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Joining the Club? Procyclicality of Private Capital Inflows in Low Income Developing Countries

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Abstract

Using a newly developed dataset this paper examines the cyclicality of private capital inflows to low-income developing countries (LIDCs) over the period 1990-2012. The empirical analysis shows that capital inflows to LIDCs are procyclical, yet considerably less procyclical than flows to more advanced economies. The analysis also suggests that flows to LIDCs are more persistent than flows to emerging markets (EMs). There is also evidence that changes in risk aversion are a significant correlate of private capital inflows with the expected sign, but LIDCs seem to be less sensitive to changes in global risk aversion than EMs. A host of robustness checks to alternative estimation methods, samples, and control variables confirm the baseline results. In terms of policy implications, these findings suggest that private capital inflows are likely to become more procyclical as LIDCs move along the development path, which could in turn raise several associated policy challenges, not the least concerning the reform of traditional monetary policy frameworks.

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Contents Page

Figures

Tables

Appendices

I. INTRODUCTION

Several low-income developing countries (LIDCs) have experienced a significant increase in private capital flows (i.e. capital flows excluding official development aid and loans) that began in the 1990s. Initially, this increase was driven by foreign direct investment (FDI) flows but by the second half of the 2000s, several LIDCs were experiencing increased non-FDI private inflows (Araujo et al., 2015). Moreover, inflows to a number of these economies began to exhibit similar patterns and characteristics to inflows to emerging markets (EMs).

While greater access to international capital markets provides significant benefits to LIDCs (for example through investment and diversification opportunities, as well as an avenue for consumption smoothing in face of adverse shocks), it also brings new challenges for financial and macroeconomic stability. In fact, the empirical literature covering EMs and advanced economies has documented that international capital flows tend to amplify business cycle fluctuations and might reinforce the adverse consequences of procyclical policies that still tend to characterize a significant number of developing economies (Kaminsky, Reinhart, and Vegh, 2005; Frankel, Vegh, and Vulletin, 2013). Procyclical flows also exacerbate the procyclicality of the domestic banking sector with important implications for financial stability.[1] Hence, an assessment of the cyclical behavior of private capital flows to LIDCs is of critical policy relevance, particularly as the size of inflows to several of these economies are close to the high levels observed before the global financial crisis.

It is useful to distinguish conceptually between three different cycles: the domestic business cycle; the domestic financial cycle (as captured for example by movements in domestic credit volumes, asset prices, interest rates, etc.); and the global financial cycle (movements in global liquidity, global risk aversion, etc.). The main focus of this paper is the association between capital inflows and the domestic business cycle, although we also discuss the role of global financial cycles. Nevertheless, one should bear in mind that there are important linkages between these three cycles that have been explored in a burgeoning literature (Obstfeld, 2014; Lane and McQuade, 2014, among others). [2]

This paper investigates whether private non-FDI capital flows amplify or dampen economic cycles in LIDCs and whether the cyclicality of capital flows to these countries differs from

[1] See Bruno and Shin (2014) for a practical discussion of the links between capital flows and the procyclicality of the banking sector. Lane and McQuade (2014) document the empirical links between domestic credit and international capital flows for a sample of advanced economies and emerging markets.

[2] Lane and McQuade (2014) present empirical evidence on the important links between international capital flows (especially international debt flows) and domestic credit growth.

the behavior observed for flows to EMs. We use a new dataset constructed by Araujo et al. (2015) that overcomes some of the limitations for LIDCs that tend to characterize other data on capital flows. Predictions by theoretical models about the cyclicality of flows tend to vary depending on the set-up, specific assumptions, and frictions considered in the model. In general, the presence of credit constraints might lead to procyclical flows (as constraints are less binding in the expansion phase) and to the extent that LIDCs are more credit constrained than EMs or advanced economies, capital flows to LIDCs should be more procyclical. Nonetheless, one would typically expect that in countries with smaller banking sectors and lower leverage, the amplification effects due to the financial accelerator would be less pronounced. Thus, a priori it would be expected that flows would less procyclical in LIDCs when compared to EMs.

Our main finding is that while private capital inflows are procyclical in general, in line with the existing empirical literature, they are less so in LIDCs relative to EMs. We acknowledge that proper identification of the cyclical component of output remains a challenge due to measurement problems and the unavailability of adequate external instruments. Nevertheless, our conclusions are robust to alternative estimation methods (including GMM techniques), sample periods, and control variables.

Moreover, the results suggest that flows to LIDCs are also more persistent than flows to EMs. Among the control variables, changes in risk aversion are a significant correlate of private capital flows in most specifications with the expected sign. In addition, flows to LIDCs tend to be less sensitive to changes in global risk aversion compared to the full sample. Trade openness and changes in the terms of trade also present statistically significant coefficients for LIDCs. While trade openness is positively associated with private flows, changes in the terms of trade are negatively related to flows.

The results of models using the Blundell-Bond system GMM estimator are consistent overall with the fixed-effects regressions. We also follow empirical strategies that attempt to take into account the consequences of "risk-on/risk-off regimes" driving international capital flows (Lane, 2014) and the results on the procyclicality of flows are similar.

The measurement of cyclical fluctuations in developing countries is challenging. To disentangle transitory fluctuations around a trend from shocks to trend growth, we also estimate regressions that include the growth of potential output on the right-hand-side in addition to a measure of the output gap. We continue to find a positive and significant association between capital inflows and the cyclical component of output. Capital inflows are also positively associated with trend growth, but these associations are weaker for LIDCs relative to EMs.

We also explore whether the results still hold when alternative control and dependent variables are considered. Notably, the results are robust to alternative measures of financial and trade openness; to different measures of institutional quality; and alternative variables capturing the level of leverage; as well as to the inclusion of an index measuring financial reform. Adding FDI flows to our measure of gross private capital flows does not fundamentally alter the conclusions. However, net flows are less related to the cycle.

The paper is structured as follows. Section 2 presents a brief survey of the theoretical and empirical literature on the cyclicality of capital flows. Section 3 describes the main features of the Araujo et al. (2015) dataset and some stylized facts regarding the unconditional (reduced form) correlation between private capital flows and the cyclical component of output. In Section 4, we discuss the estimation methodology and variables used in the empirical analysis and Section 5 presents baseline results. Section 6 presents several robustness checks, including alternative estimation methods (system GMM regressions); alternative samples and control variables; accounting for the presence of risk on/risk off regimes driving international capital flows; and disentangling the differential effects of permanent and transitory shocks. Section 7 concludes and discusses some policy implications.

II. Existing Literature

From the perspective of the capital receiving economy, if international capital inflows are countercyclical relative to the domestic business cycle, they could contribute to mitigate macroeconomic volatility and effectively provide insurance against adverse shocks.[3] If capital inflows are procyclical, they would exacerbate macroeconomic fluctuations as well as amplify the domestic financial cycle, potentially contributing to fuel asset price bubbles and unsustainable credit booms. Therefore, the cyclical behavior of gross capital inflows has important implications for financial and macroeconomic stability.

A. Theoretical Underpinnings between Capital Flows and the Economic Cycle

From a theoretical perspective, capital flows could be procyclical, counter-cyclical or even acyclical depending on the model framework. In traditional open-economy macro models for endowment economies, where frictionless access to international capital markets allows

[3]For a theoretical and empirical discussion of the adverse effects of volatility on long-term growth emphasizing the role of procyclical long-term investment in face of credit constraints see Aghion et al. (2010).

for consumption smoothing, net international capital flows should be counter-cyclical in response to supply shocks as agents smooth consumption; i.e. countries would resort to additional international borrowing in face of negative shocks and would repay their debts during good times (Obstfeld and Rogoff, 1996). Nevertheless, Vegh (2013) shows that even in a traditional set-up, capital flows would be procyclical in response to demand shocks and/or if capital flows cause the domestic business cycle.

Moreover, Gopinath (2005) argues that in open-economy real business cycles models with capital accumulation, net capital flows, interpreted as the negative of the current account, could be procyclical or acyclical, depending on two counteracting effects. On the one hand, a transitory positive productivity shock would cause investment to increase, leading ceteris paribus to a worsening of the current account and consequently an increase in net capital flows (procyclical response). On the other hand, the shock would also lead to an increase in savings as agents smooth consumption, thus countering the investment effect and improving the current account (see Bakus, Kehoe and Kydland, 1992 for a quantitative exploration with a focus on advanced economies).

Conventional models typically only address the behavior of net flows, but in a recent contribution, Van Wincoop and Tille (2010) construct a dynamic stochastic general equilibrium (DSGE) model with portfolio choice that analyzes the behavior of gross capital flows at business cycle frequencies. In their model, capital flows are driven by portfolio growth effects (which are related to increased savings), and portfolio reallocation effects (which are responses to changes in risk and the expected returns of investments).

Simulations suggest that positive productivity shocks to a country are linked to a reduction in capital inflows. While the "portfolio growth" effect leads to positive outflows and negative inflows as the productivity shock leads to a rise in "home" savings and a decrease in foreign savings; the "portfolio relocation effect" is the one that dominates capital flow dynamics. At the time of shock, there is a retrenchment of capital flows as both home and foreign investors reallocate their portfolios towards their domestic assets, which leads to negative values of both outflows and capital inflows. Subsequently, both home and foreign investors reallocate their portfolios towards foreign equity, leading to positive capital outflows and negative capital inflows. Thus, capital inflows are expected to be countercyclical in this model.

The introduction of financial frictions could entail procyclical capital flows (see Brunnermeier, Eisenbach and Sannikov, 2012 for a survey of financial frictions in macroeconomic models). Bianchi (2011) shows that in a DSGE model with financial frictions and a pecuniary externality, there can be overborrowing in foreign currency in good times, but also sharp ad-

justments in access to foreign lending in face of adverse shocks, triggering a Fisherian debt deflation mechanism of amplification of shocks. Simulations of the model calibrated to Argentinean data confirm that in the decentralized equilibrium (where the externality is not addressed) net capital inflows are strongly procyclical.

The models of capital flows surveyed above do not explicitly include features that would capture specific economic characteristics of LIDCs. For example, consumption smoothing models assume unrestricted access to global capital markets. Even models that consider financial frictions are designed to capture features of countries with advanced or intermediate levels of domestic financial development. The development of models of capital flows tailored to the characteristics of LIDCs is an important avenue for further research that would help to better interpret our findings and allow for further exploration of the relevant transmission mechanisms linking capital flows to the local business cycle.

B. Existing Empirical Work on the Cyclicality of Capital Flows

The procyclicality of net capital flows to emerging markets is a well-documented stylized fact of the empirical literature. In a seminal paper, Kaminsky, Reinhart and Vegh (2005) show that the cyclical component of net capital flows to emerging markets and most OECD economies is positively correlated with the cyclical component of GDP. More recently, Broner et al. (2013) look at this issue for a broad sample of advanced economies and emerging markets. Rather than examining simple correlations, they regress a broad measure of gross capital flows, which includes FDI and international reserves, on real GDP growth, on country dummies and, on a country specific trend, but do not include other control variables. They conclude that gross capital inflows expand during good times, while they decline during recessions, thus confirming that gross flows are also procyclical.

Moreover, Puy (2013) using monthly funds' data for a panel of countries and a Bayesian dynamic latent factor model that decomposes bond and equity flows into global, regional and country specific components, finds that international portfolio investments are highly procyclical relative to global macroeconomic and financial conditions (measured by a variety of indicators), but his sample only includes a handful of LIDCs. His results suggest that portfolio flows by institutional investors act as shock amplifiers and that both equity and debt flows are procyclical relative to global financial conditions. This cyclical behavior is present both in advanced and emerging markets, even if procyclicality is stronger in EMs.

To our knowledge, there are no studies focusing on the cyclical properties of gross capital inflows to LIDCs.[4] Kaminsky, Reinhart and Vegh (2005) show that the correlation between the cyclical component of net flows and the cyclical component of GDP is positive and significant in LIDCs, but the correlation coefficient is smaller than for other country groupings. Lane (2014) analyses the role of several control variables in explaining the cross-sectional variation of financial flows to LIDCs over three distinct periods: 2003-2007; 2008-2009; and 2010-2012. He concentrates on a sample of 41 countries that excludes fragile states and a number of small island economies. The results suggest that for the period 2003-2007, net debt inflows to LIDCs are positively related to GDP growth, but the correlation is not statistically significant. On the other hand, there is stronger evidence of procyclicality of flows when the overall current account balance is considered (albeit only at the 10 percent level). Similar results hold for the recovery phase covering the period 2010-2012. Although growth rates are likely to be contemporaneously endogenous to capital flows, Lane argues that there are no strong external instruments in relation to the cross-sectional variation of these variables that would allow for instrumental variables estimation.

III. Stylized Facts

In this section we briefly present a newly developed database containing information for 58 LIDCs and 92 emerging markets for the period from 1990 to 2012. Araujo et al. (2015) provide a detailed description of the construction of this dataset with extended LIDCs coverage. We also discuss some stylized facts on the behavior of capital flows to LIDCs and present a first pass at assessing the cyclicality of private capital flows.

A. A New Database on Gross Capital Flows to LIDCs

The dataset builds on the International Monetary Fund's Balance of Payment Statistics (BOPS) and also uses relevant information from the IMF's World Economic Outlook (WEO) database to close gaps.[5] The WEO data on capital flows is based on estimates and projections originated by IMF country desks. Therefore, one significant advantage of this dataset is the widespread availability of data across countries.

[4]Movements in gross private inflows could have important implications in terms of financial and macroeconomic stability. As Araujo et al. (2015) discuss, movements in gross non-FDI inflows and current account balances seem to be related in LICs.

[5]The compilation methodology is the one described in the Balance of Payments Manual version 5 (BPM5). This is the same methodology used by WEO at the time this study was conducted.

Our measure of interest, non-FDI private inflows, is composed of portfolio investments liabilities, other investment liabilities, and financial derivatives but excludes official liabilities. For official liabilities BOPS does not provide data on inflows originated from official institutions, hence data on inflows destined for official sectors (government and central banks) is used as a proxy. This is standard procedure in the literature and corroborated by comparison with WEO data.[6] Greater focus is given to gross flows, since shifts in those might create significant financial vulnerabilities and better capture changes in market access.[7] Due to the fact that flows to fragile and small countries usually exhibit different dynamics, we also restrict our sample to non-fragile and non-small LIDCs.[8]

Interestingly, while the share of non-FDI private inflows in total flows is increasing for LIDCs and getting closer to figures observed in EMs (Araujo et al., 2015), non-FDI inflows to LIDCs are on average considerably lower than inflows to EMs. However, as depicted in Figure 1, inflows to the top quartile of LIDCs as a share of GDP are comparable to the median inflows in EMs. Moreover, after the crisis, inflows to the top quartile of LIDCs converged to the top quartile of EMs.

A surge analysis is performed in order to identify LIDCs that are starting to experience flows dynamics more similar to EMs.[9] Among 95 countries and 2034 observations, a total of 296 surges are detected. As we can see in Figure 2, four episodes of increased share of surges, which we call waves, are detected; 1990-1994, 1996-1997, 2004-2008 and 2010-2012. The identified waves are in general in accordance with the literature, even though the data is at annual frequency, whereas the literature typically focuses on quarterly data.

It is clear that surges are much less frequent in LIDCs than in other developing economies. Nonetheless, 77 surges in LIDCs out of a total of 296 surges are identified. While not much variation is found in the number of surges in LIDCs during the first two waves of capital inflows during the 1990s, surges in these countries began to increase during the third wave of the 2000s. But it is only by 2007, when surges spread out and reached close to 40 percent of the developing countries in the sample, that LIDCs seem to have "caught the wave". After a

[6] See Dorsey et al. (2008) and Bluedorn (2013).

[7] For a discussion on gross and net flows, see Milesi-Ferretti and Tile (2011), Broner et al. (2013), Forbes and Warnock (2012) and Obstfeld (2012).

[8] See footnote 12 for a formal classification. Araujo et al. (2015) also contains a lengthy discussion on the specific characteristics of countries small and fragile countries.

[9] For previous application of surges, see Forbes and Warnock (2012), Ghosh et al. (2012) and Reinhart and Reinhart (2009). Surges in any given country in the sample are defined as a period which satisfies the following two criteria: (i) gross non-FDI private inflows as percent of GDP are in the top quartile of its own country sample (on the time dimension); (ii) gross non-FDI private inflows as percent of GDP are in the top quartile of the cross-country sample.

decline in the years following the global financial crisis, the number of surges in LIDCs rebounded in 2012.

This sub-section has illustrated some shifting patterns of inflows to LIDCs. The recent experience with non-FDI private capital inflows could signal higher integration with international capital markets and domestic financial development. Based on this new evidence, the remainder of the paper will examine the cyclicality of private capital inflows to LIDCs.

B. A First Look at the Cyclicality of Private Capital Inflows in LIDCs

This sub-section is a first pass at assessing the cyclicality of private capital flows in LIDCs, presenting reduced-form correlations between gross private capital inflows as a share of trend or "potential" GDP and the cyclical component of output. We use gross private capital inflows, excluding FDI from the Araujo et al. (2015) database. Given the limited availability of consistent data on unemployment and capacity utilization measures for LIDCs, we opted to construct the cyclical component of GDP series using standard univariate filtering techniques (rather than multivariate filtering). We applied the Hodrick-Prescott filter to the log of the GDP series at constant 2005 national prices from version 8.0 of the Penn World Table (see Appendix A for a description of the data and sources) with a smoothing parameter of 6.25, as suggested by Ravn and Uhlig (2002) for annual data. We experimented with different smoothing parameters that might be more appropriate for cycles in developing countries, which tend to have shorter duration (Rand and Tarp, 2002), as well as with the use of alternative filters (namely, the Christiano and Fitzgerald filter), but found that these variations in the methodology do not substantially affect the estimates of the output gap.

Figure 3 presents simple correlations at the country level between private capital flows as a share of potential GDP and the cyclical component of output for several LIDCs and EMs in the period 1990-2012. The data indicates that the unconditional association tends to be more positive for emerging market economies (grey bars in the Figure) relative to LIDCs (black bars), suggesting that flows are more procyclical in the former group of countries. The patterns depicted in the Figure remain broadly the similar when alternative filters are used, namely when we employ a smoothing parameter of 1 for the HP filter as suggested by Dabla-Norris, Minoiu, and Zanna (2015) for LIDCs or when we use the Christiano and Fitzgerald filter (results available upon request).

We follow Kaminsky, Reinhart and Vegh (2005) and compare capital inflows as a share of potential GDP in good and bad times, defined as periods when GDP growth is above or be-

low the median, respectively. The difference between capital inflows in good and bad times is denoted the “amplitude" of capital flows over the domestic business cycle. As Figure 4 indicates, the amplitude of gross capital flows is typically positive for both groups of countries, but much wider in EMs relative to LIDCs. In fact, the median amplitude for LIDCs is close to 0.4, whereas the corresponding number for EMs is 1.2. The evidence presented in the Figure confirms that capital flows seem procyclical (i.e. tend to be higher in good times and lower in bad ones), but the decline of capital flows in bad times in EMs is markedly larger than what is observed for LIDCs. The evidence presented in the Figure is broadly in line with the conclusions of Kaminsky, Reinhart and Vegh (ibid.) for a different time period and sample of countries.[10]

IV. ESTIMATION

While the analysis of unconditional correlations allows us to gain some important insights regarding the cyclicality of capital flows to LIDCs, it is also crucial to control for certain correlates of capital flows and for time and country fixed-effects in order to isolate the importance of cyclical fluctuations and facilitate the comparison between EMs and LIDCs given several structural differences between these country groupings. Our empirical analysis draws on existing studies on the cyclicality of capital flows, but also borrows from the literature on the procyclicality of fiscal policy in developing countries (Frankel, Vegh and Vulletin, 2013; and Alesina, Campante, and Tabellini, 2008).

A. Estimable Equation

In this context, we estimate several versions of the following equation:

$$cf_{i,t} = \alpha_i + \rho cf_{i,t-1} + \beta \bar{y}_{i,t} + \sum_{m=1}^{M} \delta_m X_{m,i,t} + \lambda_t + \varepsilon_{i,t} \quad (1)$$

where $cf_{i,t}$ is the private capital flows measure as a share of potential GDP in country i at year t; $\bar{y}_{i,t}$ is the output gap, defined as the cyclical component of GDP; $X_{m,i,t}$ denotes the control variable m (the set of controls are discussed further below); α_i and λ_t are country and time fixed-effects, respectively and $\varepsilon_{i,t}$ is the disturbance term.

[10]But it is important to note that these authors look at net flows rather than gross capital inflows.

In the baseline specifications, we use the output gap (cyclical component of GDP) to assess cyclicality rather than real GDP growth, which was used by Broner et al. (2013), because we believe that the gap provides a more direct measure of cyclical movements. Nevertheless, we acknowledge that LIDCs and lower middle-income economies are likely to be undergoing important structural transformation during the period of analysis and in this context, the economic concept of "potential output" (as opposed to the statistical estimation of potential or trend output), is not clear-cut. In fact, Aguiar and Gopinath (2007) document that in EMs shocks to trend growth are the primary source of fluctuations rather than transitory fluctuations around a stable trend and it is possible that this finding also applies to LIDCs. We will attempt to disentangle some of these effects in the robustness section of the paper, where we consider regressions that include both the output gap and the growth rate of potential output on the right-hand-side of the equation.

Firstly, we estimate the equation by using standard fixed-effects methods with Driscoll and Kraay (1998) corrected standard errors because of the possible presence of cross-sectional dependence.[11] Estimators conventionally used in panel data analysis require the assumption of cross-sectional independence across panel members. In the presence of cross-sectionally correlated error terms, these methods do not produce consistent estimates of the parameters of interest and can lead to incorrect inference (Kapetanios, Pesaran and Yamagata, 2011). Cross-sectional dependence is likely to arise because of spill-overs and/or spatial effects among countries or because of the presence of common (unobserved) factors. In fact, Puy (2013) documents the importance of common global and regional factors in driving bond and portfolio flows to developing countries.

Nevertheless, a significant problem with this framework is that the output gap is likely to be endogenous to capital flows. In addition, some of the other controls might be highly correlated with country fixed effects or could be themselves determined by capital flows. We will attempt to mitigate these issues by re-estimating the equation using GMM techniques, namely the system (Blundell-Bond) GMM estimator (see Roodman, 2009 for a discussion), which allow us to handle the potential endogeneity of some regressors by using lagged values of these variables as instruments. Still, the question of finding valid external instruments (beyond lagged values) for the output gap remains open.

[11] This procedure was implemented in Stata 13 using the code written by Daniel Hoechle from the University of Basel.

B. Control Variables

Based on the recent empirical literature on the determinants of capital flows (Broner et al., 2013; IMF, 2013a; Forbes and Warnock, 2012; Franken and van Wijnbergen, 2010; Faria et al., 2007, Puy, 2013, among others), we identified relevant control variables. These could be roughly partitioned into global ("Push") and country specific ("Pull") factors, as it is commonly discussed in the literature. Moreover, given our focus on the cyclicality of flows, it might also be useful to distinguish among different set of controls that account for global cycles (such as the VXO index and the terms of trade), domestic financial cycles (for example, the ratio of private sector credit to GDP), and other country characteristics (including openness and institutional quality). The list of possible control variables is long and ultimately, the inclusion of variables in the regressions was dictated by data availability for a large number of LIDCs.

Global Factors

Several papers use the VIX or VXO implied volatility index to capture the importance of overall global economic uncertainty, and/or investor risk appetite in driving capital flows (Forbes and Warnock, 2012). It is also common to include measures of global liquidity as control variables, such that more liquidity would be associated with increased capital flows in a standard "push" mechanism. Typical liquidity measures comprise interest rates in advanced economies and a measure of changes in the global money supply. In addition, Bruno and Shin (2014) emphasize the role of changes in net interoffice assets of foreign banks in the US as an empirical proxy for the availability of wholesale bank funding provided to borrowers in the capital recipient economy. This variable is shown to be an important determinant of bank flows, especially over the 2000s, prior to the global financial crisis. It is a reflection of the fact that global banking organizations use internal capital markets (i.e. internal to the banking firm) to reallocate funding (available funds are deployed globally).

Moreover, changes in global commodity prices could also be included as a determinant of the profitability of investments in developing economies (IMF, 2013a). Similarly, there might also be a rationale to consider changes in the terms of trade, which are likely to add a more country specific "flavor" relative to the aggregate commodity prices variable. For most LIDCs it might be reasonable to assume that terms of trade are mostly driven by exogenous (to the country) factors.

Pull Factors

The lagged dependent variable (past capital flows to a specific country) is included in regressions to capture herding effects and other departures from fully forward-looking/rational behavior by international investors (Franken and van Wijnbergen, 2010). It is also a measure of persistence of flows and may pick up the effects of omitted control variables. In addition, a number of papers control for financial development/leverage using stock market capitalization as a share of GDP. The main rationale to include this variable is that countries with deeper financial systems would attract more capital flows because of the increased availability of instruments for investment. This indicator typically is not available for LIDCs, and we use credit to the private sector as a share of GDP as an alternative. Nevertheless, it is highly likely that stock market capitalization and credit to the private sector are endogenous to international capital flows and therefore the inclusion of this variable could be problematic.

De jure measures of capital controls/financial account openness, such as the ones proposed by Chinn and Ito (2006) and the Quinn and Toyoda (2008) are also widely used, but these measures are also likely to be endogenous. Capital controls may affect capital flows in several ways. Controls on inflows constitute a transaction cost, sometimes prohibitive, that reduces the expected return from investment. Similarly, controls on outflows could be viewed as introducing a real options value (sunk cost) of investing in a country. Capital controls could also affect the risks of investing in a country. If for example, capital account restrictions are used to sustain an inconsistent policy mix they would be associated with increases in risk and in the likelihood of crises. On the other hand, if capital controls are effectively applied as macroprudential regulations (for example as "speed limits" on excessive foreign borrowing), they might contribute to reduce risks.[12]

Measures of institutional quality and/or country risk are also considered to be important, particularly because they are a crucial explanatory variable for total factor productivity and also more directly because they measure the risk of expropriation (Alfaro, Kalemli-Ozcan, and Volosovych, 2008 and Faria et al., 2007). It is also common to include proxies for overall macroeconomic stability (such as the inflation rate), as increased stability is supposed to improve the attractiveness of a country to international capital inflows. Finally, papers in the literature also include measures of trade openness as a control variable. These are intended to capture demand for trade finance and other related financial services and/or sensitivity of a country to changes in global demand.

[12]There are several possible policy rationales for introducing capital controls as part of the toolkit for capital account management. A comprehensive exposition of this debate is beyond the scope of this paper.

V. BASELINE RESULTS

In Table 1 we present fixed-effects regressions with standard errors corrected for cross-sectional dependence for several specifications of Equation 1. We focus on the link between the ratio of private capital flows (excluding FDI) to trend GDP and the cyclical component of output controlling for a parsimonious set of variables that includes the lagged dependent variable; changes in the VXO index; de facto trade openness; leverage (private credit to GDP ratio); de jure international financial openness (Chinn-Ito index); changes in the terms of trade and a variable measuring country risk/institutional quality (the ICRG country risk rating with higher values indicating lower risk/better institutional quality). Annex A contains a description of the construction of these variables and the relevant sources. We exclude small and fragile states from all specifications presented.[13] We also exclude Ethiopia from the analysis due to significant weaknesses in national accounts statistics (IMF, 2014a).

The results for the first four specifications of Table 1 are in line with the ones obtained in the literature for broader measures of capital flows focusing on advanced economies and emerging markets (Broner et al., 2013). The first column of the table presents a simple regression for the full sample of countries (i.e. including both EMs and LIDCs) that includes the lagged dependent variable, the output gap, time and country fixed-effects, but no control variables. The subsequent columns (specifications 2, 3, and 4) are implementations of Equation 1 that consider in turn: the full sample of countries with control variables (specification 2), a sample of Emerging Markets exclusively and no controls (specification 3) and a sample of EMs with controls (specification 4). The results strongly indicate that private capital flows are procyclical with $\beta > 0$ and statistically significant at conventional levels.

Specifications 5 and 6 are of particular interest for our purposes, since they consider a sample of LIDCs exclusively. The results continue to point towards procyclical capital flows in this group of countries, nevertheless, the magnitude of the coefficient for the output gap is smaller, suggesting that flows to LIDCs are less procyclical than flows to EMs (statistical significance is also reduced, but the coefficient is still significant at the 10 percent level). The regressions also suggest that capital flows are more persistent in LIDCs relative to EMs, since the coefficients for the lagged dependent variable are higher for the former group of countries (about 0.4 compared to 0.2 for EMs), as shown in specifications 3 to 6 of Table 1. The positive and

[13]The metric used to classify small countries is from IMF (2013b). We use the World Bank Definition of Fragile States as of 2011. The criteria are: (a) a harmonized average Country Policy and Institutional Assessment (CPIA) score of 3.2 or less; (b) the presence of a UN and/or regional peace-keeping or peace-building mission during the previous three years.

statistically significant coefficients obtained for the lagged dependent variable for LIDCs are in line with the evidence presented by Franken and van Wijnbergen (2010) for the period 1981-2006. This persistence might be a reflection of herding behavior by international investors, but could also be partly explained by omitted control variables.

Among the control variables, changes in risk aversion is a significant correlate of private capital flows in all specifications with the expected sign, but the association between the VXO variable and capital flows is weaker in LIDCs, as illustrated by the smaller magnitude of the coefficient for this variable in specification 6. This result suggests that flows to LIDCs are less sensitive to cycles in global risk aversion. Trade openness and changes in the terms of trade also present statistically significant coefficients in the LIDC sample (specification 6).[14] The terms of trade variable has a negative sign, which is in line with the results presented in Lane (2014), who argues that the negative association between changes in the terms of trade and capital inflows could be explained by a crowding out mechanism by which export revenues substitute for financial inflows. Finally, the coefficients for financial openness, leverage, and country risk are not statistically significant in the vast majority of specifications.

It is possible that the response of capital flows to the cycle might be linked to the size of the banking sector and to the level of leverage. Typically one would expect that in countries with a smaller banking sector and lower leverage, the amplification effects due to the financial accelerator would be less pronounced. Thus, it would be natural to observe that flows are less procyclical in LIDCs. Moreover, there might be "practical" reasons associated with the procyclicality of capital flows that might help to explain differences in the results obtained for LIDCs and EMs. For example, the types of financial instruments that are available to international investors could be a factor in explaining why flows are less procyclical in LIDCs. LIDCs typically rely more on bank flows and trade finance, whereas in EMs cross-border flows take more the form of tradable securities that have asset prices (Lane, 2014), which are themselves procyclical and thus might lead to rebalancing of portfolios over the cycle.

Overall, based on the results presented in this section, we can conclude that while private capital flows are procyclical, there is evidence that they are less so in LIDCs. Capital flows to LIDCs also seem to be more persistent. Furthermore, changes in global risk aversion are an important correlate of capital flows, but there is evidence that LIDCs are less sensitive to global risk aversion relative to the overall sample. Finally, it is possible that the differential

[14]Since VXO does not vary across countries, the baseline specification excluding time fixed effects is considered. The results are very similar to the baseline specification. Output gap significance is somewhat higher, while the magnitude is stronger to EMs, and VXO is no longer significant for LICs.

response of capital flows to the cycle among different groups of countries might be linked to the size of the banking sector and to the level of leverage.

VI. Robustness Checks

In this section, we present some of the extensive robustness exercises that were undertaken. In particular, we explore alternative estimation methods (system GMM regressions); alternative samples (countries that experienced surges in capital inflows as defined in Araujo et al., 2015); the presence of risk on/risk off regimes driving international capital flows (Lane, 2014); and we try to disentangle the differential effects of permanent and transitory shocks ("the cycle is the trend", Aguiar and Gopinath, 2007). Furthermore, we also assess whether results change when using alternative control variables (in particular an index of financial reform) and alternative measures of capital flows (for example by adding FDI flows to our measure of private flows and by estimating regressions with net rather than gross flows). Additional robustness checks that are discussed in the text, but not presented in specific Tables are available upon request.

A. GMM Regressions

To mitigate possible endogeneity bias for some of our key variables, we re-estimate our models using the Blundell-Bond system GMM estimator. We transform instruments using forward orthogonal deviations and present robust standard errors, which are consistent in the presence of heteroskedasticity and autocorrelation. We deal with the bias introduced by high instrument count by collapsing instruments by variable and lag distance.

Nevertheless, it is important to note that, contrary to the results previously presented for fixed-effect estimators, the standard errors obtained using this methodology are not corrected for cross-sectional dependency, which is only addressed here through the inclusion of time effects. In case time effects are not sufficient to remove cross-sectional dependence, it is possible that the coefficients obtained are inconsistent, thus the results should be interpreted with caution. The results are presented in Table 2 and overall are in line with the fixed-effects regressions. Private capital flows are positively associated with the output gap in all specifications with statistically significant coefficients (albeit only at the 10 percent level in the specification that focuses on LIDCs and includes control variables). As before, the coefficient for

the output gap is smaller for LIDCs, indicating that procyclclicality is weaker in these countries. The coefficient for the lagged dependent variable is higher for LIDCs, thus continuing to suggest greater persistence of flows to these economies. The VXO continues to be an important control for the full sample of countries and for EMs. In contrast to fixed-effects results, trade openness now presents positive and significant coefficients in all specifications, whereas financial openness seems to matter for EMs, but not for LIDCs.

Diagnostic tests are mixed as far as the validity of instruments is concerned, the Hansen test suggests that overidentifying restrictions are valid for all specifications, but the Sargan test rejects the validity of these restrictions. Nevertheless, one should bear in mind that the Sargan test statistic is not robust to heteroskedasticity or serial correlation and in this context, we believe that the Hansen test is more adequate.

B. Countries with Surges in Capital Inflows

We repeat the baseline specifications, but restrict the sample to countries that have experienced surges in capital inflows during the period of analysis, as identified in Araujo et al. (2015), to assess if the results change when considering countries that were larger recipient of inflows. Table 3 presents the results. We confirm the finding that overall private capital flows are positively associated with the output gap, but less so in LIDCs. The rest of the results follows closely the findings for the unrestricted sample, including the role of risk aversion.

C. Risk-on, Risk-off Regimes

Lane (2014) argues that the elasticity of capital flows with respect to country fundamentals varies with the prevailing conditions in international markets, because of the strong correlation between the scale of global capital flows and common risk factors. Hence, when analyzing capital flows to LIDCs, he advocates a strategy of estimating regressions over different cross-sections that would reflect these risk-on/risk-off "regimes". We try to address this concern by modeling the "common risk factors" more explicitly.

The general empirical specification followed is summarized in the following equation:

$$\begin{aligned} cf_{i,t} &= \rho_i cf_{i,t-1} + \beta_i \bar{y}_{i,t} + \sum_{m=1}^{M} \delta_{mi} X_{m,i,t} + u_{i,t} \\ u_{i,t} &= \alpha_i + \lambda_i f_t + \varepsilon_{i,t} \end{aligned} \tag{2}$$

where f_t is a common factor that affects all countries and changes over time and is not directly observable. In the set-up presented above we only include one common factor for ease of exposition, but the specification can be extended to include additional common factors. The economic interpretation of the common factors is not straightforward, but in our application, it could be thought of a way to model the common risk factors referred to by Lane (2014). The error term, $\varepsilon_{i,t}$, is assumed to be white noise. The coefficients associated with the output gap and the control variables; the parameter λ_i (the factor loadings for the common dynamic factor) as well as the parameter ρ_i are allowed to differ across countries in this set-up (note that we previously assumed that these coefficients were homogeneous across countries).

The estimation is carried-out using the common correlated effects mean-group (CCEMG) estimator proposed by Pesaran (2006). This estimator uses cross-sectional averages of the dependent and independent variables as proxies for unobserved common factors in the regressions. The estimator yields consistent and efficient estimates and its small sample properties do not seem to be affected by residual serial correlation of the error terms (Kapetanios, Pesaran and Yamagata, 2011). Kapetanios, Pesaran and Yamagata (2011) also show that CCEMG estimator performs well when variables included in the model are non-stationary and they advocate the use of this estimator irrespective of the order of integration of the data.

Once again, we find that capital flows are procyclical in the specifications that consider exclusively emerging markets as well as in the full sample, but the evidence of procyclicality is more mixed in specifications where only LIDCs are included (Table 4).[15] In particular, the coefficient for the output gap is significant at the 10 percent level in specification 5, which does not include the control variables, but it is not statistically significant when all the controls are included (specification 6). The common dynamic factor linked to the dependent variable is significant in all specifications, except for specification 6 and its coefficient is larger for EMs.

As an additional check, we re-estimated our baseline specification over different time periods reflecting different phases of the global risk cycle, following Lane (2014). The results are not reported, but are available upon request. In the global boom period from 2003 to 2007, the association between private capital flows and the output gap is generally positive for the different country groupings, but it is not robust for LIDCs. Regressions for the period 2008-2012, which encompasses the great recession and subsequent recovery present similar results, but the size of the coefficients for the output gap is larger and the coefficient is not significant for the specification that focuses on LIDCs only and includes the control variables. To

[15]Estimation was carried out in Stata using the code described in Eberhard (2012).

sum up, the finding that market-driven capital flows to LIDCs are less procyclical than private capital flows to emerging markets is robust to approaches taking into account risk-on/risk-off regimes driving capital flows.

D. Capital Inflows, Cyclical Fluctuations, and Trend Shocks

Aguiar and Gopinath (2007) show that in EMs, fluctuations at business cycle frequencies are driven primarily by shocks to trend growth rather than transitory shocks around a stable trend, which characterize advanced economies i.e. for EMs "the cycle is the trend" in their words. In this sub-section, we try to disentangle the differential effects of permanent and transitory shocks by adding the growth in trend-GDP to the right-hand-side of our regressions. The results are presented in Table 5. The coefficient for the output gap continues to be positive and statistically significant in all specifications. The magnitude of the coefficient for the output gap is marginally smaller for the specification that considers LIDCs exclusively.

Gross private non-FDI capital inflows also present a positive and significant association with trend growth in the full sample and in the sample that considers EMs exclusively, suggesting that inflows are linked to permanent output shocks as well as temporary ones, but this association is not statistically significant in the specifications that consider only LIDCs (in fact trend growth presents a negative sign in these specifications). The results for the control variables are in line with those obtained in the baseline regressions. Overall, we continue to find a positive and significant association between capital inflows and the output gap when trend growth is included.

E. Alternative Control Variables

In this sub-section, we explore regressions with alternative control variables relative to the baseline. We start by checking whether the results hold for two alternative measures of institutional quality. The first one is the Executive Constraints measure from the Polity IV project. It classifies the "extent of institutionalized constraints on the decision making powers of chief executives". The classification goes from 1 (unlimited authority) to 7 (executive parity or subordination). In addition, we also used the quality of bureaucracy indicator from ICRG (results are available upon request). In the case of quality of bureaucracy indicator, the result is similar to the ones already reported. When we consider the executive constraints measure, the

coefficient for the cyclical component of output is no longer statistically significant in the specification that includes LIDCs exclusively.

We also considered specifications that include the loan to deposit ratio as an alternative measure of leverage and the inclusion of this variable does not affect the main results. The measure of trade openness that we used so far is a de facto measure that is constructed based on actual flows of imports and exports over GDP. Because imports and exports are correlated with the trade balance, we may be capturing a simple mechanical effect by which larger trade balances are financed by inflows or outflows of capital. We try to address this issue by also considering a de jure measure of trade openness. We use the "Trends in average most favored nation applied tariff rates in developing and industrial countries" from the World Bank, because this series also contains sufficient observations in the time dimension. The results obtained are similar to the ones of the baseline specification and are available upon request.

Furthermore, we also considered specifications that include alternative global variables to the VXO. We started with specifications that include US interest rates (the 10-year bond rate and the 3-month T-bill rate) and our results regarding the cyclicality of flows to LIDCs still hold.[16] We also included in the regressions a commodity price index, the industrial materials index from PCPS following IMF (2013a), and the results remain unchanged. Moreover, we added to the baseline regressions the ISM manufacturing index, which is constructed based on the purchasing managers survey collected by the Institute for Supply Management. This index is highly correlated with the US Industrial Production and provides a more forward looking measure of activity. The coefficients obtained for this variable were not statistically significant. Overall, our results concerning the procyclicality of flows to LIDCs continue to hold and these robustness exercises are not reported to save space, but are available upon request.

Finally, when interpreting our findings, we suggested that the level of financial depth and leverage (especially in the banking sector) might be a factor in explaining the cyclicality of capital inflows. To further explore the role of the financial sector, we include in our regressions the index of financial reforms constructed by Abiad, Detragiache, and Tressel (2010). Unfortunately, the limited data availability of this index for LIDCs reduces the LIDC sample

[16] A specification with VXO and interest rates (but with no time fixed effects) was considered. Output gap coefficients are generally more significant, but the magnitude is larger for EMs and smaller for LICs. Interest rate coefficients are positive and significant for the entire sample and two subsamples (the coefficient is smaller for LICs) while VXO is non-significant. The result does not indicate any substantial differences between the correlation of LIC and EM flows and global monetary policy.

to only 13 countries and, on the time dimension, the data on financial reforms only covers the years up to 2005.

Table 6 shows the results obtained when we include the financial reform index in the baseline regressions. We exclude the financial openness variable because external financial openness is a component of the overall financial reform index. We also exclude the VXO from this specification because of the more limited time dimension, which impedes us to estimate the coefficient for this variable (that only presents time variation). It is interesting to note that the coefficient for the financial reform index is significant and positive for the overall sample and for the sample that includes EMs exclusively, but not for the sample that focuses on LIDCs. The results previously reported regarding the output gap still hold, but the coefficient for the output gap in the specification that focuses on LIDCs exclusively is no longer statistically significant.

F. Alternative Measures of the Dependent Variable

To further check the robustness of our results, we estimate the baseline regressions using other measures of capital flows as the left-hand-side variable. The results are presented in Table 7. We consider first specifications that include only gross FDI flows on the left-hand-side (specifications 1 and 2). These flows had been excluded from the original measure of private flows presented in previous sections. In this case, the coefficient for the output gap is not statistically significant in the full sample, but is positive and significant at the 10 percent level for the LIDC sample. The lagged dependent variable continues to be significant and positive in all specifications with large coefficients relative to the baseline. These results suggest that foreign direct investment is more persistent and less related to the cycle than private non-FDI flows. When we add FDI inflows to our measure of private capital flows (specifications 3 and 4), both the output gap and persistence are higher in LIDCs relative to the baseline specification.

Moreover, we also estimated specifications with net capital flows (excluding FDI flows) as the dependent variable (specifications 5 and 6), adding portfolio assets and other investments assets to our measure of non-FDI private flows. The results suggest that net flows are less related to the cycle, as the coefficients obtained are positive, but not significant.

VII. Conclusions

By the second half of the 2000s, several LIDCs were experiencing increased non-FDI private inflows, and inflows started to exhibit similar patterns and characteristics to inflows to emerging markets (EMs). Indeed a number of LIDCs experienced surges in non-FDI inflows in the period 2004-2008, evidence that LIDCs were "catching the wave" of the general increase in flows to developing countries in that period.

Motivated by these facts, we examine the cyclicality of private capital inflows to Low-income Developing Countries (LIDCs) over the period 1990-2012. We find that market-driven capital inflows to LIDCs are typically less procyclical and more persistent than capital inflows to emerging markets. We also show that changes in risk aversion are a significant correlate of private capital inflows, but LIDCs seem to be less sensitive to changes in global risk aversion than EMs. These conclusions are robust to different estimation methods, samples, and control variables. These findings are in line with the prior that the amplification effects due to the financial accelerator would be less pronounced in LIDCs, as these countries typically have smaller banking sectors and lower leverage.

The findings suggest that private capital inflows are likely to become more procyclical as LIDCs develop. Policies to manage capital inflows and mitigate the destabilizing effects linked to procyclicality might also become more relevant for these countries. The discussion on the prudential toolkit to manage financial stability risks from capital inflows and its effectiveness based on the experience of emerging markets presented in Ostry et al. (2012) would be increasingly useful for policymakers in LIDCs. Procyclical and volatile capital flows also pose challenges to traditional monetary policy frameworks in LIDCs that are typically based on targets for the growth rate of monetary aggregates. The instability and unpredictability of monetary aggregates reflect to a large extent high volatility of reserve money, which is linked to capital flows. This reinforces the need to accelerate the process of moving towards modern forward-looking monetary policy frameworks in these countries (IMF, 2014b).

An important avenue for future research would be to identify the precise mechanisms that are driving the results presented in this paper. We suggested that the response of capital flows to the cycle might be linked to the size of the banking sector and to the level of leverage in the economy. The types of financial instruments that are available to international investors could also be a factor in explaining why flows are less procyclical in LIDCs. These countries typically rely more on bank flows and trade finance, whereas in EMs cross-border flows take

more the form of tradable securities that have asset prices, which are themselves procyclical and thus might lead to rebalancing of portfolios over the cycle.

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Figure 1. Comparison between EMs and LIDCs by percentile (% GDP)

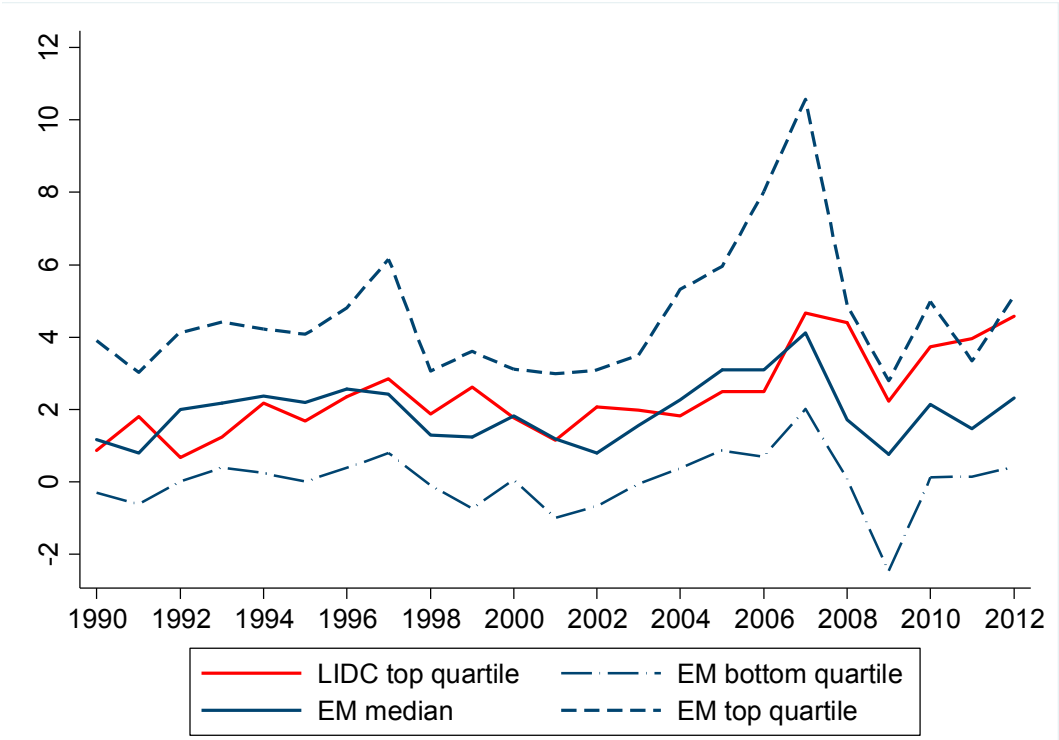

Figure 2. Surges of private non-FDI capital flows (% of total)

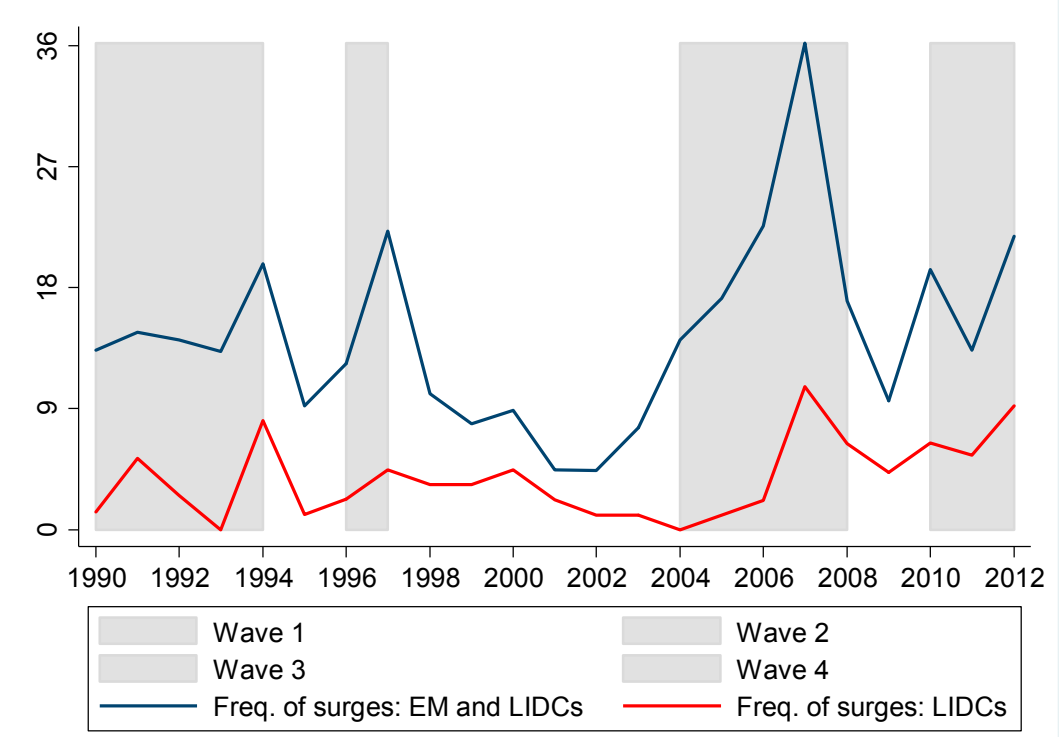

Figure 3. Capital Flows and the Cyclical Component of Output (1990-2012)

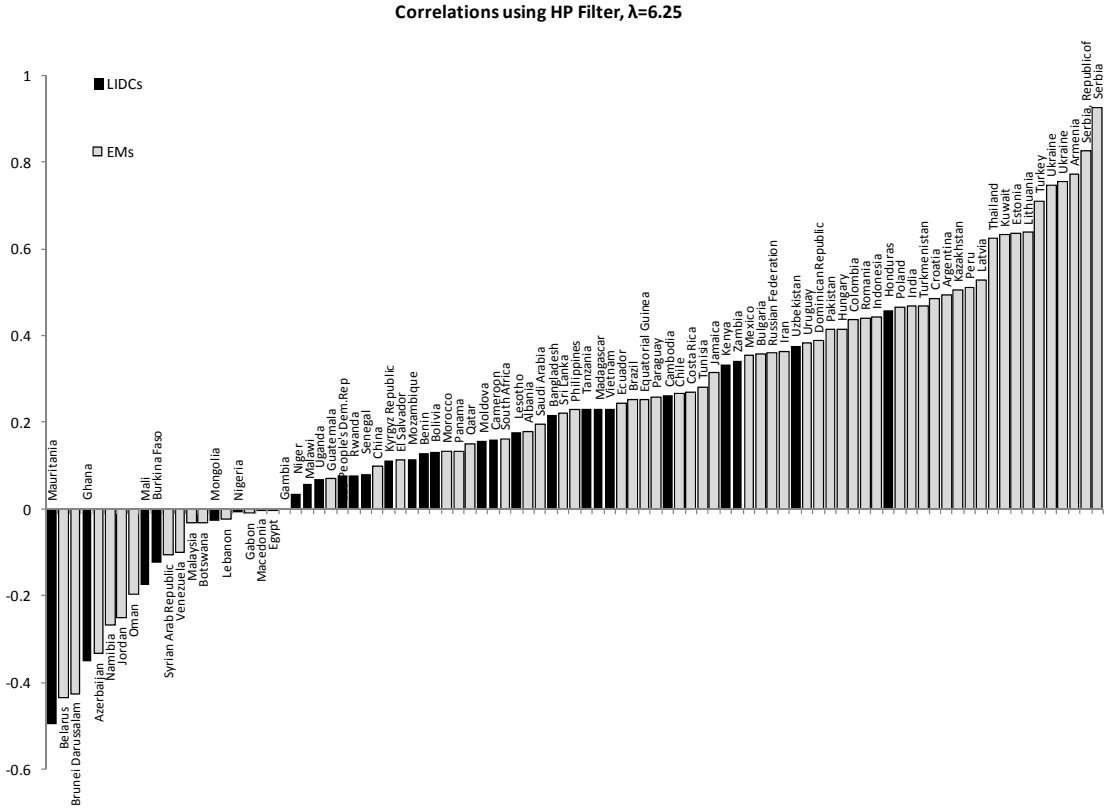

Figure 4. Amplitude of Private Inflows/GDP for periods of Growth above and below the Median

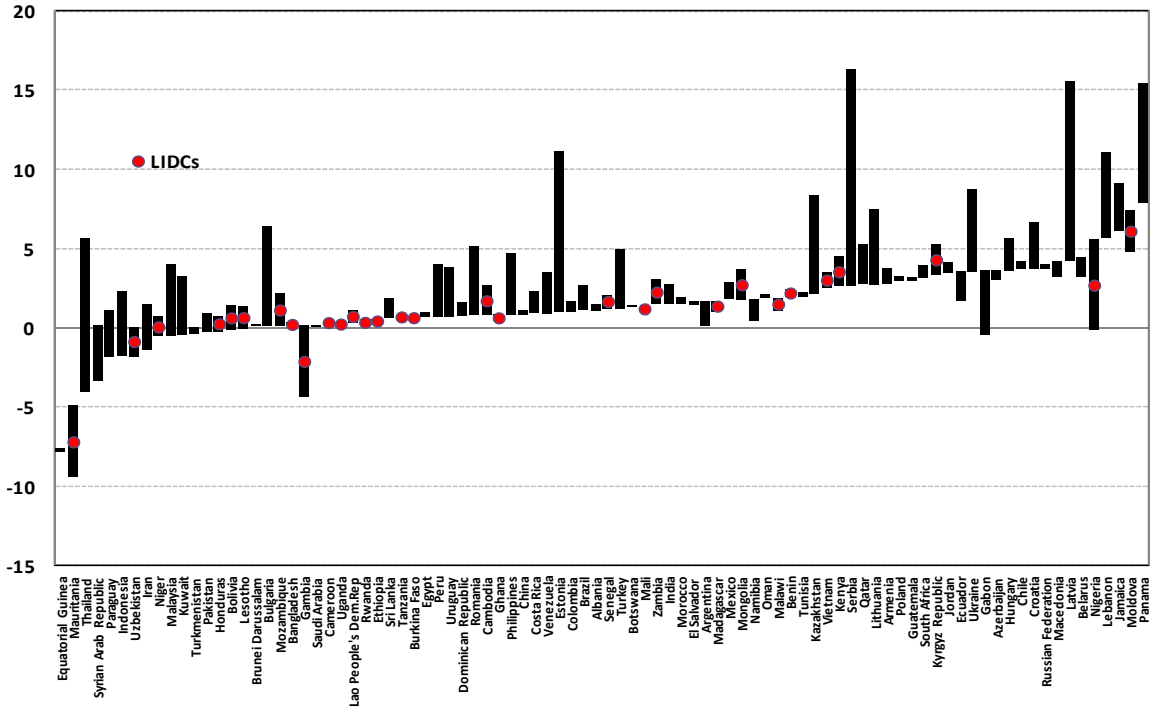

Table 1. Fixed Effects Regressions for Private Non-FDI Capital Flows

	1 Full	2 Full	3 EMs	4 EMs	5 LIDCs	6 LIDCs
Lagged Dependent Variable	0.229***	0.226***	0.202**	0.197**	0.415***	0.390***
	[0.073]	[0.073]	[0.074]	[0.074]	[0.045]	[0.035]
Output Gap	0.296**	0.285**	0.313**	0.314**	0.216*	0.205*
	[0.107]	[0.110]	[0.122]	[0.115]	[0.105]	[0.104]
Δ(VXO)		-1.457***		-1.719***		-0.586***
		[0.447]		[0.588]		[0.142]
Trade Openness		0.281		-0.380		1.591**
		[0.775]		[0.791]		[0.749]
Financial Openness		0.194		0.233		-0.164
		[0.122]		[0.189]		[0.147]
Leverage		0.208		0.462		0.358
		[0.697]		[0.896]		[0.503]
Δ(Terms of Trade)		-1.294		-0.732		-1.746**
		[0.825]		[1.452]		[0.668]
ICRG Index		1.068		-1.074		1.689
		[1.889]		[3.272]		[2.787]
Constant	2.606***	-4.426	3.703***	6.899	0.569***	-14.093
	[0.176]	[7.479]	[0.262]	[12.537]	[0.100]	[11.005]
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,323	1,323	954	954	369	369
Number of countries	75	75	55	55	20	20
R-2 (within)	0.180	0.182	0.193	0.196	0.266	0.289

Driscoll-Kraay standard errors in brackets (robust to cross-sectional dependence). *** p<0.01, ** p<0.05, * p<0.1. Time effects coefficients not reported to save space.

Table 2. GMM Regressions

	1 Full	2 Full	3 EMs	4 EMs	5 LIDCs	6 LIDCs
Lagged Dependent Variable	0.320***	0.274***	0.298***	0.249***	0.513***	0.442***
	[0.065]	[0.063]	[0.068]	[0.068]	[0.107]	[0.092]
Output Gap	0.328***	0.241**	0.351***	0.278**	0.213***	0.175*
	[0.099]	[0.097]	[0.125]	[0.137]	[0.067]	[0.086]
Δ(VXO)		-3.829***		-4.079***		-2.223
		[1.156]		[1.510]		[1.708]
Trade Openness		2.883*		3.558*		1.858**
		[1.475]		[1.997]		[0.873]
Financial Openness		0.470*		0.715**		0.019
		[0.275]		[0.333]		[0.288]
Leverage		0.080		0.036		0.130
		[0.649]		[0.743]		[0.724]
Δ(Terms of Trade)		-1.191		-0.091		-1.263
		[1.095]		[1.894]		[0.822]
ICRG Index		6.629		3.895		4.896
		[4.635]		[6.258]		[5.480]
Constant	0.948**	-39.569*	1.253**	-30.609	0.032	-28.655
	[0.454]	[21.025]	[0.572]	[28.122]	[0.643]	[23.673]
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Hansen test	51.63	58.66	31.85	29.43	0	0
Sargan test	161.6***	283.9***	130.8***	227.6***	63.47***	152.3***
Observations	1,323	1,323	954	954	369	369
Number of countries	75	75	55	55	20	20

Heterocedastcity and autocorrelation (HAC) robust standard errors clustered by country in brackets. *** p<0.01, ** p<0.05, * p<0.1. Time effects coefficients not reported to save space. Sargan and Hansen tests of tests of the validity of overidentifying restrictions. The Sargan statistic is not robust to heteroskedasticity or autocorrelation.

Table 3. Regressions for Countries that Experienced Surges

	1 Full	2 Full	3 EMs	4 EMs	5 LIDCs	6 LIDCs
Lagged Dependent Variable	0.224***	0.219***	0.198**	0.192**	0.421***	0.394***
	[0.073]	[0.073]	[0.074]	[0.075]	[0.048]	[0.042]
Output Gap	0.297**	0.294**	0.323**	0.328**	0.225*	0.222*
	[0.110]	[0.112]	[0.124]	[0.117]	[0.120]	[0.126]
Δ(VXO)		-1.664***		-2.288***		-0.421**
		[0.430]		[0.479]		[0.153]
Trade Openness		0.609		0.105		1.787*
		[0.781]		[0.763]		[1.026]
Financial Openness		0.230		0.283		-0.273
		[0.143]		[0.206]		[0.190]
Leverage		0.411		0.588		0.498
		[0.789]		[0.958]		[0.617]
Δ(Terms of Trade)		-1.915*		-1.133		-2.329**
		[1.083]		[1.690]		[1.094]
ICRG Index		-0.042		-1.688		0.749
		[2.352]		[3.784]		[3.606]
Constant	2.986***	-1.540	3.923***	7.417	1.207***	-11.542
	[0.203]	[9.507]	[0.281]	[14.746]	[0.092]	[14.261]
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,158	1,158	870	870	288	288
Number of countries	67	67	51	51	16	16
R-2 (within)	0.183	0.187	0.194	0.197	0.287	0.313

Driscoll-Kraay standard errors in brackets (robust to cross-sectional dependence). *** p<0.01, ** p<0.05, * p<0.1. Time effects coefficients not reported to save space.

Table 4. Regressions with Time-Variant Unobservable Factors (CCEMG Estimator)

	1 Full	2 Full	3 EMs	4 EMs	5 LIDCs	6 LIDCs
	Pesaran (2006) Common Correlated Effects Mean Group Estimator					
Lagged Dependent Variable	0.203***	-0.152***	0.202***	-0.121**	0.204***	-0.224***
	[0.041]	[0.046]	[0.049]	[0.055]	[0.071]	[0.083]
Output Gap	0.239***	0.154*	0.305***	0.244*	0.136*	0.021
	[0.067]	[0.090]	[0.091]	[0.126]	[0.082]	[0.110]
Δ(VXO)		-0.561		-1.797*		0.438
		[0.687]		[1.067]		[0.617]
Trade Openness		-2.117*		-3.390**		0.135
		[1.245]		[1.538]		[1.739]
Financial Openness		0.553		0.653		0.343
		[0.341]		[0.449]		[0.469]
Leverage		0.605		1.135		-0.351
		[0.931]		[1.366]		[0.987]
Δ(Terms of Trade)		-1.244		-3.316		1.633
		[1.829]		[2.665]		[2.078]
ICRG Index		0.307		-0.108		3.509
		[3.052]		[5.572]		[3.571]
Common factor linked to capital flows	0.646***	0.375***	0.790***	0.559***	0.294**	0.179
	[0.091]	[0.133]	[0.114]	[0.202]	[0.132]	[0.176]
Constant	0.619**	-4.872	0.800**	-3.478	0.106	-14.096
	[0.262]	[10.604]	[0.324]	[17.253]	[0.388]	[14.108]
Root Mean-Squared Error (sigma)	3.25	2.15	3.66	2.43	1.81	1.19
Observations	1,223	1,223	885	885	338	338
Countries	63	63	46	46	17	17

Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. Coefficients for other unobservable time-variant common factors are not reported to save space. Coefficients computed as outlier-robust means

Table 5. Regressions Including Trend Growth

	1 Full	2 Full	3 EMs	4 EMs	5 LIDCs	6 LIDCs
Lagged Dependent Variable	0.229***	0.224***	0.200**	0.190**	0.377***	0.357***
	[0.072]	[0.072]	[0.073]	[0.073]	[0.058]	[0.049]
Output Gap	0.265**	0.259**	0.272**	0.278**	0.243**	0.232**
	[0.108]	[0.110]	[0.122]	[0.116]	[0.095]	[0.096]
Trend Growth	0.196**	0.233***	0.248**	0.369***	-0.240*	-0.218
	[0.069]	[0.047]	[0.092]	[0.077]	[0.139]	[0.148]
Δ(VXO)		-1.328***		-1.590***		-0.520***
		[0.411]		[0.558]		[0.156]
Trade Openness		-0.085		-1.414*		1.411*
		[0.744]		[0.714]		[0.769]
Financial Openness		0.190		0.197		-0.221
		[0.122]		[0.186]		[0.167]
Leverage		0.524		1.067		0.298
		[0.642]		[0.794]		[0.578]
Δ(Terms of Trade)		-1.499*		-1.154		-1.690**
		[0.864]		[1.593]		[0.711]
ICRG Index		-0.627		-4.834*		1.601
		[1.610]		[2.730]		[2.854]
Constant	1.813***	2.186	2.503***	23.756**	1.225***	-11.616
	[0.372]	[6.214]	[0.505]	[9.509]	[0.415]	[11.497]
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,323	1,323	954	954	369	369
Number of countries	75	75	55	55	20	20
R-2 (within)	0.184	0.188	0.199	0.206	0.278	0.298

Driscoll-Kraay standard errors in brackets (robust to cross-sectional dependence). *** p<0.01, ** p<0.05, * p<0.1. Time effects coefficients not reported to save space.

Table 6. Regressions with the Financial Reform Index

	1 Full	2 EMs	3 LIDCs
Lagged Dependent Variable	0.197**	0.133	0.429***
	[0.077]	[0.088]	[0.051]
Output Gap	0.261***	0.328***	0.094
	[0.066]	[0.078]	[0.138]
Financial Reform Index	0.441***	0.616***	-0.070
	[0.102]	[0.141]	[0.162]
Trade Openness	-1.352	-3.168**	0.845
	[1.076]	[1.210]	[1.432]
Leverage	0.533	1.076	-0.071
	[0.602]	[0.812]	[0.553]
Δ(Terms of Trade)	-3.943***	-5.187**	-2.781**
	[1.032]	[1.930]	[0.944]
ICRG Index	0.084	-3.340	3.445
	[2.805]	[4.048]	[3.042]
Constant	-0.130	18.566	-15.414
	[8.953]	[11.662]	[15.086]
Time Effects	Yes	Yes	Yes
Fixed Effects	Yes	Yes	Yes
Observations	706	532	174
Number of countries	53	40	13
R-2 (within)	0.218	0.262	0.299

Driscoll-Kraay standard errors in brackets (robust to cross-sectional dependence). *** p<0.01, ** p<0.05, * p<0.1. Time effects coefficients not reported to save space.

Table 7. Alternative Measures of Capital Flows

	Gross FDI		Gross (Private + FDI)		Net Flows (excl. FDI)	
	1	2	3	4	5	6
	LIDCs	Full	LIDCs	Full	LIDCs	Full
Lagged Dependent Variable	0.644***	0.669***	0.504***	0.415***	0.493***	0.341***
	[0.050]	[0.045]	[0.038]	[0.073]	[0.052]	[0.015]
Output Gap	0.116*	0.016	0.331**	0.284**	0.131	0.143
	[0.063]	[0.034]	[0.154]	[0.110]	[0.150]	[0.097]
Δ(VXO)	0.697***	0.429**	-0.029	-1.060	0.714***	0.052
	[0.087]	[0.173]	[0.374]	[0.686]	[0.210]	[0.231]
Trade Openness	1.446*	1.225**	2.834*	1.715	2.541	1.857**
	[0.795]	[0.467]	[1.572]	[1.202]	[1.491]	[0.834]
Financial Openness	-0.250*	0.326	-0.460***	0.626**	-0.024	0.350***
	[0.121]	[0.206]	[0.132]	[0.249]	[0.201]	[0.090]
Leverage	0.519*	0.204	1.141*	0.309	0.538	0.368
	[0.284]	[0.240]	[0.648]	[0.671]	[0.561]	[0.495]
Δ(Terms of Trade)	0.545	-0.180	-1.142	-1.197	-4.145**	-5.611***
	[0.425]	[0.479]	[0.778]	[1.024]	[1.594]	[1.054]
ICRG Index	1.741	1.591	3.398	2.259	-4.854	-4.026**
	[1.245]	[1.248]	[2.557]	[2.477]	[3.658]	[1.879]
Constant	-13.281*	-11.015*	-26.754**	-13.987	9.104	7.620
	[7.365]	[5.507]	[10.944]	[11.053]	[14.339]	[8.164]
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	367	1,321	366	1,317	373	1,330
Number of countries	20	75	20	75	20	75
R-2 (within)	0.512	0.495	0.446	0.314	0.390	0.397

Driscoll-Kraay standard errors in brackets (robust to cross-sectional dependence). *** p<0.01, ** p<0.05, * p<0.1. Time effects coefficients not reported to save space.

APPENDIX A: DESCRIPTION OF SELECTED VARIABLES

Variable	Description	Sources
Capital Flows	Private capital flows (excluding FDI) as a share of trend GDP. Both variables are denominated in US dollars.	See main text for source on capital flows. GDP in US dollars from WEO dataset.
VXO index	Implied volatility index on the S&P 500. Calculated by Chicago Board Options Exchange.	Haver Analytics
Trade openness	Sum of exports and imports divided by GDP	WEO database
Terms of trade	Log of terms of trade index	WEO database
Country Risk/Political Instability	Log of ICRG composite risk and political risk ratings	ICRG
Financial Account Openness	Chinn-Ito kaopen index, which is based on data from the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions	Chinn &Ito (2006).
Real GDP	Real GDP at constant 2005 national prices (rgdpna series)	Penn World Table, Version 8.0. Feenstra et al. (2013).
Output Gap	Cyclical component of the log of the Real GDP series using the Hodrik-Prescott or Christiano and Fitzgerald filters. The filter was estimated over the entire period for which the GDP data is available in the PWT dataset.	Authors' calculations.
Exchange rates	Nominal LCU/$ (average and end of period) and real exchange rate index	WEO database
Leverage	Private credit to GDP ratio (missing values were interpolated)	Global Financial Development Database. Cihak et al. (2012).

APPENDIX B: DESCRIPTIVE STATISTICS FOR SELECTED VARIABLES

Variable		Mean	Std. Dev.	Min	Max	Observations
(Capital Flows)/(Potential Output)	overall	2.128	5.890	-46.246	68.710	N = 2005
	between		2.934	-7.697	12.171	n = 94
	within		5.168	-36.658	65.482	T-bar = 21.3298
Output Gap	overall	-0.039	3.363	-46.754	22.375	N = 1951
	between		0.216	-1.435	0.374	n = 89
	within		3.356	-45.358	22.737	T = 21.9213
ΔLog of VXO index	overall	2.994	0.322	2.496	3.545	N = 2152
	between		0.004	2.988	3.028	n = 94
	within		0.322	2.462	3.552	T-bar = 22.8936
Log of Terms of Trade	overall	4.631	0.333	2.912	6.360	N = 2048
	between		0.205	4.075	5.359	n = 93
	within		0.265	3.124	5.969	T-bar = 22.0215
Trade Openness	overall	4.251	0.492	2.581	6.696	N = 2110
	between		0.434	3.018	5.212	n = 94
	within		0.233	3.050	6.542	T-bar = 22.4468
Capital Account Openness	overall	0.030	1.464	-1.864	2.439	N = 1906
	between		1.231	-1.864	2.439	n = 92
	within		0.819	-3.686	2.576	T = 20.7174
Leverage	overall	2.943	0.874	-2.161	5.111	N = 1749
	between		0.756	1.373	4.679	n = 92
	within		0.461	-1.136	4.890	T = 19.0109
ICRG Country Risk	overall	4.184	0.144	3.212	4.490	N = 1819
	between		0.101	3.911	4.464	n = 83
	within		0.101	3.390	4.451	T-bar = 21.9157

APPENDIX C: DESCRIPTIVE STATISTICS FOR NON-SMALL NON-FRAGILE LIDCS

Country	Variable	Obs.	Max	Min	Mean	Std. Dev.
Bangladesh	Capital Flows/ Potential GDP	23	2.35	-0.1	0.25	0.49
	Output Gap	22	0.86	-0.62	0.04	0.34
Benin	Capital Flows/ Potential GDP	22	5.38	-1.9	2.25	2.06
	Output Gap	22	1.81	-2.42	-0.05	0.92
Bolivia	Capital Flows/ Potential GDP	23	4.63	-3.54	0.76	2.23
	Output Gap	22	2.32	-1	0.09	0.84
Burkina Faso	Capital Flows/ Potential GDP	18	3.79	-1.44	0.67	1.48
	Output Gap	22	2.94	-3.12	-0.08	1.65
Cambodia	Capital Flows/ Potential GDP	21	8.21	-1.67	1.78	2.24
	Output Gap	22	3.33	-2.88	-0.21	1.79
Cameroon	Capital Flows/ Potential GDP	23	5.05	-4.03	0.38	2.17
	Output Gap	22	1.42	-2.83	-0.04	1
Gambia, The	Capital Flows/ Potential GDP	18	1.5	-8.9	-2.09	3.82
	Output Gap	22	3.69	-2.24	0.03	1.51
Ghana	Capital Flows/ Potential GDP	23	6.09	-3.79	0.64	2.09
	Output Gap	22	3.23	-2.7	-0.02	1.04
Honduras	Capital Flows/ Potential GDP	23	4.48	-4.97	0.35	2.05
	Output Gap	22	2.99	-2.45	-0.07	1.6
Kenya	Capital Flows/ Potential GDP	23	7.87	-0.84	3.68	2.7
	Output Gap	22	2.9	-2.38	0.01	1.4
Kyrgyz Republic	Capital Flows/ Potential GDP	20	20.28	-2.52	4.51	5.91
	Output Gap	22	5.8	-10.56	0	4.18
Lao People's Dem.Rep	Capital Flows/ Potential GDP	23	3.75	-1.07	0.79	1.16
	Output Gap	22	1.93	-1.01	0.1	0.65
Lesotho	Capital Flows/ Potential GDP	23	6.52	-1.02	0.77	1.75
	Output Gap	22	1.56	-1.25	0.05	0.87
Madagascar	Capital Flows/ Potential GDP	23	10.28	-2.87	1.35	3.38
	Output Gap	22	6.7	-8.62	0	3.11
Malawi	Capital Flows/ Potential GDP	23	2.97	-1.97	1.47	1.29
	Output Gap	22	6.26	-9	0.12	3.67
Mali	Capital Flows/ Potential GDP	21	4.28	-1.13	1.2	1.4
	Output Gap	22	2.78	-5.2	-0.07	1.84

Country	Variable	Obs.	Max	Min	Mean	Std. Dev.
Mauritania	Capital Flows/ Potential GDP	23	16.44	-46.25	-7.46	12.93
	Output Gap	22	8.37	-3.47	-0.11	3.1
Moldova	Capital Flows/ Potential GDP	19	15.63	-2.07	5.78	4.62
	Output Gap	22	8.79	-12.56	0	4.66
Mongolia	Capital Flows/ Potential GDP	23	27.75	-4.6	2.87	6.55
	Output Gap	22	5.63	-6.14	-0.21	3.19
Mozambique	Capital Flows/ Potential GDP	23	8.42	-3.08	1.28	2.93
	Output Gap	22	3.79	-5.12	-0.01	2.24
Niger	Capital Flows/ Potential GDP	22	3.65	-4.51	0.15	2.01
	Output Gap	22	4.91	-3.73	-0.04	2.05
Nigeria	Capital Flows/ Potential GDP	23	13.06	-5.63	2.35	5.07
	Output Gap	22	6.76	-5.64	0.37	2.74
Rwanda	Capital Flows/ Potential GDP	23	2.7	-1.98	0.35	1.05
	Output Gap	22	17.39	-40.87	0.12	10.84
Senegal	Capital Flows/ Potential GDP	23	5.71	-2.36	1.75	2.07
	Output Gap	22	1.87	-2.7	-0.02	1.22
Tanzania	Capital Flows/ Potential GDP	23	3.25	-0.77	0.73	1.03
	Output Gap	22	1.01	-0.66	0.04	0.42
Uganda	Capital Flows/ Potential GDP	23	1.93	-1.46	0.26	1.11
	Output Gap	22	2.67	-2.06	0.02	1.25
Uzbekistan	Capital Flows/ Potential GDP	21	2.89	-5.57	-0.53	2.15
	Output Gap	22	4.87	-2.57	0	1.59
Vietnam	Capital Flows/ Potential GDP	17	11.07	0.07	3.01	2.62
	Output Gap	22	1.9	-1.48	-0.05	0.86
Zambia	Capital Flows/ Potential GDP	23	7.47	-2.87	2.38	2.55
	Output Gap	22	5.57	-4.8	-0.01	1.91

APPENDIX D: LIST OF LIDC COUNTRIES AND CLASSIFICATION

Country	Classification		Country	Classification	
Afghanistan, I.R. of	Fragile		Liberia	Fragile	
Bangladesh			Madagascar		
Benin			Malawi		
Bhutan		Small	Mali		
Bolivia			Mauritania		
Burkina Faso			Moldova		
Burundi	Fragile		Mongolia		
Cambodia			Mozambique		
Cameroon			Myanmar	Fragile	
Central African Rep.	Fragile		Nepal	Fragile	
Chad	Fragile		Nicaragua		
Comoros	Fragile	Small	Niger		
Congo, Dem. Rep. of	Fragile		Nigeria		
Congo, Republic of	Fragile		Papua New Guinea		
Côte d'Ivoire	Fragile		Rwanda		
Djibouti		Small	São Tomé & Príncipe	Fragile	Small
Eritrea	Fragile		Senegal		
Ethiopia			Sierra Leone	Fragile	
Gambia, The			Solomon Islands	Fragile	Small
Ghana			Sudan	Fragile	
Guinea	Fragile		Tajikistan	Fragile	
Guinea-Bissau	Fragile		Tanzania		
Haiti	Fragile		Togo	Fragile	
Honduras			Uganda		
Kenya			Uzbekistan		
Kiribati	Fragile	Small	Vietnam		
Kyrgyz Republic			Yemen, Republic of	Fragile	
Lao People's Dem.Rep			Zambia		
Lesotho			Zimbabwe	Fragile	