Queen's Economics Department Working Paper No. 1345

Patterns of International Capital Flows and Productivity Growth: New Evidence

Margaux MacDonald
Queen's University

Department of Economics
Queen's University
94 University Avenue
Kingston, Ontario, Canada
K7L 3N6

7-2015

Patterns of International Capital Flows and Productivity Growth: New Evidence

Margaux MacDonald*

April, 2015

Abstract

Recent evidence from developing and emerging economies shows a negative correlation between growth and net capital inflows, a contradiction to neoclassical growth theory. I provide updated and disaggregated evidence on the origins of this puzzle. An analysis of the components of capital flows and of gross portfolio positions shows that foreign direct investment is directed towards countries with the highest growth rates, but that portfolio investment outflows exceed these inflows. Liberalized capital accounts further exacerbate this pattern. My results suggest a desire for international portfolio diversification in liquid assets by fast growing countries lies at the heart of the puzzle.

Keywords: Gross capital flows; Net capital flows; Allocation puzzle; Productivity growth

JEL Classification Numbers: F21,F41, F43,

*Department of Economics, Queen's University, Kingston, ON, Canada, K7L 3N6; macdonald@econ.queensu.ca. I thank Gregor Smith, Allan Gregory, an anonymous referee of this journal, and participants at the 2013 Canadian Economics Association meetings for their helpful comments.

1. Introduction

Aggregate capital flows to developing and emerging market economies have increased substantially since 1980. Unsurprisingly this has generated interest in understanding the behavior and consequences of these flows. One recent observation related to the rise in global capital flows is depicted in figure 1 (a), which shows that the developing and emerging countries with the lowest productivity growth rates relative to the world frontier growth rate have experienced the largest net inflow of capital. This stands in contradiction to neoclassical growth theory, which predicts countries furthest from the productivity frontier will have the fastest growth rates and will import relatively more capital to finance high levels of investment and smooth consumption.[1] Gourinchas and Jeanne (2013), Prasad, Rajan, and Subramanian (2007), and Alfaro, Kalemli-Ozcan, and Volosovych (2014) were the first to document this puzzling finding.

The purpose of this paper is to study whether there is empirical evidence to support the hypothesis that differences in the degree of asset liquidity and in financial markets can explain the departure from neoclassical growth theory predictions observed across developing and emerging market economies between 1980 and 2010. I begin by using a larger dataset both in the number of countries and the time frame relative to previous empirical studies, and confirm that there is a negative correlation between net capital inflows and productivity growth relative to frontier productivity growth, referred to in the literature as "productivity catch–up" (this is defined explicitly in section 3.2).[2] Unlike previous studies, I find that this negative correlation is markedly influenced by the degree of capital account openness in each country. Results are robust to several different measures of growth and capital flows, and to a shorter sample period.[3]

Once these general features of the productivity catch–up–capital flow relationship are documented, I study the components of aggregate capital flows in more detail. Because demand for each component of capital is based on different needs and because each may be subject to different regulations, the behavior of different types of capital flows will point to broader financial market characteristics and different levels of liquidity demand in emerging market countries. I hypothesize that these factors may explain the negative correlation between catch–up and net capital inflows. Specifically, I disaggregate net capital flows into direct

[1] See Gourinchas and Jeanne (2013) and Gourinchas and Rey (2013) for a theoretical derivation of the predicted positive relationship between productivity growth and capital inflows.

[2] The dataset contains 92 countries over the time period 1980–2010. This is larger than in other papers that studied the puzzle, including Gourinchas and Jeanne (2013) who covered 67 countries over the 1980–2000 period and Alfaro *et al.* (2012) who covered 75 countries over the 1980–2007 period. See table 1 for the list of countries included in the sample. Robustness exercises were conducted for the time period 1990–2010 and this sample contains 95 countries.

[3] Robustness results are provided in a supplementary online appendix, available from the author at https://sites.google.com/site/margauxmacdonald/home/research.

investment and portfolio investment flow components (including foreign exchange reserve flows, portfolio debt flows, portfolio equity flows, and financial derivative flows) and study each separately. While previous studies have focused on the division of aggregate net capital flows into public and private components, this is a more detailed analysis that partitions the data one step further. I show that it is the most liquid assets, including foreign exchange reserve purchases, which are the primary source of the negative correlation between aggregate net capital inflows and productivity catch–up. Furthermore I show that this result is relatively consistent across the distribution of capital flow size, and is not driven by outlier countries with the largest capital flows.[4]

I then disaggregate capital flows further by looking at patterns of gross capital flows. I show that large volumes of *gross capital outflows* from the fastest growing countries are driving the negative correlation between net capital inflows and productivity catch–up. These gross outflows are composed mainly of portfolio investments. I also show that there is a positive correlation between *gross capital inflows* and productivity catch–up among this set of countries, as predicted by theory. These gross inflows, unlike gross outflows, are composed primarily of direct investment. Countries with more open capital accounts see relatively larger gross portfolio investment outflows, foreign exchange reserve purchases, and gross direct investment inflows in response to a rise in productivity catch–up. Thus, the negative relationship between relative productivity growth and net capital inflows is not a result of lower investment rates in countries with higher relative productivity growth rates, but rather of greater investment in foreign portfolio assets by countries with higher relative productivity growth rates. This suggest that a strong international portfolio diversification motive in fast growing countries is driving the puzzle.

The paper proceeds as follows. Section 2 provides a brief overview of related empirical and theoretical literature. Section 3 describes data collection and variable construction methods. Section 4 confirms the negative correlation between productivity catch–up and net capital inflows with the larger dataset, and examines the role of financial market characteristics and of different types of capital. Section 5 looks at the role of gross portfolio positions. Section 6 concludes.

[4]A panel analysis as well as an analysis of the shorter 2007–2010 period were also conducted, but are not reported here. The puzzle lies in the long run relationship between net capital inflows and growth, and so studying the panel does not provide any additional insights to the origins of the puzzle. Similarly, the three–year period 2007–2010 is most likely not a sufficiently long time period for investors to react to changing productivity growth rates in EMEs. Unfortunately the Lane and Milesi-Ferretti (2007a) External Wealth of Nations dataset that I use in this study is updated only to 2011, so any specific analysis of the financial crisis and subsequent years is not feasible.

2. Research Context

Two strands of literature have emerged in an attempt to explain the puzzling negative relationship between net capital inflows and productivity growth *across* developing and emerging market countries.[5] Empirical studies distinguish between public and private capital flows, finding that they respond differently to high rates of productivity growth. Meanwhile, theoretical studies focus on the role financial market frictions and incomplete risk sharing have in producing the negative correlation. This paper lies at the confluence of the empirical and theoretical literature.

Prasad et al. (2007), Gourinchas and Jeanne (2013), and Alfaro *et al.* (2012) find a negative correlation between productivity growth and net capital inflows across a sample of developing and emerging economies.[6] Gourinchas and Jeanne (2013) and Alfaro *et al.* (2012) explain this negative correlation by isolating public and private capital flows, and showing that sovereign-to-sovereign transactions are primarily responsible for the observed negative correlation between growth and net capital inflows. Prasad *et al.* (2007), on the other hand, find large foreign capital inflows cause real exchange rate overvaluation which reduces the profitability of domestic investment and impedes growth. Aguiar and Amador (2011) also study the behavior of public capital flows in relation to growth in developing countries, albeit with a specific focus on foreign exchange reserve accumulation. In a related empirical study Aizenman, Pinto, and Radziwill (2007) find that those developing and emerging countries which self-financed investment during the 1990s tended to have higher growth rates on average than those who financed investment with foreign capital.

A number of studies have taken these empirical findings as fact and modeled the puzzling negative correlation between capital flows and growth. Buera and Shin (2011), Sandri (2014), and Song, Storesletten, and Zilibotti (2011) theorize that the negative correlation between capital inflows and growth is driven by limited financial market access for entrepreneurs, which forces these agents to self–finance investment with personal savings. These models predict that following a rise in growth rates, aggregate savings rise immediately while aggregate investment rises after a time lag, thereby generating capital outflows. Related studies, including Mendoza, Quadrini, and Rios-Rull (2009) and Caballero, Farhi, and Gourinchas (2008), find that different levels of financial market development produce global imbalances as savers in less-developed financial markets seek safe assets in US bonds. Benhima (2013) focuses on the role of investment risk and portfolio

[5]Note that this puzzle is different than the Lucas (1990) puzzle, which finds that capital does not flow from rich to poor countries. Here it is the allocation of foreign capital across developing countries that is puzzling — regardless of its origins.

[6]This literature uses various different measures of growth: Gourinchas and Jeanne (2013) use productivity catch-up (defined in section 3.2), Prasad *et al.* (2007) use GDP growth, and Alfaro *et al.* (2012) use GDP growth relative to U.S. GDP growth.

composition in generating the negative correlation between productivity growth and net capital inflows. He shows that once uninsurable idiosyncratic investment risk is included in a neoclassical model, it predicts a negative correlation between growth and net capital inflows for those countries with negative steady-state external positions (which relates to the well-known Kraay and Ventura (2000) result).

These theoretical contributions to the literature inspire the direction of this paper. In particular, I study the role financial market characteristics and availability of liquid assets have on capital flows by looking at specific measures of financial market size and disaggregated capital flows. This touches on the completeness of financial markets, which the theoretical literature has noted is of importance. Furthermore, I investigate the patterns of gross flows, which indicates whether financial frictions are present for both domestic and foreign residents and whether they cause similar distortions for both groups.

The decision to study gross capital flows, which have not been examined in any of the studies described above, is based on recent trends in the international capital flow literature. Lane and Milesi-Ferretti (2007b) document the rise in gross international asset trade since the mid– to late–1990s, and note that gross portfolio positions have become multiple times the size of GDP for many industrial and non-industrial countries. With such large positions, the return differential on foreign asset and liabilities can significantly affect the dynamics of a country's net foreign asset position.[7] It is therefore important to study the implication such large gross positions have, and in particular their relationship to productivity growth. Studying gross flows also speaks to the Feldstein and Horioka (1980) puzzle — that savings and investment exhibit a positive correlation in open economies. From this perspective, the puzzling negative correlation between net capital inflows and productivity catch–up must be due to a larger positive correlation between productivity catch–up and savings versus investment. The analysis of gross flows explicitly measures the size of each of these correlations.

3. Data and Method

I assemble a comprehensive data set which characterizes capital inflows, capital outflows, productivity growth, productivity catch-up, and financial market characteristics on an annual basis for a large set of countries over the period 1980–2010. Data for national accounts, population, GDP, price levels, income classification, investment, and consumption are from the World Bank's World Development Indicators and Heston, Summers, and Aten (2012). Data on external capital asset and liability positions, including the division of total net foreign assets into foreign direct investment, portfolio debt, portfolio equity, foreign exchange reserves,

[7] Other studies documenting the substantial rise in gross portfolio flows include Forbes and Warnock (2012), Broner, Didier, Erce, and Schmukler (2013), and Cardarelli, Elekdag, and Kose (2010).

and financial derivatives are from Lane and Milesi-Ferretti (2007a). These authors construct external wealth components based on a compilation of reported data published by individual countries and international organizations (the IMF, the World Bank, and the Bank for International Settlements). The benefit to using this dataset rather than the IMF's Balance of Payment Statistics is a wider coverage of countries. Other control variables used include the *de jure* capital account openness index developed by Chinn and Ito (2008), and financial market development indicators from Abaid, Detragiache, and Tressel (2008). The starting point of the time series is set to 1980, prior to which developing and emerging countries had very limited international capital flows. As a robustness exercise the starting point of the sample period is set to 1990, results for this exercise are available in the online appendix.

The initial sample contains 117 countries. I include all countries who report current account balances, net foreign asset positions, and other relevant series required to construct total factor productivity (TFP). Consistent with previous studies, I create a five year window around the first and last years of the sample in order to include those countries who do not report the necessary data for the full sample (for instance China).[8] I focus on developing and emerging market countries only, dropping OECD countries from the sample with the exception of Israel, Chile, Korea, Mexico, and Poland. These countries were only named to the OECD group after 1994, which is more than halfway through the sample period. The final data set contains 92 countries which are listed in table 1. The 1990-2010 sample, results for which are available online, contains 95 countries including several Eastern European countries (Albania, Bulgaria and Romania) and other emerging markets (Vietnam, Lebanon).[9] Results for both samples are qualitatively similar. As noted, the sample of countries used in this study is larger than the sample used in related studies. The additional countries in my sample which are not included in previous studies are noted in table 1 and include countries with substantial international capital flows such as Hungary, Poland, South Africa, Botswana, Algeria, and Nicaragua, among others.

3.1. Measuring Capital Flows

I calculate net capital inflows as the negative of the ratio of the change in reported net foreign assets to initial GDP between 1980 and 2010, using data from Lane and Milesi-Ferretti (2007a). The series is normalized by GDP to control for the relative size of countries' economies. Normalizing by GDP is useful because large capital inflows may not be of concern for larger economies who have large absorptive capacity, as noted by

[8]For the variables *portfolio equity* and *financial derivatives* most countries either do not have any data or have not reported data prior to the early 2000s. When using these variables in the analysis section, I drop all countries and years with missing data.

[9]Several, generally small countries, dropped out of the sample between 1980 and 1990.

Ghosh et al. (2014).[10] The current account (plus errors and omissions) to GDP ratio is used as an alternative measure to test robustness, results are similar and reported in the online appendix.[11] Using the current account ensures that valuation effects, which are implicitly included in net foreign assets, are not driving the results. Lane and Milesi-Ferretti (2001) and Alfaro *et al.* (2007, 2012) note concerns surrounding both measures of capital flows, namely that there may be substantial differences in reporting or misreporting for many countries. That estimation results using both the change in net foreign assets and the current account are similar suggests that neither valuation effects nor mis–reporting are affecting the results.

The Lane and Milesi-Ferretti (2007a) dataset divides net foreign assets into the following components:

$$\begin{aligned} NFA_{it} &= TA_{it} - TL_{it} \\ &= (FDI^A_{it} + PD^A_{it} + PE^A_{it} + FD^A_{it} + FXRes_{it}) - (FDI^L_{it} + PD^L_{it} + PE^L_{it} + FD^L_{it}) \end{aligned} \tag{1}$$

where TA_{it} is total assets for country i in year t, TL_{it} is total liabilities, FDI_{it} is net foreign direct investment, PD_{it} is net portfolio debt (which is the sum of portfolio debt securities and other investment), PE_{it} is net portfolio equity, FD_{it} is net financial derivatives, and $FXRes_{it}$ is foreign exchange reserves (excluding gold). Variables with a superscript A are gross asset stocks and those with a superscript L are gross liability stocks. I calculate the net inflow of each component, which I define as the negative of the change in reported net assets over initial GDP between 1980 and 2010. The exception to this is foreign exchange reserves which are purely an outflow variable. The negative of reported foreign exchange reserves is used to keep consistency in reporting capital inflows. I also study gross capital inflows, which I define as the ratio of the change in gross assets or gross liabilities to initial GDP between 1980 and 2010.

Lane and Milesi-Ferretti (2007a) report external positions in U.S. dollars. I convert the series to purchasing power parity (PPP) dollars by constructing a PPP price deflator using data from Heston et al. (2012) defined as $Q_{it} = (pi_{it} \cdot cgdp_{it})/rgdpl_{it}$, where $cgdp$ is PPP converted GDP per capita at current international dollar prices, pi is the price level of investment, and $rgdpl$ is real GDP per capita using the Laspeyres index in 2005 constant prices. Variables reported in U.S. dollars are divided by this deflator in order to convert them to a PPP basis.[12]

[10] Results are qualitatively similar when flows are normalized by 2010 GDP.

[11] I assume errors and omissions as unreported capital outflows. It is a common approach in the literature to assume that capital inflows are reported accurately, but that capital outflows tend to be misrepresented in most countries.

[12] In their paper Gourinchas and Jeanne (2013) also convert all series to PPP terms, and note that while using PPP adjustments will reduce the estimated size of capital flows relative to output in poor countries, because they tend to have a lower price of output, it will not change the sign.

3.2. Measuring Growth

Various measures are used to defined growth and return on investment in neoclassical growth theory, the most common of which are average TFP or GDP growth, and TFP or GDP growth relative to their frontier growth rates. In this study I use TFP growth relative to the frontier TFP growth rate as the principal measure of growth, and use average and relative GDP growth as robustness tests. My motivation for focusing on TFP growth comes from several sources. Prasad *et al.* (2007) show a strong positive correlation between average GDP growth and the Bosworth-Collins measure of TFP growth for nonindustrial countries. Hall and Jones (1999), Easterly and Levine (2011), and Prescott (1998) show that relative to physical or human capital, TFP explains most output differences across countries. Gourinchas and Jeanne (2013) note that cross-country differences in income per capital are predominantly driven by differences in TFP. This implies that high productivity growth will increase the marginal product of capital, which should in turn stimulate investment and capital inflow. The amount of capital a country is able to absorb will depend on their level of TFP, thus as TFP growth rises the increase in capital stock should be filled by foreign capital inflows.

I define TFP growth as a residual and I calculate its value using standard development accounting methods, as described in detail by Caselli (2005). I assume a Cobb-Douglas production function, expressed in log-per worker terms as $lny_{it} = (1-\alpha)lnA_{it} + \alpha lnk_{it}$. The labor force in each country is derived from the adult population data series available from the World Development Indicators database. Capital's share of output is set to $\alpha = 0.3$ for all countries, which is common in related literature.[13] Initial capital stock is defined as $K_{i0} = I_{i0}/(\gamma_i \delta)$, where I_{it} is investment, γ_i is the geometric growth rate of investment over the period 1970–1980, and δ is the rate of depreciation. The rate of depreciation is set to $\delta = 0.06$, following Caselli (2005). Capital stock in subsequent years is measured using the perpetual inventory method according to $K_{it} = I_{it} + (1-\delta)K_{it-1}$. Investment, I_{it}, is constructed from Heston et al. (2012) using the investment share of real GDP per capita variable. Investment is calculated as $I_{it} = rgdpl_{it} \cdot ki_{it} \cdot pop_{it}$, where ki is investment's share of GDP per capita (where GDP is PPP converted in 2005 constant prices), and *pop* is total population. The Cobb-Douglas production functions allows one to easily back out TFP as $lnA_{it} = (lny_{it} - \alpha lnk_{it})/(1-\alpha)$. The TFP series are not de-trended or filtered. Results with HP-filtered series are not shown, and are similar.

There is a long history in the literature relating technology, distance to the frontier, and growth conver-

[13] As a robustness exercise capital's share of output is replaced with alternative values from Caselli and Feyrer (2007). The online appendix provides details on this measure and estimation results. An alternative approach is to use the more general translog function to estimate TFP, as in Griffith, Redding, and Van Reenen (2004) who use industry–level data from the OECD to estimate this function. Unfortunately there is insufficient industry–level data for my sample of EMEs to do the same here.

gence. Nelson and Phelps (1966) stress the importance of "technology gaps" as a determinants of technology diffusion. Findlay (1978) applies this concept to explain foreign capital investment. I define a measure of relative TFP growth which is the same as that used by Gourinchas and Jeanne (2013) and Alfaro *et al.* (2012). This productivity catch-up measure defines a country's TFP growth relative to the frontier TFP growth. Specifically

$$\pi_i = \frac{\exp(\ln A_{it} - \ln A_{i0})}{g_{US}^T} - 1 \tag{2}$$

where g_{US} is the average TFP growth in the U.S. over the period 1980–2010 (1990-2010), which is used as a proxy for frontier TFP growth.

For a robustness exercise I use GDP growth in place of productivity catch up. GDP growth was used as the main dependent variable by Alfaro *et al.* (2012) and Prasad *et al.* (2007). GDP growth is defined as $\triangle y_i = ((y_{iT} - y_{i,0})/y_{i,0}) \cdot 100$. The estimation results are similar to those using productivity catch up. I conduct estimation using GDP growth relative to frontier GDP growth (proxied by U.S. GDP growth) as another robustness test. The results are qualitatively similar and reported in the online appendix.

4. Analyzing the Puzzle: Net Capital Inflows

Summary statistics motivating this study are reported in table 2. The underlying puzzle which I am studying can be observed in the bottom panel of column (1), which reports a negative correlation coefficient between net capital inflows ($-\triangle NFA_i/Y_{i0}$) and productivity catch-up (π_i). Columns (3) and (4) suggest that this negative correlation may be driven by countries at the lower end of the net capital inflow distribution. I will carefully analyze this possibility in section 4.3. In no instance do I take a stand on the direction of causation between these variables, rather the analysis focuses on examining these correlations more explicitly.

The additional correlation coefficients reported in the bottom panel of column (1), (3), and (4) provide context for the direction my analysis will take. I will show that the negative correlation between net capital inflows and productivity catch-up is driven by gross capital outflows whose magnitude exceeds gross capital inflows in the fastest growing countries. Alternatively this can be stated by saying that purchases of foreign assets by domestic residents exceed purchases of domestic assets by foreigners, in the fastest growing countries. The correlation coefficients hint at this result, with the correlation coefficient between gross change in total assets (gross capital outflows) and productivity catch-up larger than the correlation coefficient between

gross change in total liabilities (gross capital inflows) and productivity catch-up, in the full sample. I will show that the puzzle being studied is not a lack of capital flowing to fast growing countries (in fact it is), but rather that on a gross basis, the fastest growing countries are exporting more capital than they are importing.

Of note is also the observation that across all countries there is a very high correlation between gross capital inflows and gross capital outflows. Those countries importing the most capital are also the ones exporting the most capital to international markets. Broner, Didier, Erce, and Schmukler (2013) were the first to note this large, positive correlation between foreign capital imports and domestic capital exports. The focus here is on the long-run correlation between capital inflows and outflows across countries, unlike in Broner et al. (2013) who focus on the correlation over business cycles.

I hypothesize that the large positive correlation between gross capital outflows and productivity catch-up, and between gross capital outflows and gross capital inflows may be the result of insufficient savings instruments for domestic residents in fast growing emerging market economies. The volatile nature of productivity catch-up in these countries further suggests that the large volume of capital outflows may be the result of a strong demand for safe assets and international portfolio diversification.[14] In fact as table 2 shows, the domestic savings rate is negative correlated with net capital inflows. As domestic savings rises, local residents' increase in purchases of foreign assets exceeds foreign investors' purchases of domestic assets.

In order to determine whether a lack of savings instruments and a desire for international portfolio diversification is causing the negative correlation between productivity catch-up and net capital inflows, I conduct a detailed analysis which looks at the behavior of each component of capital separately as well as at certain financial market characteristics. I show that the original negative correlation between net capital inflows and productivity catch-up is driven by large gross capital *outflows* from fast growing countries, and specifically that productivity catch-up is positively correlated with net *outflows* of highly liquid portfolio assets and positively correlated with net *inflows* of much less liquid direct investment; these results support the initial hypothesis.

[14]Measuring the demand for safe assets has been studied extensively in the literature. IMF (2012), Caballero (2010), Caballero et al. (2008), Caballero and Krishnamurthy (2009), and Bernanke (2005) among others, note that even prior to the financial crisis of 2007 there was high demand for safe assets in world financial markets. In particular, the large and rapid accumulation of foreign exchange reserves coupled with financial market underdevelopment witnessed in developing and emerging economies demonstrated that the demand for foreign safe assets in these countries far exceeded their supply.

4.1. Net Capital Inflows and Productivity Catch–Up

The puzzling relationship between net capital inflows and productivity catch-up is displayed in figure 1 (a), which plots net capital inflows against productivity catch-up over the 1980–2010 period. The negative correlation is of similar magnitude to the correlation found by Gourinchas and Jeanne (2013), though the sample size and time period are significantly larger (92 versus 67 countries).

To investigate the robustness of the negative correlations displayed in figure 1 (a), I estimate a cross-section regression of net capital inflow on productivity catch-up. I include control variables for capital account openness, an interaction term between capital account openness and growth, the growth rate of the work force (n_i), initial capital per worker as a fraction of initial GDP per worker (k_{i0}/y_{i0}), and initial debt levels per worker (d_{i0}/y_{i0}). This set of controls is identical to those used by Alfaro *et. al* (2012) and Gourinchas and Jeanne (2013), which facilitates comparison. I also include measures of financial market size to control for the amount of domestic assets (primarily liquid assets) available in each country. These are private credit by commercial banks and other financial institutions, financial systems deposits, stock market capitalization, and domestic private debt securities issued in domestic markets.[15]

Results are reported in table 4.[16] Columns (1)-(5) report results from regressing net capital inflows on productivity catch-up and controls, and columns (6)-(10) report results from regressing net capital inflows on GDP growth and controls. The point estimates for both productivity catch-up and GDP growth are negative and statistically significant for all versions of the model. These strongly significant negative point estimates suggest that the puzzle is robust to different measures of growth. The coefficients on the interaction term between productivity catch-up or GDP growth and capital account openness is negative and statistically significant for all versions of the model, indicating that the total impact of a change in productivity catch-up is greater the more open a country's capital account. These effects are substantial, with a 1% increase in productivity catch–up (which represents a $0.01/(\pi+1)$ increase in productivity) associated with a reduction in net capital inflows of 10% of initial capital over the 30 year period in the most open economy (column (1), table 4).[17]

[15]Financial market data is from Beck, Demirguc-Kunt, Levine, Cihak, and Feyen (1999) (2013 update). Private credit is private domestic debt securities issued by financial institutions and corporations as a share of GDP. Financial system deposits are demand, time, and saving deposits in banks and other financial institutions as a share of GDP. Stock market capitalization is the value of listed shares to GDP. Domestic private debt securities are private domestic debt securities issued by financial institutions and corporations as a share of GDP.

[16]Estimates using the shorter 1990-2010 sample are reported in the online appendix.

[17]The change in productivity from a 1% change in π is: $\%\Delta A_T = (A_T^{'} - A_T)/A_T = ((\pi^{'}+1)A_0 g^T - (\pi+1)A_0 g^T)/(\pi+1)A_0 g^T = 1/(1+\pi)$. The impact on capital inflows is calculated as:$(-3.454 - 2.6 \times (2.453)) \times 0.01 = 9.83\%$ of initial capital (with a standard error of 2.97%), where 2.6 is the highest degree of capital

That the degree of capital account openness plays a role in reducing net capital inflows in response to productivity catch-up corroborates the findings of Aguiar and Amador (2011) who show that the negative relationship between foreign exchange reserve accumulation and growth depended on capital account openness. Here I extend their conclusion to aggregate capital accumulation. Several other versions of the model as well as a number of robustness checks are conducted, and results are similar to those reported here.[18] In most cases including controls for financial market size reduces the magnitude of the coefficient on productivity catch-up slightly. The coefficient estimate on stock market capitalization is statistically significant, suggesting that a greater availability of liquid assets may reduce net capital inflows somewhat. This could be driven by, for example, domestic residents decreasing their foreign asset purchases when they are able to satisfy their liquidity needs in their home market.

4.2. Net Capital Inflow Components and Productivity Catch–Up

Existing literature has focused on disaggregating net capital inflows into public and private components. These studies classify foreign direct investment assets and liabilities, portfolio equity assets and liabilities, financial derivatives assets and liabilities, and certain components of portfolio debt as "private capital flows", and classify foreign exchange reserves (excluding gold) and the remaining components of portfolio debt assets and liabilities as "public capital flows". In this section I study each component individually, paying particular attention to different components of private capital.[19,20] The advantage to analyzing each component of capital separately and examining them apart from the public–private context is to determine whether certain types of capital exhibit a positive correlation with productivity catch-up and others do not, and thus which sectors of financial markets or which types of assets are generating the negative correlation between aggregate net capital inflows and growth. For example, different behaviors of foreign direct investment and portfolio equity investment may suggest a different ability to access financing for liquid versus non-liquid investments in a country. The average size of the net flows of each component is denoted in column 1 of table 3.

Figures 1 (b)-(f) plot each component of net capital inflows against productivity catch-up over the period

account openness in the the Chinn–Ito index, which ranges from -2.6 to 2.6.

[18] In addition to using the 1990-2010 sample, the online appendix reports robustness exercises using different measures of capital inflows, estimates of marginal products of capital in place of productivity catch-up, GDP catch–up instead of productivity catch–up, and controls for institutional quality. The results show a negative correlation between sophisticated measures of marginal products and net capital inflows, similar to those discussed above. Results using GDP catch–up and those controlling for institutions are qualitatively unchanged from those in Table 3.

[19] In their most basic measure of private capital, Alfaro *et. al* (2012) do not disaggregate the stock of foreign direct investment and of portfolio equity holds. In this section I show that in fact these two forms of capital behave very differently in relation to productivity catch-up.

[20] Portfolio debt assets and securities include portfolio debt securities and other investment.

1980-2010. Table 5 reports estimation results from regressing net inflow of each component of capital on productivity–catch-up and controls. Regression estimates using GDP growth in place of productivity catch-up produced similar results, and are not presented.

Column (2) of table 5 reports a positive and statistically significant coefficient estimate from regressing foreign direct investment inflows on productivity growth, this is in accordance with neoclassical growth theory. The coefficient estimates for all other components of capital on productivity catch-up (columns (1) and (3)-(5)) are all negative and statistically significant, a contradiction to neoclassical growth theory. These estimates indicate that a 1% rise in productivity catch–up in the most open economy is associated with a 3% increase in net FDI inflows and a 5% decrease in net portfolio debt inflows over the 30 year period (both relative to initial levels).[21] Other components exhibit similar sized estimates. To a degree, this result supports previous studies which have found that public capital flows (in particular foreign exchange reserves) are negatively correlated with growth while private capital flows (in particular foreign direct investment) are positively correlated with growth. The results reported in table 5 however, extend this explanation. While portfolio debt is comprised of both public and private capital, portfolio equity and financial derivates are primarily private capital, and they are all predicted to decrease in response to a rise in productivity catch-up.

The distinction between which types of capital are positively correlated with growth and those which are negatively correlated depends more on the degree of asset liquidity than whether these assets are publicly or privately sourced. Generally, portfolio investments (portfolio debt, portfolio equity, and financial derivatives) are significantly more liquid than direct investments. As noted by Itay and Razin (2006) the choice between FDI investment and portfolio investment is inherently a choice between control and liquidity. They find that investors with high (low) expected liquidity needs, or high (low) probability of experiencing a liquidity shock, are more likely to choose less (more) active investments. Given that table 2 shows that growth rates are quite volatile in the set of countries I study, it is not surprising that there is high demand for liquid assets in these countries. It is this demand for liquid assets that seems to be driving the negative correlation between capital inflows and growth in fast growing countries. As was the case with aggregate net capital inflows, the degree of capital account openness further increases the negative correlation between portfolio investment assets and productivity catch-up. Overall the results from table 5 suggest that the public-private distinction does not fully explain the negative correlation between net capital inflows and productivity–catch-up, rather the distinction between direct investment and portfolio investment more clearly separates those types of capital which are positively correlated with growth and those which are negatively correlated.

[21] The standard deviation of these estimates are 1.87% and 1.88%, respectively.

That productivity catch–up is associated with net portfolio outflows may also suggest that investors in fast–growing EMEs are taking advantage of integrated financial markets for international diversification and consumption smoothing purposes — as neoclassical theory predicts. Empirical evidence of this consumption–smoothing channel is, however, quite limited. For example Kose, Prasad, and Terrones (2003) show that financial integration actually increases consumption volatility in EMEs. Thus, while my results are suggestive of a consumption smoothing channel, because I do not look directly at consumption data I can not speak to it directly. This would be an interesting avenue for future research.

4.3. Net Capital Inflows: Are Outliers Driving the Results?

In order to ensure that the results reported in tables 4 and 5 are not driven by outlier countries with capital flows which are large relative to the mean, quantile regressions are estimated for aggregate and disaggregate net capital flows at the 20th, 50th, and 80th quantile. In particular, East Asian countries with large purchases of foreign exchange reservers, portfolio equity, and portfolio debt come to mind as possibly influencing the results presented thus far.

Columns (1)-(2) of table 6 report quantile regressions for aggregate net capital inflows on productivity catch-up and controls. It is clear that in those countries at the lower end of the distribution (those with the largest negative net capital inflow), productivity catch-up is associated with larger and more significant net capital outflows. For all types of capital flows except FDI, reported in columns (3)-(12), the coefficients on productivity catch-up and on the interaction between productivity catch-up and capital account openness are also all larger negative values at the lower end of the distribution.

Table 6 suggests that up to a point the main results presented in table 5 are influenced by countries with the largest net capital outflows (smallest net inflows). However these countries are not driving the entire result. Once interacted with capital account openness the estimated coefficients for all types of capital flows (except FDI) on productivity catch-up are generally still negative and statistically significant for countries at the upper end of the distribution. In those cases when the upper quantile regressions report positive estimated coefficients on productivity catch up these coefficients are quite small and not statistically significant. Thus, while the puzzling negative correlation between growth and net capital inflows may occasionally be weak, there is never a strong positive correlation observed, as is predicted by neoclassical growth theory. Overall, the original results presented in tables 4 and 5 appear to be relatively robust and are not dependent on

countries with very large or very small net capital flows.

5. Analyzing the Puzzle: Gross Capital Flows

Though most often associated with foreign capital inflows, an increase in *net* capital inflows can arise from either an increase in foreign capital inflow *or* from a decrease in domestic capital outflow. The results presented thus far have not distinguished whether it is gross capital inflows or gross capital outflows generating the puzzling negative correlation between productivity catch-up and net capital inflows. Figure 2 motivates the need to study gross capital flows by plotting gross assets, gross liabilities, and net foreign assets (all as a percentage of GDP) for the sample over time.[22] This graph shows that while the gross external positions have increased significantly over time, they have done so almost in sync while leaving the net external position relatively unchanged. Thus, gross capital flows may provide insight into the behavior of net capital flows in the context of their puzzling relationship with productivity growth. Columns 2–3 of table 3 denote the average size of the gross flows of each component. Note that the difference of the size of components is greatly reduced when looking at gross versus net flows, underlying the importance of studying gross flows.

I define gross capital outflows as the change in the gross stock of assets over time, which is the net sales and purchases of foreign assets by domestic residents. Thus capital outflows can take on positive or negative values (negative in the case where domestic residents' sale of foreign assets exceeds their purchases of foreign assets). I define gross capital inflows as the change in the gross stock of liabilities, which is the net purchases and sales of domestic assets by foreigners. As with capital outflows, capital inflows can take on positive or negative values. Neither gross position is made negative, as was the case when net capital inflows were defined as the negative of net foreign assets. Thus a positive change in gross assets is interpreted as an outflow, and a positive change in gross liabilities is interpreted as an inflow.

5.1. Aggregate and Disaggregate Gross Capital Flows

Table 7 reports estimation results from the regression of gross assets (gross capital outflow) and gross liabilities (gross capital inflows) on productivity catch-up (columns (1)-(2)) and for gross assets and gross liabilities of each component of capital flows (columns (3)-(11)).[23] The point estimates from regressing aggregate gross capital inflows and outflows on productivity catch-up are large, positive and statistically significant. Coefficients on the interaction variable of productivity catch-up and capital account openness are

[22] These series are constructed as $x_t = \sum_{i=1}^{N} x_{it}/y_{it}$, where x_{it} denotes gross assets, gross liabilities, or net foreign assets for country i at time t, and y_i is GDP of country i at time t.

[23] Results from regressions using GDP growth in place of productivity catch-up are similar and not reported.

also large, positive, and highly significant. For the most open countries a 1% rise in productivity catch–up is associated with a 39% rise in capital outflows and a 29% rise in capital inflows, relative to initial levels.[24] That productivity catch-up has a positive effect on both gross capital inflows and gross capital outflows is a noteworthy result. Recall in Section 4 an increase in productivity catch-up was linked to decreases in net capital inflows. That the change in outflows is greater than the change in inflows coincides with the result that net capital inflows decrease with a positive increase in productivity catch-up. These results suggest the association between growth and lower capital inflow is not being driven by lower investment in higher growth countries, but by greater foreign asset purchases by domestic residents in countries with higher growth rates.

Columns (3)-(11) report estimates from regressing the gross flow of each type of capital on productivity catch-up, capital account openness, and other controls. For each component of gross capital flows, the estimated coefficients on productivity catch-up are positive and are all statically significant. Notice that these estimates also accord with the results in section 4 in the sense that all coefficient estimates for the different types of gross capital outflows on productivity catch-up are larger than the corresponding coefficient estimates of the different types of gross capital inflows on productivity catch-up. For example, the estimated coefficient of the change in portfolio equity assets on productivity catch-up is larger than the estimated coefficient on the change in portfolio equity liabilities. Section 4 showed a negative relationship between productivity catch-up and net portfolio equity inflows. The same is true for portfolio debt and financial derivatives, and the opposite for FDI. As before, the effect of productivity catch-up on any component of capital flow is generally enhanced by more open capital accounts.

5.2. Gross Capital Flows: Are Outliers Driving the Results?

Tables 8 and 9 report quantile regression estimates for each component of gross capital inflows and outflows at the 20th and 80th quantile level, respectively. Though the magnitudes differ substantially between the upper and lower quantiles, the estimated coefficient from regressing foreign direct investment liabilities and foreign exchange reserves on productivity catch-up are qualitatively similar to the main regression estimates. Namely, the estimated coefficient from regressing foreign direct investment liabilities on productivity catch-up exceeds the estimated coefficient from regressing foreign direct investment assets for both quantiles. This supports estimation results in section 4.2. Similarly the estimated coefficients from regressing gross foreign exchange reserves flows on productivity catch-up support evidence presented in the previous sections.

The estimated coefficient from regressing portfolio debt, portfolio equity, and financial derivatives on

[24] With standard deviations of 13% and 10%, respectively.

productivity catch-up on the other hand, suggest that there may in fact be a difference in the behavior of gross flows of these types on capital depending on the total size of gross capital flows. In almost all cases, at the lower end of the distribution the estimated coefficient of gross asset flows on productivity catch-up is equal to or lower than the estimated coefficient of gross liability flows on productivity catch-up. This would suggest a net inflow of capital in response to a rise in productivity catch-up. However, at the upper end of the distribution the relative size of the estimated coefficients are reversed - the estimated coefficient of gross asset inflows on productivity catch-up is greater than the estimated coefficient of gross liability flows on productivity catch-up. Thus, for those countries with large total gross asset and liability flows, a rise in productivity catch-up is associated with a larger rise in foreign asset purchases than in foreign liability inflows. This translates into the net inflow of each types of capital observed in section 4.2.[25] One could interpret this as suggesting that investors in those countries with the most open capital accounts — as measured both by the Chinn–Ito index and the upper quantile of flows — are attempting to diversify internationally or smooth consumption, as discussed in section 4.2, while those in countries with less overall flows do not or are unable to do so.

The estimates reported in tables 8 and 9 suggests that the the results in section 5.1 are driven to a larger extent by those countries at the upper end of the gross capital flow distribution. This, however, should not bring any doubt into my finding that the negative correlation between productivity catch-up and net capital inflows is driven by gross capital outflows of highly liquid assets in fast growing countries. Countries at the lower end of the gross capital flow distributions show either insignificant or very small responses in gross asset and liability flows to rises in productivity catch-up, and furthermore even if the degree of their capital accounts openness were increased it would not increase their observed gross capital inflows or outflows by a notable amount. Thus, these countries with very limited flows are neither contributing to the underlying puzzle nor to its explanation.

6. Conclusion

Neoclassical growth theory predicts that countries furthest from the world frontier growth rate should grow the fastest, and that the fast growing countries should import foreign capital to finance new investment and allow consumption smoothing in response to rising domestic productivity. Using a large set of developing

[25] In section 4.3 the lowest quantile represented countries with the lowest net capital inflows, or largest net capital outflows. In this section the highest quantile is represented by countries with the largest gross capital inflow or the largest gross capital outflows. Thus, China for example, which has very large net capital outflows and very large gross capital outflows would be in the lowest quantile of the net capital inflow regression analysis in section 4.3 and in the highest quantile of the gross capital outflow regression analysis in this section.

and emerging market countries over a long time period, I show that in fact we observe a negative correlation between net capital inflows and relative growth in the data. This finding is robust to several measures of growth, of capital inflows, over the full distribution of capital flows, and over the time periods 1980–2010 and 1990–2010. The size and significance of the negative correlation, however, depends on the level of capital account openness and may be smaller the larger is a country's financial market.

I present a thorough empirical investigation which exposes sources of this negative correlation and pursues explanations related to financial market underdevelopment. As a first step, I divide net capital flows into five components and analyze each separately relative to growth rates. My estimates show that the negative correlation between productivity catch-up and net capital inflows is driven in large part by the accumulation of foreign exchange reserves. However, net portfolio debt, portfolio equity, and financial derivative flows are also negatively correlated with productivity catch-up. To a degree this supports the common explanation that the difference between public and private capital flows can explain the negative correlation, but extends it further. Portfolio equity and financial derivatives are purely private forms of capital and a substantial portion of portfolio debt is privately held, yet their net flows are all negatively correlated with productivity catch-up. On the other hand, foreign direct investment flows (which are also private) exhibit a positive correlation with productivity catch-up. The notable difference between these types of capital is their degree of liquidity, not whether they are public or privately held. My results show that net flows of less liquid assets (FDI) act in accordance with neoclassical growth theory, while net flows of highly liquid assets (portfolio equity, debt, financial derivatives, and foreign exchange reserves) do not. I show that these results are consistent across the distribution of capital flows.

I also show that a second key determinant to understanding the negative productivity catch-up-net capital inflow correlation lies with gross capital flows. Though productivity catch-up is positively correlated with both gross capital inflows and gross outflows, the estimated rise in gross capital outflows exceeds the estimated rise in gross capital inflows in response to an increase in productivity growth. This produces a negative correlation between net capital inflows and productivity catch-up. This is equivalent to saying that in the fastest growing emerging market economies, investment in foreign assets is relatively higher than foreign investment in domestic assets. I show that, with the exception of foreign exchange reserves, these gross outflows are composed primarily of highly liquid foreign portfolio investment purchases. This finding, along with the large positive correlation between domestic savings and gross capital outflows in the fastest growing emerging market economies suggests both a demand for international portfolio diversification and possibly insufficient domestic savings opportunities. Thus the puzzling negative correlation between net

capital inflows and relative growth can be explained almost entirely by high–growth countries who receive large inflows of direct investment from foreigners, but who export even greater amounts of capital in search of foreign liquid, portfolio investment assets.

References

Abaid, A., E. Detragiache, and T. Tressel (2008, December). A new database of financial reforms. *IMF Working Paper 08*(266).

Aguiar, M. and M. Amador (2011). Growth in the shadow of expropriation. *Quarterly Journal of Economics 126*, 651–697.

Aizenman, J., B. Pinto, and A. Radziwill (2007). Sources for financing domestic capital - is foreign saving a viable option for developing countries? *Journal of International Money and Finance 26*(5), 682–702.

Alfaro, L., S. Kalemli-Ozcan, and V. Volosovych (2014, October). Sovereigns, upstream capital flows, and global imbalances. *Journal of the European Economic Association 12*(5), 1240–1284.

Beck, T., A. Demirguc-Kunt, R. Levine, M. Cihak, and E. H. Feyen (1999). *A new database on financial development and structure*, Volume 2146. World Bank Publications.

Benhima, K. (2013). A reappraisal of the allocation puzzle through the portfolio approach. *Journal of International Economics 89*(2), 331–346.

Bernanke, B. (2005). The global savings glut and the U.S. current account deficit. In F. R. Board (Ed.), *Sandridge Lecture*, Richmond, Virginia. Virginia Association of Economics.

Broner, F., T. Didier, A. Erce, and S. L. Schmukler (2013). Gross capital flows: Dynamics and crises. *Journal of Monetary Economics 60*(1), 113–133.

Buera, F. and Y. Shin (2011). Productivity growth and capital flows: The dynamics of reforms. *NBER Working Paper 15268*.

Caballero, R. J. (2010). The 'other' imbalance and the financial crisis. *NBER Working Paper 15636*.

Caballero, R. J., E. Farhi, and P.-O. Gourinchas (2008). An equilibrium model of "global imbalances" and low interest rates. *American Economic Reivew 98*(1), 358–393.

Caballero, R. J. and A. Krishnamurthy (2009). Global imbalances and financial fragility. *American Economic Review: Papers and Proceedings 99*(2), 584–588.

Cardarelli, R., S. Elekdag, and M. A. Kose (2010). Capital inflows: Macroeconomic implications and policy responses. *Econoimc Systems 34*, 333–356.

Caselli, F. (2005). Accounting for cross-country income differences. *Handbook of Economic Growth 1*(1), 679–741.

Caselli, F. and J. Feyrer (2007). The marginal product of capital. *Quarterly Journal of Economics 122*(2), 535–568.

Chinn, M. D. and H. Ito (2008). A new measure of financial openness. *Journal of Comparative Policy Analysis 10*, 209–322.

Easterly, W. and R. Levine (2011). It's not factor accumulation: Stylized facts and growth models. *World Bank Economic Review 15*(2), 177–219.

Feldstein, M. and C. Horioka (1980). Domestic saving and international capital flows. *Economic Journal 90*(358), 314–29.

Findlay, R. (1978). Relative backwardness, direct foreign investment, and the transfer of technology: a simple dynamic model. *The Quarterly Journal of Economics*, 1–16.

Forbes, K. J. and F. E. Warnock (2012). Capital flow waves: Surges, stops, flight, and retrenchment. *Journal of International Economics 88*(2), 235–251.

Ghosh, A., J. Kim, M. S. Qureshi, and J. Zalduendo (2014). Surges. *Journal of International Economics 92*(2), 266–285.

Gourinchas, P.-O. and O. Jeanne (2013). Capital flows to developing countries: the allocation puzzle. *Review of Economic Studies 80*(4), 1484–1515.

Gourinchas, P.-O. and H. Rey (2013). External adjustment, global imbalances and valuation effects. *NBER Working Paper 19240*.

Griffith, R., S. Redding, and J. Van Reenen (2004). Mapping the two faces of r&d: Productivity growth in a panel of oecd industries. *Review of Economics and Statistics 86*(4), 883–895.

Hall, R. E. and C. I. Jones (1999). Why do some countries produce so much more output per worker than others? *Quarterly Journal of Economics 114*(1), 83–116.

Heston, A., R. Summers, and B. Aten (2012). Penn world table version 7.1. Technical report, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania.

IMF (2012). Global financial stability report: The question for lasting stability. Technical report, International Monetary Fund, Washington D.C.

Itay, G. and A. Razin (2006). An information based trade off between foreign direct investment and foreign portfolio investment. *Journal of International Economics 70*(1), 271–295.

Kose, M. A., E. S. Prasad, and M. E. Terrones (2003). Financial integration and macroeconomic volatility. *IMF Staff papers*, 119–142.

Kraay, A. and J. Ventura (2000). Current accounts in debtor and creditor countries. *Quarterly Journal of Economics 115*(4), 1137–1166.

Lane, P. and G. M. Milesi-Ferretti (2001). The external wealth of nations: Measures of foreign assets and liabilities for industrial and developing countries. *Journal of International Economics 55*, 263–294.

Lane, P. and G. M. Milesi-Ferretti (2007a). External wealth of nations mark II: Revised and extended estimates of foreign assets and liabilities, 1970-2004. *Journal of International Economics 73*, 223–250.

Lane, P. and G. M. Milesi-Ferretti (2007b). A global perspective on external positions. In *G7 Current Account Imbalances: Sustainability and Adjustment*, pp. 67–102. National Bureau of Economic Research, Inc.

Lucas, R. E. (1990). Why doesn't capital flow from rich to poor countries? *The American Economic Review*, 92–96.

Mendoza, E. G., V. Quadrini, and J.-V. Rios-Rull (2009). Finanical integration, financial development, and global imbalances. *Journal of Political Economy 117*(3), 371–416.

Nelson, R. R. and E. S. Phelps (1966). Investment in humans, technological diffusion, and economic growth. *The American Economic Review*, 69–75.

Prasad, E., R. Rajan, and A. Subramanian (2007). Foreign capital and econoimc growth. *Brookings Papers on Economic Activity 38*, 153–230.

Prescott, E. (1998). Needed: A theory of total factor productivity. *International Economic Review 39*(3), 525–551.

Sandri, D. (2014). Growth and capital flows with risky entrepreneurship. *American Economic Journal: Macroeconomics 6*(3), 102–123.

Song, Z., K. Storesletten, and F. Zilibotti (2011). Growing like China. *American Economic Reivew 101*(1), 196–233.

Table 1: **Countries in Sample 1980-2010**

Region	**Code**	**Country**	**Region**	**Code**	**Country**	**Region**	**Code**	**Country**
Region	Code	Country	Region	Code	Country	Region	Code	Country
Africa	DZA	Algeria◇	Africa	SYC	Seychelles	Asia	VUT	Vanuatu
Africa	AGO	Angola†	Africa	SLE	Sierra Leone	Asia	VNM	Vietnam
Africa	BEN	Benin†◇	Africa	ZAF	South Africa◇	Europe	ALB	Albania
Africa	BWA	Botswana†	Africa	SWZ	Swaziland	Europe	BGR	Bulgaria
Africa	BFA	Burkina Faso	Africa	TZA	Tanzania†◇	Europe	CYP	Cyprus†
Africa	BDI	Burundi	Africa	TGO	Togo†◇	Europe	HUN	Hungary
Africa	CMR	Cameroon†◇	Africa	TUN	Tunisia†◇	Europe	MLT	Malta
Africa	CPV	Cape Verde	Africa	UGA	Uganda†◇	Europe	POL	Poland
Africa	TCD	Chad	Africa	ZWE	Zimbabwe	L.Amer&Car.	ATG	Antigua and Barbuda
Africa	COM	Comoros	Asia	BHR	Bahrain	L.Amer&Car.	ARG	Argentina†◇
Africa	COG	Congo, Rep.†◇	Asia	BGD	Bangladesh†◇	L.Amer&Car.	BLZ	Belize
Africa	CIV	Cote d'Ivoire†◇	Asia	KHM	Cambodia	L.Amer&Car.	BOL	Bolivia†◇
Africa	EGY	Egypt, Arab Rep.†◇	Asia	CHN	China†◇	L.Amer&Car.	BRA	Brazil†◇
Africa	GNQ	Equatorial Guinea	Asia	HKG	Hong Kong†	L.Amer&Car.	CHL	Chile†◇
Africa	ETH	Ethiopia†◇	Asia	IND	India†◇	L.Amer&Car.	COL	Colombia†◇
Africa	GAB	Gabon†	Asia	IDN	Indonesia†◇	L.Amer&Car.	CRI	Costa Rica†◇
Africa	GMB	Gambia, The	Asia	IRN	Iran, Islamic Rep.†◇	L.Amer&Car.	DOM	Dominican Republic†◇
Africa	GHA	Ghana†◇	Asia	ISR	Israel	L.Amer&Car.	ECU	Ecuador†◇
Africa	GIN	Guinea	Asia	JOR	Jordan†◇	L.Amer&Car.	SLV	El Salvador†◇
Africa	GNB	Guinea-Bissau	Asia	KOR	Korea, Rep.†	L.Amer&Car.	GTM	Guatemala†◇
Africa	KEN	Kenya†◇	Asia	LAO	Lao PDR	L.Amer&Car.	GUY	Guyana
Africa	LBN	Lebanon	Asia	MYS	Malaysia†◇	L.Amer&Car.	HTI	Haiti†◇
Africa	LSO	Lesotho	Asia	NPL	Nepal†◇	L.Amer&Car.	HND	Honduras†◇
Africa	MDG	Madagascar†◇	Asia	OMN	Oman†◇	L.Amer&Car.	MEX	Mexico†◇
Africa	MWI	Malawi†◇	Asia	PAK	Pakistan†◇	L.Amer&Car.	NIC	Nicaragua
Africa	MLI	Mali†◇	Asia	PNG	Papua New Guinea†◇	L.Amer&Car.	PAN	Panama†◇
Africa	MRT	Mauritania	Asia	PHL	Philippines†◇	L.Amer&Car.	PRY	Paraguay†◇
Africa	MAR	Morocco†◇	Asia	ROM	Romania	L.Amer&Car.	PER	Peru†◇
Africa	MOZ	Mozambique†◇	Asia	SGP	Singapore†	L.Amer&Car.	LCA	St. Lucia
Africa	NAM	Namibia	Asia	SLB	Solomon Islands	L.Amer&Car.	VCT	St. Vincent and the Grenadines
Africa	NER	Niger†◇	Asia	LKA	Sri Lanka†◇	L.Amer&Car.	SUR	Suriname
Africa	NGA	Nigeria†◇	Asia	SYR	Syrian Arab Republic†◇	L.Amer&Car.	TTO	Trinidad and Tobago†
Africa	RWA	Rwanda†◇	Asia	THA	Thailand†◇	L.Amer&Car.	URY	Uruguay†◇
Africa	SEN	Senegal†◇	Asia	TUR	Turkey†◇	L.Amer&Car.	VEN	Venezuela, RB†◇

† denotes countries also included in the Gourinchas and Jeanne (2013) sample.
◇ denotes countries also included in the Alfaro *et. al* (2012) sample.

Table 2: **Capital Flows and Productivity 1980–2010, Summary Statistics**

	Full sample of countries		Lower end of NFA/GDP distribution $-(\triangle NFA_i/Y_{i0}) < -(\triangle \widetilde{NFA_i}/Y_{i0})$		Upper end of NFA/GDP distribution $-(\triangle NFA_i/Y_{i0}) > -(\triangle \widetilde{NFA_i}/Y_{i0})$	
	(1)	(2)	(3)	(4)	(5)	(6)
	Mean	*Std.Dev.*	*Mean*	*Std.Dev.*	*Mean*	*Std.Dev.*
π_i	0.111	0.89	0.176	0.564	0.454	0.962
$-\triangle \text{NFA}_i/Y_{i0}$	0.499	3.461	2.18	2.105	0.181	1.997
$\triangle TA_i/Y_{i0}$	4.021	12.338	2.094	3.994	2.26	6.364
$\triangle TL_i/Y_{i0}$	4.52	9.922	4.274	4.56	2.44	5.165
$\triangle S_i/Y_{i0}$	7.309	10.185	5.097	6.846	3.641	4.243
Correlations:	*Corr.Coef.*		*Corr.Coef.*		*Corr.Coef.*	
$(-\triangle \text{NFA}_i/Y_{i0}, \pi_i)$	-0.2068		-0.3328		0.1446	
$(\triangle TA_i/Y_{i0}, \pi_i)$	0.2421		0.2667		0.1950	
$(\triangle TL_i/Y_{i0}, \pi_i)$	0.2367		0.2439		0.2344	
$(\triangle S_i/Y_{i0}, \pi_i)$	0.5981		0.6715		0.4394	
$(-\triangle \text{NFA}_i/Y_{i0}, \triangle S_i/Y_{i0})$	-0.6163		-0.7200		-0.0557	
$(\triangle TA_i/Y_{i0}, \triangle S_i/Y_{i0})$	0.5903		0.6534		0.1450	
$(\triangle TL_i/Y_{i0}, \triangle S_i/Y_{i0})$	0.5411		0.6244		0.1164	
$(\triangle TA_i/Y_{i0}, \triangle TL_i/Y_{i0})$	0.9841		0.9966		0.9349	
N	92		46		46	

Note: I. All statistics reported are in percentage terms, where 50 represents 50%. II. π_i is productivity catch-up; $-\triangle \text{NFA}_i/Y_{i0}$ is the ratio of the change in net foreign assets to GDP and is used as the primary measure of net capital inflows, $-\triangle \widetilde{\text{NFA}}_i/Y_{i0}$ is the average value of net capital inflows; $\triangle S_i$ is the cumulated domestic savings over the full time series; $\triangle TA_i/Y_{i0}$ is gross change in total assets to GDP, which is the measure used for gross capital outflows; $\triangle TL_i/Y_{i0}$ is gross change in total liabilities to GDP, which is the measure of gross capital inflows. The correlation and variance statistics remain similar when using the annual average domestic savings instead of cumulated domestic savings. III. The number of observations diminishes when using data involving savings. The number of observations in these instances is 70.

Table 3: **Cross-Country Average Financial Flows by Type**

	(1) Net Flow	(2) Gross Outflow	(3) Gross Inflow
FDI	1.4	0.65	2.04
Portfolio Debt	0.05	2.01	2.06
Portfolio Equity	-0.10	0.46	0.36
Financial Derivatives	-0.01	0.07	0.06
FX Reserves	-0.83	-0.83	N/A

Note: Values are calculated as the cross–country simple average of net or gross flows over the 1980–2010 period. Source: EWNII, IFS

Table 4: **Growth and Net Capital Inflows 1980-2010**

Dependent var:	$-(\triangle NFA_i/Y_{i0})$									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
π_i	-3.454***	-2.731**	-3.335***	-3.356***	-4.433***					
	(0.992)	(1.039)	(1.016)	(1.025)	(1.034)					
$\triangle y_i$						-2.154**	-1.947**	-1.986**	-2.099**	-3.233***
						(0.843)	(0.809)	(0.863)	(0.905)	(1.043)
$Openness_i$	-0.766*	-0.761*	-0.722*	-0.700*	-1.404	0.226	-0.093	0.258	0.241	0.122
	(0.427)	(0.380)	(0.424)	(0.418)	(1.062)	(0.460)	(0.397)	(0.464)	(0.463)	(1.066)
$Openness_i * \pi_i$	-2.453***	-1.774**	-2.394***	-2.378***	-2.919***					
	(0.793)	(0.803)	(0.788)	(0.805)	(0.565)					
$Openness_i * \triangle y_i$						-1.590**	-1.306**	-1.510**	-1.546**	-2.234***
						(0.710)	(0.646)	(0.707)	(0.747)	(0.673)
k_{i0}/y_{i0}	0.066***	0.072***	0.063***	0.064***	-0.273	-0.001	0.017	-0.002	-0.001	-1.151
	(0.020)	(0.019)	(0.021)	(0.020)	(1.798)	(0.007)	(0.010)	(0.007)	(0.007)	(1.844)
d_{i0}/y_{i0}	0.008	0.012	0.007	0.006	0.025	0.008	0.012	0.007	0.007	0.021
	(0.010)	(0.011)	(0.010)	(0.010)	(0.029)	(0.009)	(0.011)	(0.009)	(0.009)	(0.026)
n_i	-0.746**	-0.423	-0.772**	-0.790**	-0.191	-0.841**	-0.494	-0.874**	-0.863**	-0.397
	(0.373)	(0.363)	(0.366)	(0.354)	(0.533)	(0.419)	(0.367)	(0.427)	(0.409)	(0.529)
Stock Mrkt Cap/GDP		-0.021*					-0.017			
		(0.011)					(0.011)			
Private Credit/GDP			-0.005					-0.010		
			(0.017)					(0.017)		
Financial System Dep./GDP				-0.006					-0.004	
				(0.023)					(0.022)	
Private Bond Mrkt Cap/GDP					0.066					0.102
					(0.054)					(0.071)
Constant	1.821*	1.229	2.091*	2.210*	0.311	3.455***	2.348**	3.827**	3.654**	4.349
	(1.045)	(0.843)	(1.118)	(1.291)	(4.322)	(1.308)	(1.038)	(1.473)	(1.465)	(4.018)
Observations	92	56	92	92	21	92	56	92	92	21
R^2	0.381	0.633	0.383	0.383	0.790	0.311	0.623	0.316	0.311	0.778

Note: Robust standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$. π_i is a measure of productivity catch-up over 1980-2010 period, $\triangle y_i$ measures the change in GDP over 1980-2010 period, $Openness_i$ is a measure of capital account openness based on the Chinn-Ito index, k_{i0}/y_{i0} is initial capital to GDP in 1980, d_{i0}/y_{i0} is initial debt to GDP in 1980, and n_i the growth rate of the work force. The dependent variable is $-\triangle \text{NFA}_i/Y_{i0}$, which is the ratio of the change in net foreign assets to GDP and is used as the primary measure of net capital inflows.

Table 5: **Growth and Net Capital Inflows: By Capital Type 1980-2010**

Dependent var:	$-(\triangle FXRes_i/Y_{i,0})$	$-(\triangle FDI_i/Y_{i,0})$	$-(\triangle PD_i/Y_{i,0})$	$-(\triangle PE_i/Y_{i,0})$	$-(\triangle FD_i/Y_{i,0})$
	(1)	(2)	(3)	(4)	(5)
π_i	-1.945***	1.267**	-1.675***	-1.138**	-0.084***
	(0.325)	(0.623)	(0.627)	(0.487)	(0.021)
$Openness_i$	-0.384**	0.388**	-0.470**	-0.384**	0.022
	(0.148)	(0.180)	(0.212)	(0.152)	(0.016)
$Openness_i * \pi_i$	-0.815***	0.679	-1.359***	-0.956**	-0.163***
	(0.253)	(0.483)	(0.494)	(0.372)	(0.018)
k_{i0}/y_{i0}	0.040***	-0.030**	0.037***	0.021**	-0.012
	(0.007)	(0.012)	(0.012)	(0.010)	(0.017)
d_{i0}/y_{i0}	0.000	-0.003	0.007	0.002	0.000
	(0.003)	(0.004)	(0.005)	(0.003)	(0.000)
n_i	-0.354***	0.010	-0.218	-0.286	-0.003
	(0.116)	(0.256)	(0.223)	(0.187)	(0.013)
Constant	-0.082	1.598**	0.168	0.397	0.061
	(0.323)	(0.703)	(0.617)	(0.395)	(0.046)
Observations	92	91	92	77	23
R^2	0.6442	0.2227	0.4085	0.5028	0.9190

Note: Robust standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$. π_i is a measure of productivity catch-up over 1980-2010 period, $\triangle y_i$ measures the change in GDP over 1980-2010 period, $Openness_i$ is a measure of capital account openness based on the Chinn-Ito index, k_{i0}/y_{i0} is initial capital to GDP in 1980, d_{i0}/y_{i0} is initial debt to GDP in 1980, and n_i the growth rate of the work force. The dependent variables are $-\triangle \text{FX}_i/Y_{i0}$ the ratio of the change in foreign exchange reserves to GDP, $-\triangle \text{FDI}_i/Y_{i0}$ the ratio of the change in foreign direct investment to GDP, $-\triangle \text{PD}_i/Y_{i0}$ the ratio of the change in portfolio debt to GDP (portfolio debt is the sum of portfolio debt securities and other investment), $-\triangle \text{PE}_i/Y_{i0}$ the ratio of the change in portfolio equity to GDP, and $-\triangle \text{FD}_i/Y_{i0}$ the ratio of the change in financial derivatives to GDP.

Table 6: **Growth and Net Capital Inflows 1980-2010: Quantile Regression by Capital Type**

Dependent var:	$-\frac{\triangle NFA_i}{Y_{i0}}$		$-\frac{\triangle FXRes_i}{Y_{i,0}}$		$-\frac{\triangle FDI_i}{Y_{i,0}}$		$-\frac{\triangle PD_i}{Y_{i,0}}$		$-\frac{\triangle PE_i}{Y_{i,0}}$		$-\frac{\triangle FD_i}{Y_{i,0}}$	
Quantile	20th	80th	20th	80th	20th	80th	20th	80th	20th	80th	20th	80th
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
π_i	-4.381***	-0.221	-2.334***	-0.266***	0.185**	2.141***	-2.483***	0.323	-1.645***	0.297	-0.076	-0.047***
	-0.435	-0.888	-0.209	-0.046	-0.092	-0.666	-0.297	-0.29	-0.21	-0.203	-0.076	(0.014)
$Openness_i$	-1.524***	0.2	-0.555***	-0.016	0.057	0.716	-1.014***	-0.162	-0.639***	0.048	0.022	0.018
	-0.261	-0.717	-0.141	-0.034	-0.048	-0.467	-0.186	-0.172	-0.089	-0.113	-0.045	(0.012)
$Openness_i * \pi_i$	-2.777***	-1.508**	-0.992***	0.070**	-0.012	1.248**	-1.769***	-0.265	-1.295***	0.117	-0.156***	-0.130***
	-0.351	-0.671	-0.163	-0.034	-0.065	-0.49	-0.245	-0.208	-0.164	-0.142	-0.052	(0.020)
k_{i0}/y_{i0}	0.111***	-0.015	0.053***	0.002	0	-0.058***	0.067***	-0.008	0.036***	-0.007*	-0.018	-0.012
	-0.008	-0.02	-0.004	-0.001	-0.002	-0.014	-0.006	-0.007	-0.004	-0.004	-0.073	(0.007)
d_{i0}/y_{i0}	-0.003	0.005	0	0	0.003**	-0.002	-0.002	0	-0.002	0	0	0.000
	-0.007	-0.015	-0.003	-0.001	-0.001	-0.015	-0.006	-0.004	-0.003	-0.002	-0.001	(0.000)
n_i	-0.981***	-0.037	-0.225	-0.080**	-0.036	0.099	-0.467*	0.088	-0.226**	-0.03	-0.007	-0.008
	-0.333	-0.727	-0.14	-0.038	-0.057	-0.758	-0.26	-0.255	-0.1	-0.144	-0.029	(0.010)
Constant	0.389	1.859	-0.961**	-0.058	0.377**	2.3	-0.15	0.484	-0.231	0.255	0.041	0.090***
	-0.879	-1.937	-0.395	-0.112	-0.164	-2.085	-0.711	-0.695	-0.239	-0.385	-0.15	(0.027)
Observations	92	92	92	92	91	91	92	92	77	77	23	23

Note: Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$. π_i is a measure of productivity catch-up over 1980-2010 period, $\triangle y_i$ measures the change in GDP over 1980-2010 period, $Openness_i$ is a measure of capital account openness based on the Chinn-Ito index, k_{i0}/y_{i0} is initial capital to GDP in 1980, d_{i0}/y_{i0} is initial debt to GDP in 1980, and n_i the growth rate of the work force. The dependent variables are $-\triangle \text{NFA}_i/Y_{i0}$ the ratio of the change in net foreign assets to GDP, $-\triangle \text{FX}_i/Y_{i0}$ the ratio of the change in foreign exchange reserves to GDP, $-\triangle \text{FDI}_i/Y_{i0}$ the ratio of the change in foreign direct investment to GDP, $-\triangle \text{PD}_i/Y_{i0}$ the ratio of the change in portfolio debt to GDP (portfolio debt is the sum of portfolio debt securities and other investment), $-\triangle \text{PE}_i/Y_{i0}$ the ratio of the change in portfolio equity to GDP, and $-\triangle \text{FD}_i/Y_{i0}$ the ratio of the change in financial derivatives to GDP.

Table 7: **Growth and Gross Capital Inflows 1980-2010**

Dependent var:	$\frac{\triangle TA_i}{Y_{i0}}$	$\frac{\triangle TL_i}{Y_{i0}}$	$-\frac{\triangle FXRes_i}{Y_{i0}}$	$-\frac{\triangle FDI_i^A}{Y_{i0}}$	$-\frac{\triangle FDI_i^L}{Y_{i0}}$	$-\frac{\triangle PD_i^A}{Y_{i0}}$	$-\frac{\triangle PD_i^L}{Y_{i0}}$	$-\frac{\triangle PE_i^A}{Y_{i0}}$	$-\frac{\triangle PE_i^L}{Y_{i0}}$	$-\frac{\triangle FD_i^A}{Y_{i0}}$	$-\frac{\triangle FD_i^L}{Y_{i0}}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
π_i	13.832***	10.378***	1.945***	2.924***	4.191***	6.174**	4.500*	2.360***	1.222***	0.749***	0.662***
	(4.258)	(3.393)	(0.325)	(0.763)	(1.060)	(2.837)	(2.284)	(0.508)	(0.296)	(0.150)	(0.130)
$Openness_i$	3.806**	3.040**	0.384**	0.853*	1.241**	1.858**	1.388*	0.827***	0.443**	-0.298***	-0.266***
	(1.563)	(1.256)	(0.148)	(0.447)	(0.493)	(0.864)	(0.742)	(0.292)	(0.192)	(0.085)	(0.073)
$Openness_i * \pi_i$	9.809***	7.356***	0.815***	2.278***	2.957***	4.550*	3.190*	1.784***	0.827***	1.253***	1.088***
	(3.421)	(2.731)	(0.253)	(0.649)	(0.853)	(2.290)	(1.860)	(0.407)	(0.244)	(0.150)	(0.133)
k_{i0}/y_{i0}	-0.268***	-0.202***	-0.040***	-0.055***	-0.085***	-0.120**	-0.083*	-0.046***	-0.026***	0.163	0.151
	(0.082)	(0.065)	(0.007)	(0.015)	(0.021)	(0.053)	(0.042)	(0.011)	(0.006)	(0.109)	(0.094)
d_{i0}/y_{i0}	-0.066*	-0.058**	-0.000	-0.011	-0.014	-0.047**	-0.040**	-0.006	-0.004	-0.002	-0.002
	(0.036)	(0.029)	(0.003)	(0.009)	(0.009)	(0.023)	(0.019)	(0.005)	(0.003)	(0.002)	(0.001)
n_i	1.865	1.119	0.354***	0.033	0.042	1.220	1.002	0.310	0.024	-0.036	-0.042
	(1.462)	(1.243)	(0.116)	(0.316)	(0.420)	(1.062)	(0.922)	(0.263)	(0.149)	(0.087)	(0.075)
Constant	2.729	4.550	0.082	1.234	2.832**	0.994	1.162	0.226	0.623	-0.448	-0.380
	(3.353)	(2.817)	(0.323)	(1.221)	(1.362)	(2.178)	(1.820)	(0.768)	(0.546)	(0.279)	(0.236)
Observations	92	92	92	91	91	92	92	77	77	24	24
R^2	0.5836	0.5486	0.6442	0.4795	0.5187	0.4857	0.4273	0.6184	0.5272	0.9301	0.9296

Note: Robust standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$. π_i is a measure of productivity catch-up over 1980-2010 period, $\triangle y_i$ measures the change in GDP over 1980-2010 period, $Openness_i$ is a measure of capital account openness based on the Chinn-Ito index, k_{i0}/y_{i0} is initial capital to GDP in 1980, d_{i0}/y_{i0} is initial debt to GDP in 1980, and n_i the growth rate of the work force. The dependent variables are the change in total gross assets to GDP ratio $-\triangle \mathrm{TA}_i/Y_{i0}$, the change in total gross liabilities to GDP ratio $-\triangle \mathrm{TL}_i/Y_{i0}$, and the gross asset (denoted by superscript A) and gross liability (denoted with superscript L) components of $-\triangle \mathrm{FX}_i/Y_{i0}$ the ratio of the change in foreign exchange reserves to GDP, $-\triangle \mathrm{FDI}_i/Y_{i0}$ the ratio of the change in foreign direct investment to GDP, $-\triangle \mathrm{PD}_i/Y_{i0}$ the ratio of the change in portfolio debt to GDP (portfolio debt is the sum of portfolio debt securities and other investment), $-\triangle \mathrm{PE}_i/Y_{i0}$ the ratio of the change in portfolio equity to GDP, and $-\triangle \mathrm{FD}_i/Y_{i0}$ the ratio of the change in financial derivatives to GDP.

Table 8: **Growth and Gross Capital Inflows 1980-2010: Quantile Regressions by Capital Type, 20 Percent Quantile**

Dependent var:	$-\frac{\triangle FXRes_i}{Y_{i0}}$	$-\frac{\triangle FDI_i^A}{Y_{i0}}$	$-\frac{\triangle FDI_i^L}{Y_{i0}}$	$-\frac{\triangle PD_i^A}{Y_{i0}}$	$-\frac{\triangle PD_i^L}{Y_{i0}}$	$-\frac{\triangle PE_i^A}{Y_{i0}}$	$-\frac{\triangle PE_i^L}{Y_{i0}}$	$-\frac{\triangle FD_i^A}{Y_{i0}}$	$-\frac{\triangle FD_i^L}{Y_{i0}}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
π_i	-2.334***	0.036***	0.705***	0.013	0.640***	0.003***	0.106***	0.098	0.049*
	(0.209)	(0.004)	(0.073)	(0.066)	(0.135)	(0.001)	(0.009)	(0.084)	(0.028)
$Openness_i$	-0.555***	0.016***	0.168***	-0.022	0.020	0.002***	0.029***	-0.025	-0.013
	(0.141)	(0.003)	(0.044)	(0.051)	(0.107)	(0.000)	(0.006)	(0.029)	(0.010)
$Openness_i * \pi_i$	-0.992***	0.018***	0.215***	-0.121**	0.346***	0.002***	0.060***	0.075	0.053**
	(0.163)	(0.003)	(0.049)	(0.047)	(0.097)	(0.000)	(0.007)	(0.063)	(0.021)
k_{i0}/y_{i0}	0.053***	-0.000	-0.012***	0.006***	0.003	-0.000***	-0.002***	0.014	0.021
	(0.004)	(0.000)	(0.002)	(0.002)	(0.003)	(0.000)	(0.000)	(0.038)	(0.012)
d_{i0}/y_{i0}	-0.000	-0.000*	0.002*	-0.001	-0.003	-0.000	-0.000	-0.000	-0.000
	(0.003)	(0.000)	(0.001)	(0.001)	(0.002)	(0.000)	(0.000)	(0.001)	(0.000)
n_i	-0.225	0.009***	0.072	-0.038	-0.089	0.001	0.014	-0.002	-0.027
	(0.140)	(0.003)	(0.046)	(0.054)	(0.106)	(0.000)	(0.008)	(0.076)	(0.024)
Constant	-0.961**	-0.001	0.357***	0.275*	0.581**	0.000	0.010	-0.052	0.008
	(0.395)	(0.009)	(0.124)	(0.141)	(0.265)	(0.001)	(0.021)	(0.147)	(0.044)
Observations	92	91	91	92	92	77	77	23	23

Note: Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$. Regressions are quantile regressions at the 20th quantile. π_i is a measure of productivity catch-up over 1980-2010 period, $\triangle y_i$ measures the change in GDP over 1980-2010 period, $Openness_i$ is a measure of capital account openness based on the Chinn-Ito index, k_{i0}/y_{i0} is initial capital to GDP in 1980, d_{i0}/y_{i0} is initial debt to GDP in 1980, and n_i the growth rate of the work force. The dependent variables are the gross asset (denoted by superscript A) and gross liability (denoted with superscript L) components of $-\triangle FX_i/Y_{i0}$ the ratio of the change in foreign exchange reserves to GDP, $-\triangle FDI_i/Y_{i0}$ the ratio of the change in foreign direct investment to GDP, $-\triangle PD_i/Y_{i0}$ the ratio of the change in portfolio debt to GDP (portfolio debt is the sum of portfolio debt securities and other investment), $-\triangle PE_i/Y_{i0}$ the ratio of the change in portfolio equity to GDP, and $-\triangle FD_i/Y_{i0}$ the ratio of the change in financial derivatives to GDP.

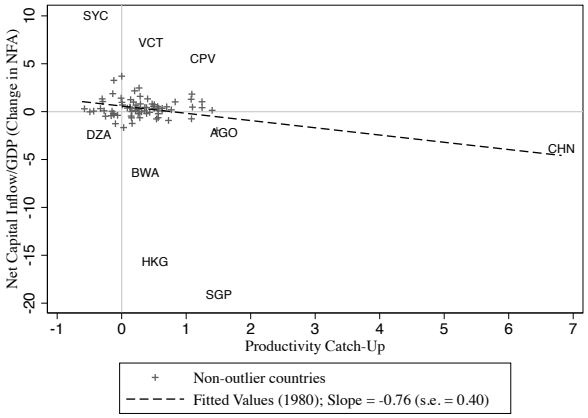
Table 9: **Growth and Gross Capital Inflows 1980-2010: Quantile Regressions by Capital Type, 80 Percent Quantile**

Dependent var:	$-\frac{\triangle FXRes_i}{Y_{i0}}$	$-\frac{\triangle FDI_i^A}{Y_{i0}}$	$-\frac{\triangle FDI_i^L}{Y_{i0}}$	$-\frac{\triangle PD_i^A}{Y_{i0}}$	$-\frac{\triangle PD_i^L}{Y_{i0}}$	$-\frac{\triangle PE_i^A}{Y_{i0}}$	$-\frac{\triangle PE_i^L}{Y_{i0}}$	$-\frac{\triangle FD_i^A}{Y_{i0}}$	$-\frac{\triangle FD_i^L}{Y_{i0}}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
π_i	-0.266***	3.031***	5.437***	8.486***	5.628***	2.635***	1.141***	0.781	0.647*
	(0.046)	(0.191)	(0.462)	(1.001)	(1.260)	(0.176)	(0.157)	(0.723)	(0.311)
$Openness_i$	-0.016	1.246***	1.972***	2.886***	2.003***	1.227***	0.464***	-0.238	-0.221
	(0.034)	(0.124)	(0.313)	(0.358)	(0.486)	(0.144)	(0.114)	(0.424)	(0.182)
$Openness_i * \pi_i$	0.070**	2.184***	3.314***	6.208***	3.407***	1.916***	0.727***	1.275**	1.072***
	(0.034)	(0.160)	(0.364)	(0.802)	(1.012)	(0.150)	(0.129)	(0.492)	(0.211)
k_{i0}/y_{i0}	0.002	-0.070***	-0.133***	-0.185***	-0.126***	-0.063***	-0.028***	0.046	0.154
	(0.001)	(0.004)	(0.010)	(0.019)	(0.023)	(0.003)	(0.003)	(0.687)	(0.293)
d_{i0}/y_{i0}	-0.000	-0.001	-0.003	-0.011	-0.012	-0.001	-0.000	-0.001	-0.001
	(0.001)	(0.003)	(0.009)	(0.012)	(0.013)	(0.004)	(0.003)	(0.009)	(0.003)
n_i	-0.080**	0.286**	0.623*	0.686	0.808	0.338**	0.129	0.021	0.037
	(0.038)	(0.136)	(0.368)	(0.442)	(0.532)	(0.149)	(0.118)	(0.267)	(0.119)
Constant	-0.058	1.166***	2.722**	3.212***	2.230	0.930**	0.444	-0.191	-0.381
	(0.112)	(0.373)	(1.147)	(1.153)	(1.351)	(0.377)	(0.294)	(1.415)	(0.593)
Observations	92	91	91	92	92	77	77	23	23

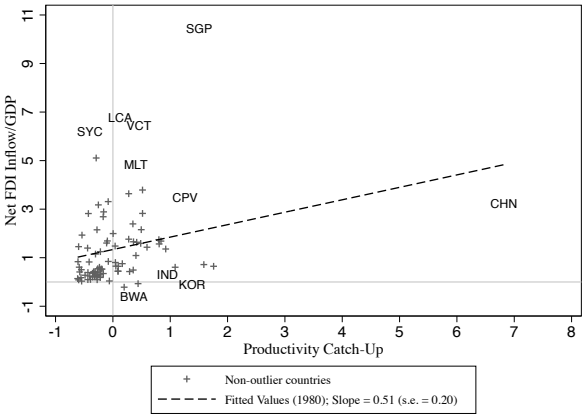
Note: Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$. Regressions are quantile regressions at the 80th quantile. π_i is a measure of productivity catch-up over 1980-2010 period, $\triangle y_i$ measures the change in GDP over 1980-2010 period, $Openness_i$ is a measure of capital account openness based on the Chinn-Ito index, k_{i0}/y_{i0} is initial capital to GDP in 1980, d_{i0}/y_{i0} is initial debt to GDP in 1980, and n_i the growth rate of the work force. The dependent variables are the gross asset (denoted by superscript A) and gross liability (denoted with superscript L) components of $-\triangle FX_i/Y_{i0}$ the ratio of the change in foreign exchange reserves to GDP, $-\triangle FDI_i/Y_{i0}$ the ratio of the change in foreign direct investment to GDP, $-\triangle PD_i/Y_{i0}$ the ratio of the change in portfolio debt to GDP (portfolio debt is the sum of portfolio debt securities and other investment), $-\triangle PE_i/Y_{i0}$ the ratio of the change in portfolio equity to GDP, and $-\triangle FD_i/Y_{i0}$ the ratio of the change in financial derivatives to GDP.

Figure 1: Capital Flows and Productivity Catch-up Correlations

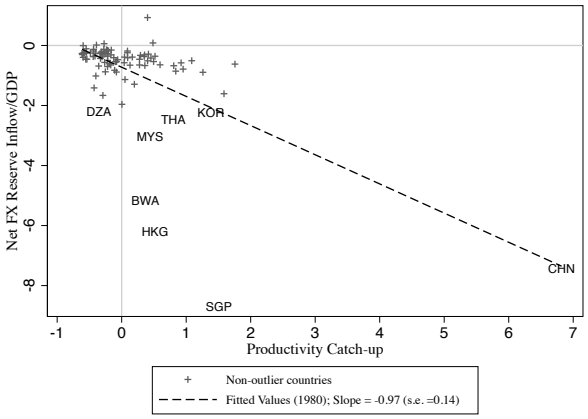
(a) Aggregate Net Capital Inflows



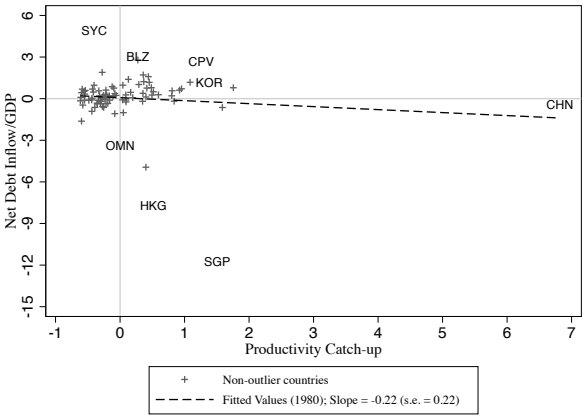
(b) Foreign Direct Investment Inflows



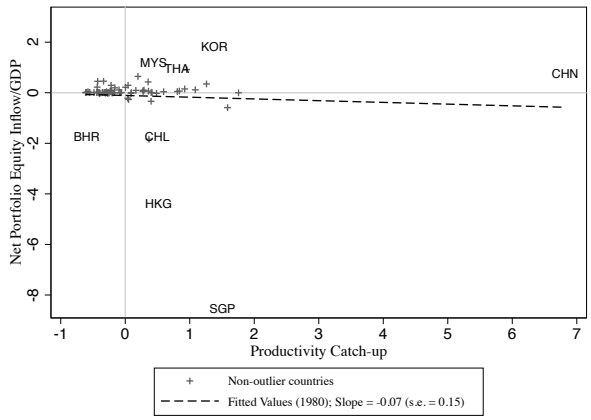
(c) FX Reserve (minus gold) Inflows



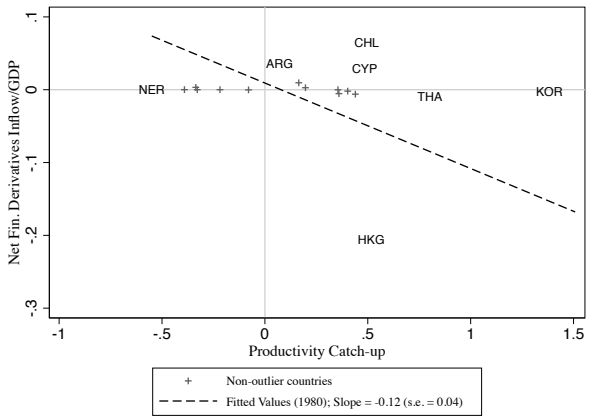
(d) Debt Inflows



(e) Portfolio Equity Inflows

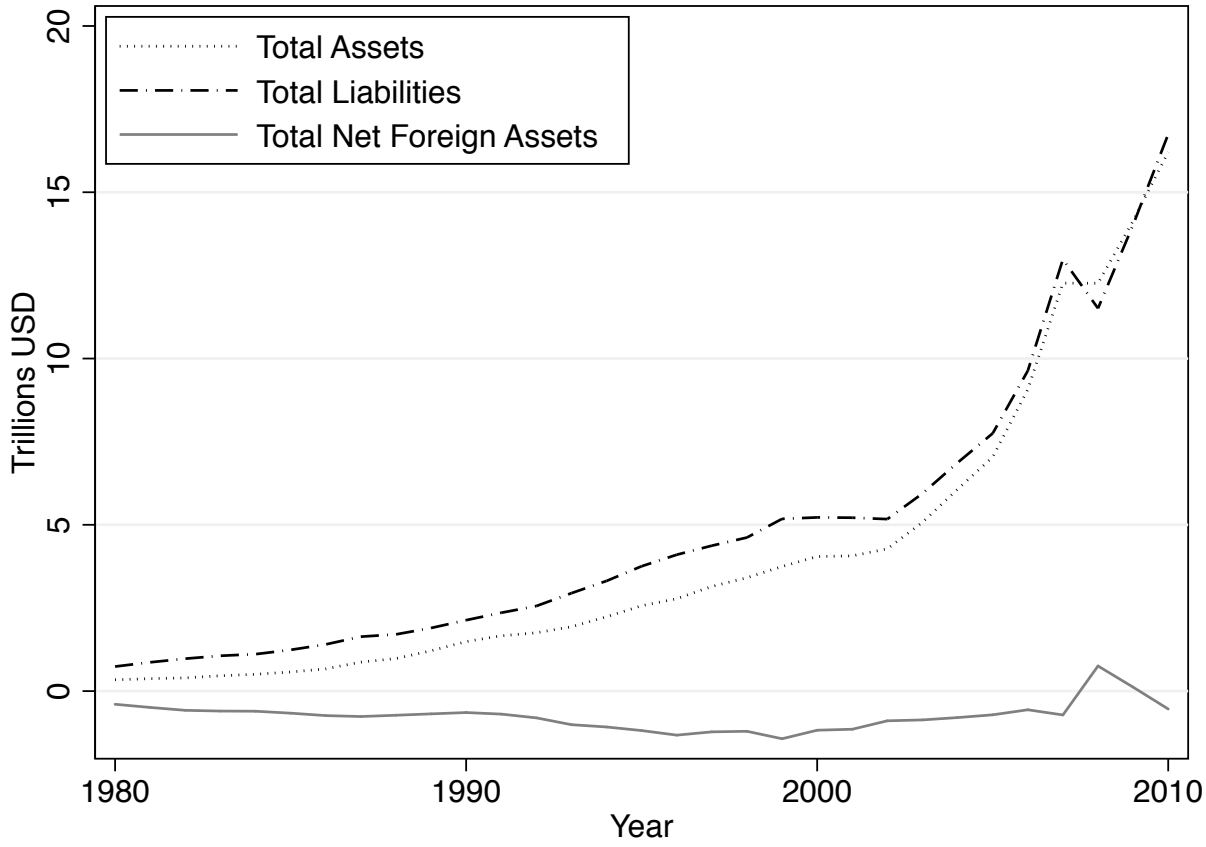


(f) Financial Derivatives Inflows



Note: Scatter plot points represent data from the 1980-2010 period. The number of observations for figures (a), (b), (c), and (d) are $N = 92$, for figure (e) is $N = 77$, and for figure (f) is $N = 24$. Productivity catch-up is a measure of TFP growth relative to the world TFP frontier, where U.S. TFP growth is used as a proxy for the world TFP frontier. A positive value means the country's TFP growth is greater than U.S. TFP growth, a negative value means it is lower. Aggregate net capital inflows (a) are measured as the change in net foreign assets over the 1980-2010, each component of net capital flow (b)-(f) is measured similarly. Specific definitions for net capital inflows and productivity catch-up are given in section 3.

Figure 2: Gross and Net Capital Flows



Note: The series are constructed as $x_t = \sum_{i=1}^{N} x_{it}$, where x_{it} denotes gross assets, gross liabilities, or net foreign assets for country i at time t in U.S. dollars.