bank or IMF data provided the same final regression (7), after eliminating subsequently each non-significant variable. Only bank inflows turned out to be significant with a coefficient slightly lower than in the previous period. A striking result is the dramatic fall in the national saving rate coefficient. Note however that the low probability value for the Arellano-Bond test casts doubts about the validity of the results in regression (7).

Overall, these findings put in evidence the weakness of the results obtained in the full-period regressions. It is somewhat disappointing to notice how the significance previously found for some of the capital inflow variables is virtually smashed by this simple check of robustness. This confirms the findings by Arteta *et al*, who have already noticed that the effects of capital account liberalisation on economic growth are not robust to period changes. Table 6 shows that this is indeed the case for foreign direct investment and for portfolio equity flows, while there is a fragile sign that

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[5] If the residuals ε_{it} were first-order correlated, then y_{it-2} would be correlated with $\Delta\varepsilon_{it}$ and it could not be used as an

portfolio debt investment may have a role in economic development. Only bank inflows display strong robustness to period changes. Furthermore, its coefficient in both sub-periods remains pretty stable.

5.3 Low and middle-income countries

A final issue refers to the possibility that the effects of capital inflows on growth may change with the level of economic development. The argument implicitly assumes that richer economies have better domestic institutions and this would allow them to benefit more from capital inflows. On the other hand, the argument goes, poor countries do not count with the appropriate institutions to deal with large amounts of foreign capital. In this context, capital flows may actually hurt more than help. The analysis of the impact of capital inflows on developing countries' growth is also important given the costly incentives that many developing countries are willing to provide in order to win the 'beauty contest' for foreign capital.

Recent findings on this issue are mixed. Edwards (2001) finds that during the period 1980-1990 financial opening had a positive effect on growth only in more advanced economies, favouring the hypothesis of the role of well-functioning institutions. To reach this conclusion Edwards uses an interaction term between Quinn's index of capital account openness and the GDP per capita. In the other extreme, Arteta *et al* (2001) use the same index of openness in a longer time span and do not find any evidence that the effects of financial openness vary with the income level. Moreover, they find no sign that the effects of financial liberalisation change with the level of financial depth -a more direct measure of the quality of domestic institutions. Between both extremes are Klein and Olivei (1999) who report a significant effect of capital account liberalisation on financial deepening but in OECD countries only. However they obtain small if any effect from capital account liberalisation on growth.

I analyse this question by studying directly the effects of capital inflows on a sub-sample of low and middle-income countries during the period 1992-1996, when these countries received most of foreign capital inflows. A direct study of the effects on high-income countries is not feasible with the econometric approach of this paper, due to the low number of rich countries. Regressions (8) and (9) in Table 7 show no significant effects from capital inflows, using the two different data sets. The standard procedure of successive elimination of the less significant variables results in regression

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instrument. The same is true with any variable from $\mathbf{X}_{it}$ that is contemporarily correlated with ε_{it}.

(10), where only bank inflows present some degree of significance. The point estimate is slightly lower than in the sample including high-income countries (cf. Table 6), providing some evidence in favour of the hypothesis that bank inflows are more productive in richer countries than in the poorer ones. The primary conclusion from this is that private capital flows do not help but do not hurt either economic growth in developing countries.

6. Final Remarks

This paper has explored the effects of individual types of private capital inflows on economic growth during the period 1985-1996. Although there is some evidence that national income is positively affected by foreign direct investment, portfolio debt investment and bank lending, and it is harmed by portfolio equity inflows, most of these results do not withstand some basic tests of robustness. First, they do not pass checks for sub-period stability and, second, they are significantly affected when a sub-sample of developing countries is studied. Only one component of foreign capital –bank inflows– displays a remarkably high degree of robustness both, in the sub-period and sub-country sample checks. These findings complement recent empirical studies that have analysed the effects on growth of capital account liberalisation as a whole. The main policy conclusions that may be inferred from these results are: first, the use of incentives to attract specific types of foreign investment is unjustified since there is no sign that foreign capital has a return larger than domestic capital; and second, selective taxing of capital inflows is not justified either, since there is no robust evidence that specific forms of foreign capital hinder economic growth.

Unfortunately, the lack of series with high-quality information on the components of capital inflows –reflected in the large differences between the different series available– makes the inference on their risks and benefits difficult. Hopefully in the near future improved information will make it possible to obtain more conclusive results on the role of foreign financing for domestic economic growth.

But besides the need of better information, one crucial question refers to the identification of the circumstances under which individual types of capital inflows can promote growth. Arteta *et al* have found preliminary evidence that opening the capital account in the presence of black market premiums may hinder economic growth. But this line of research is in an early stage yet, at least too early to provide reliable conclusions. Although much has been said about the preconditions for a successful capital account liberalisation, further empirical research on this topic is badly needed.

Appendix: The choice of instruments

Let's assume that the panel is balanced (as in the present case) with N countries and T periods for each country. To facilitate notation, let's regroup the right-hand variables of equation (3) in $W_{it} = [y_{it-1}\ y_{it-2}\ X_{it}\ X_{it-1}]$ for i = 1, …, N and t = 3, …, T. Then rewrite (3) in matrix notation:

$$\Delta Y = \Delta W\, \Phi + \Delta E \qquad \text{(A1)}$$

where $Y = [Y_1' \dots Y_N']'$ with $Y_i = [y_{i3} \dots y_{iT}]'$; $W = [W_1' \dots W_N']'$ with $W_i = [W_{i3}' \dots W_{iT}']'$; Φ is the associated vector of parameters and E is the vector of residuals. Note that that (A1) is defined from t = 4 only. Defining $Z = [Z_1' \dots Z_N']'$ as a matrix of z instruments with $Z_i = [Z_{i4}' \dots Z_{iT}']'$ a (T-3)×z matrix, the GMM estimator is given by:

$$\Phi_{GMM} = [\ \Delta W'ZA\Delta Z'W\ ]^{-1}[\ \Delta W'ZAZ'\Delta Y\ ] \qquad \text{(A2)}$$

The matrix A yielding efficient estimates is

$$A = \left(\sum_{i=1}^{N} Z_i' \hat{E}_i \hat{E}_i' Z_i \right)^{-1} \qquad \text{(A3)}$$

where $\hat{E}_i$ represents a first step estimation of the residuals. The expression inside the brackets in (A3) is a matrix z×z and its rank is at most N, so A is defined only when N ≥ z. Arellano and Bond (1991) suggest to use lagged values of each regressor as a different instrument. Taking just the two-period lagged level of each one of the eight variables in W (the income level, the saving rate, four types of capital inflows and two control variables) produces 8×(T-3) instruments. The full sample goes from 1985 to 1996, which would imply 72 instruments, i.e. exactly the total number of countries available.

Blundell and Bond (1998a,b) note that the lagged levels of variables that are highly persistent perform poorly as instruments for their subsequent first-differences. They show that the use of the additional moment restrictions previously proposed by Arellano and Bover (1995) increase

dramatically the efficiency of the estimates. This translates into an extended GMM estimator that appends the equation in levels to the equation in first differences and uses one-period lagged first-differences as instruments for the equation in levels. See Blundell and Bond for a discussion on the requirements for these additional instruments to be valid.

The system GMM yields one additional observation per country, since the equation in levels can be estimated starting in t = 3 (recall that this equation includes the income level lagged up to two periods). If all the eight variables in W were used as instruments the extended system estimator would provide $8\times(2T-5) = 152$ instruments, exceeding the number of countries. As explained in the main text, in order to reduce the number of instruments the choice has been to use the two-period lagged levels of the income per capita, the national saving rate and the current account (as a summary measure of foreign savings) for the equation in differences. For the equation in levels I use the one-period lagged first differences of the above variables, plus the first difference of the terms of trade change. This choice produces $3\times(T-3) + 4\times(T-2) = 67$ instruments and makes possible the full-period estimation of Table 5. The regressions in the subsequent tables employ the same set of instruments for reasons of comparability.

References

Adams, C., Mathieson, D., Schinasi, G., 1999. International capital markets: developments, prospects, and key policy issues. IMF, Washington.

Aitken, B., Harrison, A., 1999. Do domestic firms benefit from direct foreign investment? Evidence from Venezuela. American Economic Review, 89(3), 605-618.

Arellano, M., Bover, O., 1995. Another look at the instrumental variable estimation of error-components models. Journal of Econometrics 68, 29-51.

Arellano, M., Bond, S., 1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. Review of Economic Studies 58, 277-297.

Arteta, C., Eichengreen, B., Wyplosz, C., 2001. When does capital account liberalization help more than it hurts? NBER Working Paper 8414.

Attanasio, O., Picci, A., Scoru, L., 2000. Saving, growth, and investment: A macroeconomic analysis using a panel of countries. The Review of Economics and Statistics 82(2), 182-211.

Bekaert, G., Harvey, C., Lundblad, C., 2001. Emerging equity markets and economic development. Journal of Development Economics 66(2), 465-504.

Blanchard, O., Fischer, S., 1989. Lectures on macroeconomics. The MIT Press, Cambridge.

Blundell, R., Bond, S., 1998a. Initial conditions and moment restrictions in dynamic panel data models. Journal of Econometrics 87, 115-143.

Blundell, R., Bond, S., 1998b. GMM Estimation with persistent panel data: An application to production functions. IFS Working Paper Series 99/4.

Boone, P., 1996. Politics and the effectiveness of foreign aid. European Economic Review 40(2), 289-329.

Borensztein, E., de Gregorio, J., Lee, J., 1998. How Does Foreign Direct Investment Affect Economic Growth? Journal of International Economics 45(1), 115-135.

Burnside, C., Dollar, D., 2000. Aid, policies, and growth. American Economic Review 90(4), 847-868.

Campbell, J., 1987. Does saving anticipate declining labor income? An alternative test of the permanent income hypothesis. Econometrica 55, 1249-1273.

Carkovic, M., Levine, R., 2000. Does foreign direct investment accelerate economic growth?, Unpublished paper, University of Minnesota.

Carroll, C., Weil, D., 1994. Saving and growth: A reinterpretation. Carnegie-Rochester Conference Series on Public Policy 40, 133-192.

Caselli F., Esquivel, G., Lefort, F., 1996. Reopening the convergence debate: a new look at cross-country growth empirics. Journal of Economic Growth 1, 363-389.

Claessens, S., Dooley, M., Warner, A., 1995. Portfolio capital flows: hot or cold? The World Bank Economic Review 9(1), 131-174.

Corsetti, G., Pesenti, P., Roubini, N., 1998. What caused the Asian currency and financial crisis? Part I: A macroeconomic overview. NBER Working Paper 6833.

De Mello, L., 1999. Foreign direct investment-led growth: Evidence from time-series and panel data. Oxford Economic Papers 51(1), 133-51.

Edwards, S., 2001. Capital mobility and economic performance: Are emerging economies different? NBER Working Paper 8076.

Fischer, S., 1998. IMF and crisis prevention. Financial Times, March 29.

Goodfriend, M., McDermott, J., 1998. Industrial development and the convergence question. American Economic Review 88(5), 1277-1289.

Grossman, G., Helpman, E., 1991. Innovation and growth in the global economy. The MIT Press, Cambridge.

Haddad, M., Harrison, A., 1993. Are there positive spillovers from direct foreign investment? Evidence from panel data for Morocco. Journal of Development Economics 42(1), 51-74.

Hansen, H., Tarp, F., 2001. Aid and growth regressions. Journal of Development Economics 64, 547-570.

Klein, M., Olivei, G., 1999. Capital account liberalization, financial depth and economic growth. NBER Working Paper 7384.

Levine, R, 2001. International financial liberalization and economic growth. Review of international economics 9(4), 688-702.

Levine, R., Zervos, S., 1998a. Stock markets, banks and economic growth. American Economic Review 88(3), 537-558.

Levine, R., Zervos, S., 1998b. Capital control liberalization and stock market development. World Development 26(7),1169-1183.

McKinnon, R., Pill, H., 1997. Credible economic liberalizations and overborrowing. American Economic Review 87(2), 189-193.

Newey, W., McFadden, D., 1994. Large sample estimation and hypothesis testing, in: Engle, R., McFadden, D. (Eds.), Handbook of econometrics, Vol. 4. North-Holland, Amsterdam, pp. 2111-2245.

Obstfeld, M., 1994. Risk-taking, global diversification, and growth. American Economic Review 84(5), 1310-1329.

Quinn, D., 1997. The correlates of change in international financial regulation. American Political Science Review 91(3), 531-551.

Razin, A., Sadka E., Yuen, C., 1999. An information-based model of foreign direct investment: the gains of trade revisited. NBER Working Paper 6884.

Reisen H., 1999. After the great Asian slump: towards a coherent approach to global capital flows. Development Centre Policy Brief 16. OECD, Paris.

Reisen, H., Soto, M., 2001. Which types of capital inflows foster developing-country growth? International Finance 4(1), 1-14.

Rodrik, D., Velasco, A., 1999. Short-term capital flows. NBER Working Paper 7364.

Sarno, L., Taylor, M., 1999. Hot money, accounting labels and the permanence of capital flows to developing countries: an empirical investigation. Journal of Development Economics 59(2), 337-364.

World Bank, 1997. Private capital flows to developing countries. Oxford University Press, New York.

Table 1: Countries used

Income Level	Country
High-Income (14 countries)	Australia, Austria, Canada, Finland, France, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States.
Middle-Upper Income (14 countries)	Botswana, Brazil, Chile, Grenada, Hungary, Malaysia, Mauritius, Mexico, Panama, Poland, Republic of Korea, Seychelles, Uruguay, Venezuela.
Middle-Lower Income (23 countries)	Belize, Bulgaria, Colombia, Costa Rica, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Guatemala, Jamaica, Jordan, Morocco, Papua New Guinea, Paraguay, Peru, Philippines, Sri Lanka, St. Vincent and the Grenadines, Swaziland, Syrian Arab Republic, Thailand, Tunisia.
Low Income (21 countries)	Bangladesh, Burundi, Cameroon, China, Cote d'Ivoire, Ethiopia, Gambia, Ghana, Haiti, Honduras, India, Indonesia, Kenya, Madagascar, Mali, Mozambique, Nicaragua, Nigeria, Pakistan, Republic of Congo, Uganda.

Table 2: Data Statistics (1985-1996)

Variable	Mean	Max	Min	Standard Deviation
GNP per capita, PPP	5883	28620	330	6238
GNP growth	0.053	0.272	-0.228	0.057
National Saving / GNP	0.195	0.650	-0.307	0.094
Current Account / GNP	-0.036	0.339	-0.584	0.078
Foreign Direct Investment (WB) / GNP	0.017	0.203	-0.064	0.023
Portfolio Debt Flows (WB)/ GNP	0.005	0.103	-0.046	0.014
Portfolio Equity Flows (WB) / GNP	0.003	0.102	-0.010	0.009
Foreign Direct Investment (IMF) / GNP	0.017	0.258	-0.125	0.025
Portfolio Debt Flows (IMF) / GNP	0.007	0.380	-0.049	0.025
Portfolio Equity Flows (IMF) / GNP	0.003	0.102	-0.038	0.008
Banks Inflows (BIS) / GNP	0.003	0.844	-2.040	0.091

Table 3: World Bank versus IMF data correlation

Variable	Correlation
Foreign Direct Investment / GNP	0.942
Portfolio Debt Flows / GNP	0.511
Portfolio Equity Flows / GNP	0.924

Table 4: Comparison of slow and fast growing countries (annual averages 1985-1996; %)

Slow growing countries

Country	GNP growth	National Saving	Current Account	Direct Invest. (WB)	Portfolio Debt (WB)	Portfolio Equity (WB)	Direct Invest. (IMF)	Portfolio Debt (IMF)	Portfolio Equity (IMF)	Bank Inflows (BIS)
Congo, Rep.	-0.48	13.95	-25.21	0.47	0.00	0.00	0.48	0.00	0.00	-1.79
Cameroon	-0.16	16.93	-3.01	0.29	0.00	0.00	0.30	0.00	0.00	-0.76
Haiti	0.57	7.29	-2.12	0.16	0.00	0.00	0.16	0.00	0.00	-0.05
Nicaragua	0.89	-4.30	-34.63	1.51	-0.04	0.00	1.51	-0.04	0.00	1.03
Burundi	1.79	10.07	-3.98	0.09	0.00	0.00	0.09	0.00	0.00	-0.25
Average	0.52	8.79	-13.79	0.51	-0.01	0.00	0.51	-0.01	0.00	-0.36

Fast growing countries

Country	GNP growth	National Saving	Current Account	Direct Invest. (WB)	Portfolio Debt (WB)	Portfolio Equity (WB)	Direct Invest. (IMF)	Portfolio Debt (IMF)	Portfolio Equity (IMF)	Bank Inflows (BIS)
China	11.85	38.04	-0.03	2.64	0.23	0.24	2.64	0.32	0.24	1.40
Korea, Rep.	10.86	34.54	0.82	0.36	0.88	0.44	0.36	0.90	0.50	1.24
Thailand	10.40	32.12	-5.01	1.50	0.67	0.68	1.50	0.70	0.74	5.69
Chile	9.68	20.97	-3.86	2.96	0.35	0.53	3.70	0.15	0.65	-1.23
Indonesia	9.09	28.13	-2.61	1.15	0.28	0.69	1.15	0.31	0.37	2.36
Average	10.38	30.76	-2.14	1.72	0.48	0.52	1.87	0.48	0.50	1.89

Table 5: Full-sample regressions

Dependent variable: log(GNP per capita$_t$)
All 72 countries included.
Sample Period: 1987-1996

	GMM Estimates (Standard errors in parenthesis)			
Variable	**(1)** (WB data)	**(2)** (WB data)	**(3)** (IMF data)	**(4)** (IMF data)
log(GNP per capita$_{t-1}$)	1.143†	1.134†	1.093†	1.097†
	(0.024)	(0.021)	(0.020)	(0.016)
log(GNP per capita$_{t-2}$)	-0.149†	-0.137†	-0.093†	-0.099†
	(0.025)	(0.022)	(0.021)	(0.017)
National Saving$_t$	0.432†	0.390†	0.403†	0.387†
	(0.040)	(0.023)	(0.037)	(0.019)
National Saving$_{t-1}$	-0.201†	-0.175†	-0.185†	-0.174†
	(0.033)	(0.021)	(0.023)	(0.017)
FDI$_t$	0.186‡	0.215†	0.249†	0.250†
	(0.086)	(0.065)	(0.092)	(0.071)
FDI$_{t-1}$	-0.041		-0.186†	-0.219†
	(0.085)		(0.069)	(0.057)
PDF$_t$	0.122		0.017	
	(0.272)		(0.081)	
PDF$_{t-1}$	0.743*	0.910†	0.215†	0.209†
	(0.385)	(0.338)	(0.058)	(0.049)
PEF$_t$	-1.223†	-1.172†	-1.242†	-1.191†
	(0.322)	(0.230)	(0.257)	(0.192)
PEF$_{t-1}$	0.204		0.646†	0.760†
	(0.318)		(0.229)	(0.180)
BANKS$_t$	0.292†	0.292†	0.257†	0.259†
	(0.023)	(0.018)	(0.018)	(0.013)
BANKS$_{t-1}$	0.050†	0.051†	0.067†	0.070†
	(0.012)	(0.012)	(0.010)	(0.010)
Terms of Trade change$_t$	-0.008		-0.015	
	(0.021)		(0.021)	
Terms of Trade change$_{t-1}$	0.067†	0.075†	0.063†	0.065†
	(0.008)	(0.005)	(0.006)	(0.005)
Inflation$_t$	-0.003†	-0.003†	-0.003†	-0.003†
	(3e-4)	(2e-4)	(2e-4)	(0.000)
Inflation$_{t-1}$	0.002†	0.001†	0.001†	0.001†
	(2e-4)	(2e-4)	(2e-4)	(2e-4)
Sargan Test (p. value)	0.836	0.926	0.487	0.526
AB Test (p. value)	0.221	0.293	0.123	0.120

†, ‡,* Coefficients are significant at a 1%, 5% and 10% level, respectively.

Table 6: Sub-period regressions

Dependent variable: log(GNP per capita$_t$)
All 72 countries included
Sample period: 1987-1991 [columns (5) and (6)]; 1992-1996 [column (7)].

	GMM Estimates (Standard errors in parenthesis)		
Variable	**(5)** (WB data; 87-91)	**(6)** (IMF data; 87-91)	**(7)** (92-96)
log(GNP per capita$_{t-1}$)	1.131†	1.207†	1.103†
	(0.080)	(0.065)	(0.049)
log(GNP per capita$_{t-2}$)	-0.150*	-0.240†	-0.109‡
	(0.088)	(0.065)	(0.049)
National Saving$_t$	0.518†	0.516†	0.100‡
	(0.053)	(0.055)	(0.040)
National Saving$_{t-1}$	-0.258†	-0.260†	
	(0.066)	(0.057)	
PDF$_t$		0.356‡	
		(0.158)	
BANKS$_t$	0.272†	0.308†	0.214†
	(0.061)	(0.066)	(0.056)
BANKS$_{t-1}$	0.070‡		
	(0.037)		
Terms of Trade change$_t$			0.152†
			(0.032)
Terms of Trade change$_{t-1}$	0.053†	0.048†	0.079†
	(0.014)	(0.013)	(0.017)
Inflation$_t$	-0.003†	-0.003†	-0.051‡
	(0.001)	(0.001)	(0.022)
Inflation$_{t-1}$	0.001†	0.001†	
	(4.8e-4)	(3.9e-4)	
Sargan Test (p. value)	0.973	0.951	0.677
AB Test (p. value)	0.962	0.883	0.031

†, ‡,* Coefficients are significant at a 1%, 5% and 10% level, respectively.

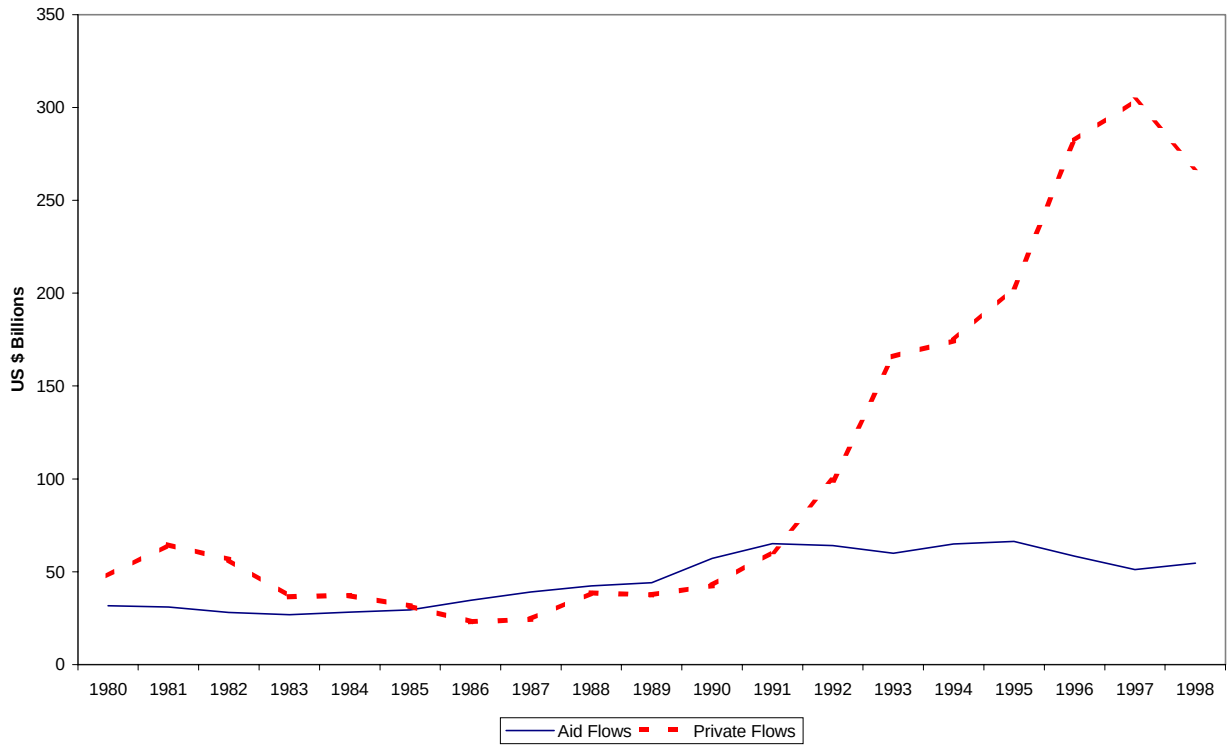
Table 7: Developing countries regressions

Dependent variable: log(GNP per capita$_t$)
58 low and middle-income countries.
Sample period: 1992-1996

Variable	GMM Estimates (Standard errors in parenthesis)		
	(8) (WB data)	**(9)** (IMF data)	**(10)**
log(GNP per capita$_{t-1}$)	1.202†	1.305†	1.172†
	(0.089)	(0.080)	(0.048)
log(GNP per capita$_{t-2}$)	-0.210‡	-0.315†	-0.174†
	(0.094)	(0.084)	(0.050)
National Saving$_t$	0.042	-0.229	0.109†
	(0.192)	(0.232)	(0.029)
National Saving$_{t-1}$	0.058	0.275	
	(0.186)	(0.211)	
FDI$_t$	0.156	0.583	
	(0.437)	(0.415)	
FDI$_{t-1}$	-0.105	-0.256	
	(0.450)	(0.451)	
PDF$_t$	-1.897	-0.018	
	(1.065)	(0.357)	
PDF$_{t-1}$	0.411	-0.085	
	(1.323)	(0.498)	
PEF$_t$	-0.852	0.059	
	(0.862)	(0.998)	
PEF$_{t-1}$	0.587	-0.488	
	(0.658)	(0.810)	
BANKS$_t$	0.170	0.021	0.181†
	(0.118)	(0.097)	(0.056)
BANKS$_{t-1}$	0.054	-0.126	
	(0.196)	(0.144)	
Terms of Trade change$_t$	0.125†	0.159†	0.125†
	(0.042)	(0.053)	(0.027)
Terms of Trade change$_{t-1}$	0.045	0.046	0.047†
	(0.031)	(0.029)	(0.012)
Inflation$_t$	-0.007	-0.014	
	(0.018)	(0.017)	
Inflation$_{t-1}$	0.003	0.003	0.003*
	(0.002)	(0.003)	(0.002)
Sargan Test (p. value)	0.636	0.656	0.780
AB Test (p. value)	0.982	0.931	0.696

†, ‡,* Coefficients are significant at a 1%, 5% and 10% level, respectively.

Figure 1: Aid versus private capital flows to developing countries.



Source: World Development Indicators, World Bank.

Figure 2: Savings, Capital flows and income growth