On the Changing Relationship between Net Public Foreign Assets and Growth*

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Abstract

This paper documents how the relationship between economic growth and international capital flows has changed across developing countries. Previous literature found a negative relationship between growth and net public foreign asset flows during the 1980s and 1990s. Using data through 2019, we show that this relationship has gradually weakened and disappeared. We document changes in public external debt and international reserves, as well as distinct patterns in private capital flows. We also examine changes in economic volatility, suggesting a potential role for precautionary saving. To investigate these findings, we develop a stochastic neoclassical growth model that distinguishes between public and private external borrowing. We use the model to assess the relative contributions of changes in productivity volatility and borrowing wedges to the evolution of international capital flows.

JEL Codes: F21, F32, F41, F43, F44, O47

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1 Introduction

The relationship between economic growth and international capital flows has changed substantially over the past four decades. Historically, slower-growing developing countries accumulated larger public external liabilities than faster-growing economies. However, this pattern has weakened over time, and by the 2010s, the negative relationship between growth and public external positions had largely disappeared. In this paper, we document this transformation and investigate the forces behind the changing patterns of international capital allocation.

In this paper, we document the changing relationship between economic growth and international capital flows across emerging market and low-income developing countries over 1980–2019. We show that the disappearance of the negative relationship between growth and public external positions reflects important changes in the composition of countries' foreign assets and liabilities. Slower-growing economies reduced public external debt while accumulating international reserves. At the same time, the relationship between growth and private capital flows evolved differently, suggesting that the forces shaping public and private external positions need not be the same.

These findings provide a new perspective on the allocation puzzle documented by Gourinchas and Jeanne (2013), who showed that capital tended to flow toward slower-growing developing countries, contrary to the predictions of the neoclassical growth model. Our results suggest that this historical pattern was not a stable feature of international capital allocation. Rather, the relationship changed substantially over time, particularly for the public sector.

We examine whether the changing relationship between growth and public external positions can be explained by differences in country characteristics and macroeconomic conditions. We find that the negative relationship observed during the earlier period, and its subsequent disappearance, are robust to controlling for a broad range of economic, financial, and institutional factors. These results suggest that the changing relationship is not driven by any single observable country characteristic.

We also document changes in economic volatility across developing countries. In particular, slower-growing economies experienced changes in output and productivity volatility over the sample period, alongside substantial adjustments in their public external positions. The combination of these patterns motivates our examination of whether changes in economic uncertainty can help explain the evolution of public borrowing and reserve accumulation. In particular, greater uncertainty may strengthen precautionary saving incentives, leading governments to reduce external liabilities and accumulate foreign assets.

To understand the forces behind these changes, we develop a stochastic neoclassical growth model of a small open economy in which public and private external borrowing decisions are determined separately. Households choose investment and private external debt, while the government chooses public external debt, taking into account how households respond to its borrowing decisions. We introduce wedges on investment, private borrowing, and government borrowing, allowing the model to capture differences in saving and borrowing incentives across countries. This framework allows us to examine how changes in productivity risk and these wedges affect the accumulation of public and private foreign assets, and ultimately the relationship between growth and international capital flows.

We calibrate the model separately for five groups of developing countries, ranked according to their average GDP per capita growth rates, and for two periods, 1980–2004 and 2005–2019. The calibration targets investment rates and private and public capital flows, together with their volatility. We then use the model to examine how changes in productivity volatility and borrowing wedges contribute to the evolution of international capital flows. By distinguishing between public and private borrowing decisions, our framework allows us to evaluate whether changes in government borrowing incentives and precautionary motives can account for the disappearance of the negative relationship between growth and public external positions.

[Quantitative results and counterfactual findings to be added.]

This paper contributes to the literature on the relationship between economic growth and international capital flows (Gourinchas and Jeanne, 2013; Aguiar and Amador, 2011; Alfaro et al., 2014). Gourinchas and Jeanne (2013) document a negative relationship between productivity growth and net capital inflows across developing countries, which they attribute to distortions in saving and investment decisions. Aguiar and Amador (2011) show that this relationship is largely driven by the public sector, particularly the accumulation of international reserves, while Alfaro et al. (2014) further examine the composition of public external debt by creditor type. We build on this literature by documenting how the relationship between growth and public external positions has evolved over time, distinguishing between public and private capital flows, and investigating the forces behind these changes. More recently, Capelle and Pellegrino (2025) study how financial globalization has affected the international allocation of capital, showing that asymmetric changes in financial openness across rich and poor countries have contributed to global capital misallocation.

The remainder of the paper is organized as follows. *Section 2* describes the data used for the empirical analysis. *Section 3* presents our main empirical analysis and findings. *Section 4* outlines the model and *Section 5* the calibration procedure. In *Section 6* we conduct our main decomposition exercise. *Section 7* concludes.

2 Data Sources and Sample Selection

Our main empirical analysis uses external public and publicly guaranteed debt from the World Bank's International Debt Statistics (IDS) and international reserves from the IMF's International Financial Statistics (IFS). Private capital flows are constructed using the External Wealth of Nations database from Lane and Milesi-Ferretti (2007) and Lane and Milesi-Ferretti (2018), while current account data come from the IMF's World Economic Outlook (WEO). We obtain total factor productivity (TFP) and capital stocks from the Penn World Table, investment from the WEO, and GDP per capita from the World Development Indicators and the WEO. Additional data sources and variable definitions are described in *Appendix A*.

Our sample covers 1980–2019, ending before the COVID-19 pandemic and the associated emergency financing and debt relief programs. We focus on emerging and low-income countries reporting external debt to the World Bank. Following Gourinchas and Jeanne (2013), we require data on public external debt, international reserves, and GDP in U.S. dollars in both 1980 and 2000. Of the 68 countries satisfying these criteria, five are excluded due to missing data in subsequent years, leaving a final sample of 63 countries. The full list is reported in *Table B.1* in *Appendix B*.[1]

3 Relationship between Capital Flows and Growth

This section documents the main empirical facts motivating our quantitative model: how the relationship between international capital flows and growth has changed over time. We begin with net public foreign assets, which previous research has identified as the primary driver of the relationship between total net foreign assets and growth, before turning to private flows and the current account.

3.1 Relationship between Public NFA and Growth

The net public foreign asset position of a country is defined as the difference between public external debt and international reserves,

$$\text{PuNFA}_{j,T} = \frac{\text{US\$ External PPG Debt}_{j,T}}{\text{US\$ GDP}_{j,T}} - \frac{\text{US\$ International Reserves}_{j,T}}{\text{US\$ GDP}_{j,T}} \tag{1}$$

[1]The IDS removes the historical data of countries that graduate to high-income status, excluding countries such as Korea, Chile, and Malaysia from our sample. In *Appendix B.4*, we show that our results are robust to using the alternative data of Alfaro et al. (2014), which retain these countries.

where j denotes an individual country and T represents a given year. PuNFA is the net public foreign asset position, External PPG Debt is the external public and publicly guaranteed debt, and International Reserves is international reserves minus gold.

Following Aguiar and Amador (2011), we study the relationship between changes in net public foreign assets and average growth rate (relative to the United States) of a country. We define these changes in the net public foreign asset position as,

$$\Delta \text{PuNFA}_{j,T} = \frac{\text{PuNFA}_{j,T} - \text{PuNFA}_{j,1980}}{T - 1980} \tag{2}$$

where $\Delta \text{PuNFA}_{j,T}$ is the flow of public foreign assets to country j in year T, relative to 1980. That is, $\Delta \text{PuNFA}_{j,T}$ represents the change in PuNFA over the 1980 to T time period. The growth rate of a country is determined as changes in real GDP per-capita. We define the average growth rate of a country relative to the U.S. as,

$$\Delta \text{g}_{j,T} = \frac{\sum_{k=1980}^{T} g_{j,k}}{T - 1980} - \frac{\sum_{k=1980}^{T} g_{US,k}}{T - 1980} \tag{3}$$

where $g_{j,k}$ is real GDP per capita growth of country j at time k, and $g_{US,k}$ is real GDP per capita growth of the US at time k. Hence, the resulting $\Delta \text{g}_{j,T}$ is the average GDP per capita growth over the 1980 to T time period, relative to the average growth rate of the U.S. over the same time period. To illustrate how the relationship has changed over time we estimate the following regression, for $T \in \{1991, 1992, ..., 2019\}$,

$$\Delta \text{PuNFA}_{j,T} = \alpha + \beta_T \Delta \text{g}_{j,T} + \epsilon_{j,T} \tag{4}$$

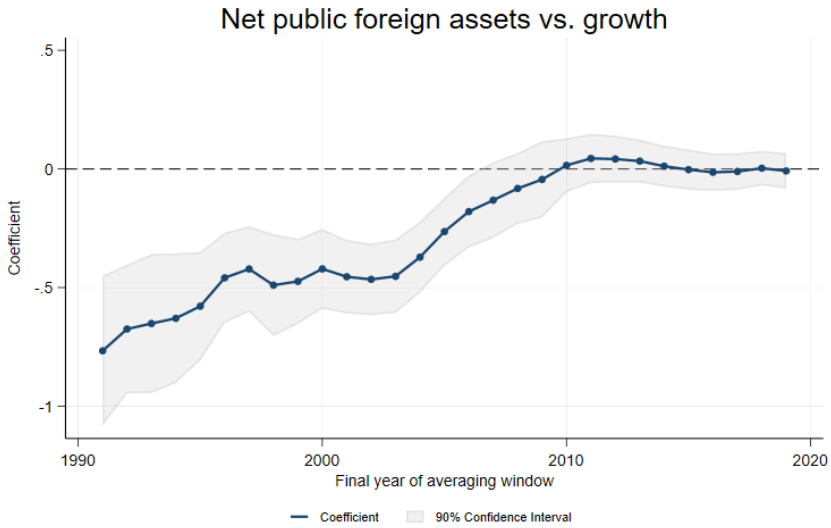
That is, we begin by determining the correlation between changes in growth and changes in PuNFA using the 1980-1991 time period, by running the regression in equation (4). We then re-run the same regression for the 1980-1991 time period (β_{1991}), 1980-1992 time period (β_{1992}), and so on, up until the 1980-2019 time period (β_{2019}). This produces a sequence of coefficients β_T. *Figure 1* shows how this coefficient has evolved over time.[2]

Beginning in the early 2000s, the relationship between growth and net public foreign assets changed.[3] Over 1980–2004, the coefficient averaged −0.37 and was significantly different from zero. This is consistent with Aguiar and Amador (2011), Alfaro et al. (2014), and Gourinchas and Jeanne (2013), whose samples ended in the early 2000s, just before the

[2]We start the regression in 1991 which allows for a sufficient time horizon to mitigate the effects of business cycles.

[3]While the choice of cutoff is somewhat arbitrary, the data suggest that the relationship began changing around 2004. We therefore use 1980–2004 and 2005–2019 as our two behcnmark sample periods throughout the paper.

Figure 1: Relationship between Net Public Foreign Assets and Growth Over Time



Notes: This figure plots the resulting coefficient β_T from equation (4). The coefficient is the blue line and the gray area is a 90 percent confidence interval, computed with robust standard errors.

relationship began to change.

Table 1 estimates the relationship separately for 1980-2004 and 2005-2019. The coefficient changes from -0.37 to 0.19. The change is significant at the one percent level. The coefficient for the later period is positive but not significantly different from zero. The same result holds when the public position is measured with annual flows instead of the change in the stock (*Panel B* of *Table 1*) as in Alfaro et al. (2014) and Gourinchas and Jeanne (2013). We also examine the individual components of net public foreign assets and document changes in the relationship with growth for both public external debt and international reserves, including differences across creditor types (see Appendix B.2).

The change in relationship between growth and net public foreign assets is robust to an array of alternative specifications. In *Appendix B.3*, we first show that the result does not depend on the choice of the base year. Starting the analysis in 1970 instead of 1980, the coefficient remains negative and significant through the early 2000s and approaches zero by 2019 (see *Figure B.6*). We also estimate the relationship using 10- and 15-year rolling windows, rather than progressively expanding the sample (see *Figure B.7* and *Figure B.8*). Both exercises show a similar pattern, with negative coefficients in the earlier periods that disappear after the mid-2000s. Furthermore, the results remain unchanged when we exclude influential observations using Cook's distance (see *Figure B.9*) or calculate average growth using a geometric rather than an arithmetic mean (see *Figure B.10*).

We also show that the change in relationship is robust to the sample of countries or the

Table 1: Relationship between Net Public Foreign Assets and Growth by Period

1980-2004	2005-2019	Δ	N
Panel A: Δ net public foreign asset position			
-0.371^{***}	0.190	0.562^{***}	63
(0.091)	(0.124)	(0.173)	
Panel B: Net public foreign asset flows			
-0.296^{*}	0.147	0.443^{**}	63
(0.163)	(0.096)	(0.182)	

Notes: This table reports the coefficient on growth from a regression of net public foreign assets on average growth relative to the U.S., estimated on two observations per country (1980-2004 and 2005-2019). The column Change is the difference between the two coefficients. In Panel A the dependent variable is the annualized change in the net public foreign asset position over each period. In Panel B it is the average of annual flows over each period, winsorized at the 1st and 99th percentiles. Standard errors clustered by country in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

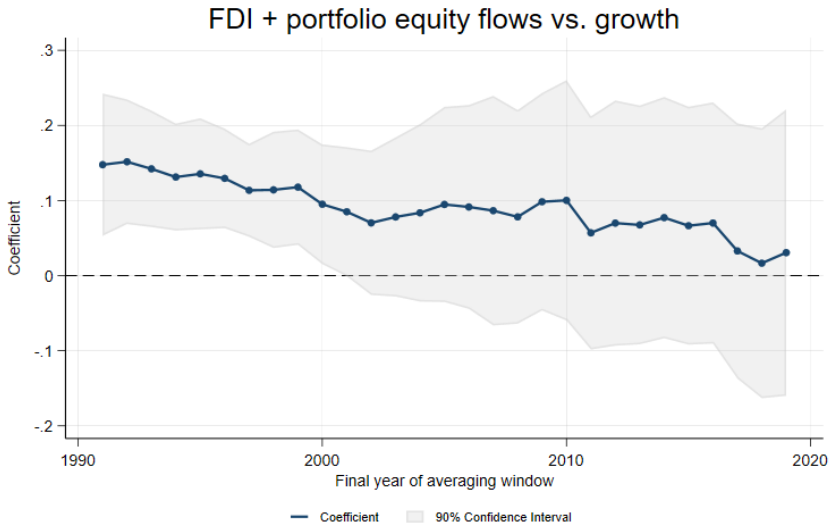
data used to measure public capital flows. In *Appendix B.4*, we replicate the analysis using the data from Alfaro et al. (2014), which include countries that are no longer covered by the World Bank's debt statistics because they became high-income economies. Using this alternative dataset, the coefficient on growth remains negative, at −0.45 for 1980–2004 and weakly positive at, 0.16 for 2005–2018, with the difference statistically significant at the 1 percent level. The result also holds when we restrict the sample to countries with data available in both periods, suggesting that changes in sample composition do not account for our findings.

3.2 Private Flows

We now examine the relationship between private capital flows and growth. Following Alfaro et al. (2014), we define private flows as net foreign direct investment and portfolio equity flows, measured as a share of GDP. We estimate equation (4) using average private flows as the dependent variable over the 1980 to T period.

Figure 2 shows that during the 1990s, the relationship between private capital flows and growth was positive and statistically significant, with a coefficient of roughly 0.15. That is, faster-growing countries received more private capital inflows, consistent with the predictions of the neoclassical growth model. However, this relationship weakens in later time period. The coefficient averages 0.08 for the 1980-2004 period and 0.03 for 1980-2019, becoming statistically insignificant in the early 2000s. This result is also robust to a wide array of exercises, as discussed in *Section 3.1* and *Appendix B.3*.

Figure 2: Relationship between Private Flows and Growth Over Time



Notes: This figure plots the resulting coefficient β_T from equation (4) when the dependent variable is net foreign direct investment and portfolio equity flows. The coefficient is the blue line and the gray area is a 90 percent confidence interval.

3.3 Current Account

Finally, having examined public and private capital flows separately, we turn to the current account, which aggregates the two. We estimate equation (4) using the average current account deficit as a share of GDP as the dependent variable, over the 1980 to T period.

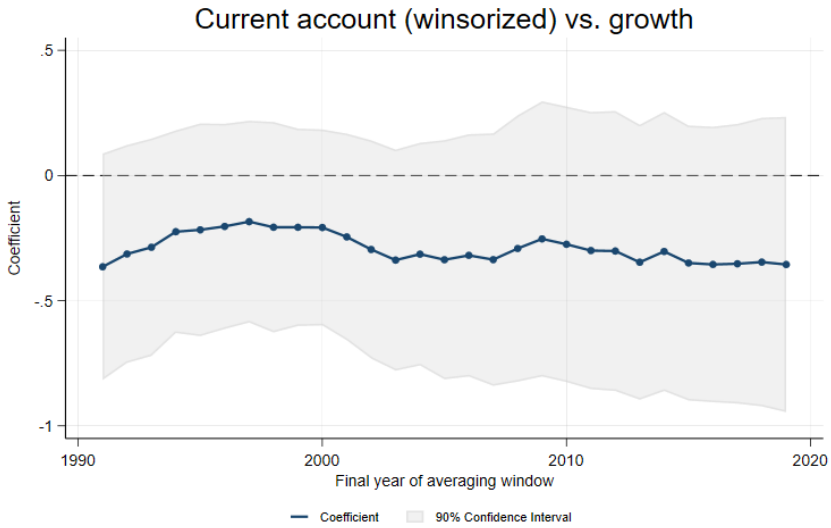
Figure 3 shows that the coefficient is negative throughout the sample, but is not statistically different from zero. The coefficient is -0.31 for the 1980–2004 period and -0.36 for 1980–2019. Again, this result is also robust to a wide array of exercises, as discussed in *Section 3.1* and *Appendix B.3*.

Taken together, these results suggest that the changing relationship between growth and international capital flows is primarily observed at the sectoral level. While the relationship between public foreign assets and growth changes substantially, and the positive relationship between private flows and growth weakens, we do not observe a comparable change in the relationship between the current account and growth.

3.4 International Reserves and Public External Debt

To better understand the disappearance of the negative relationship between net public foreign assets and growth, we examine the dynamics of its two components: public external debt and international reserves. We divide countries into two groups based on their average

Figure 3: Relationship between the Current Account and Growth Over Time



Notes: This figure plots the resulting coefficient β_T from equation (4) when the dependent variable is the current account deficit. The coefficient is the blue line and the gray area is a 90 percent confidence interval.

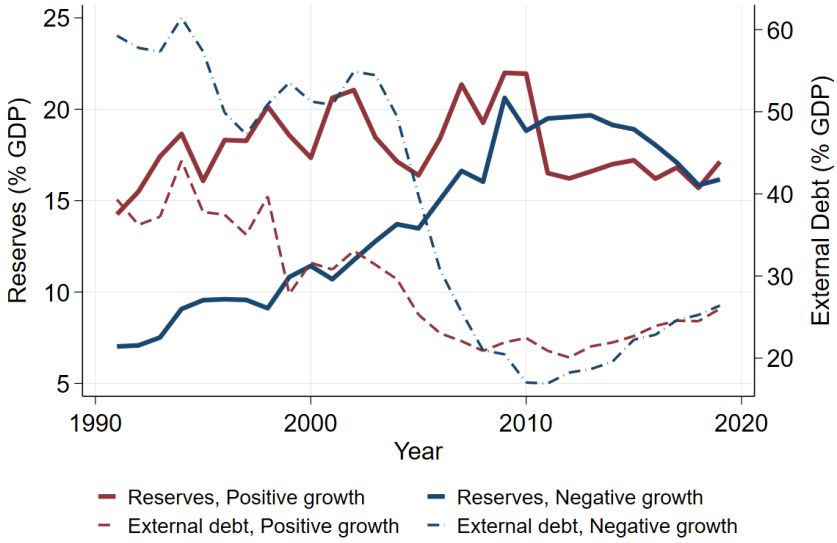
GDP per capita growth relative to the United States. We classify countries as negative growth (positive growth) countries if their average growth rate is below (above) that of the United States.[4] *Figure 4* plots the average public external debt and international reserves, as a share of GDP, for each group over time.

Figure 4 shows that in the early 1990s, negative growth countries had substantially higher levels of public external debt than positive growth countries, averaging 59% of GDP compared with 39%. At the same time, negative growth countries held considerably fewer international reserves, averaging 7% of GDP compared with 14% for positive growth countries. These differences narrowed substantially over the following two decades. In particular, negative growth countries reduced their public external debt from 59% of GDP in 1991 to 17% by 2010, while increasing their international reserves from 7% to 19% of GDP over the same period. By 2010, the two groups had similar levels of public external debt and international reserves.

These patterns suggest that the disappearance of the negative relationship between growth and net public foreign assets is closely associated with changes in the external positions of slower-growing countries. In particular, these countries substantially reduced their public external debt while accumulating international reserves, bringing their net public external positions closer to those of faster-growing countries.

[4]This classification is purely illustrative, intended to highlight broad patterns in the data and none of our empirical or quantitative results depend on this classification.

Figure 4: International Reserves and Public External Debt to GDP (simple average)



Source: IDS World Bank, WDI World Bank, IFS IMF, and authors' calculations.

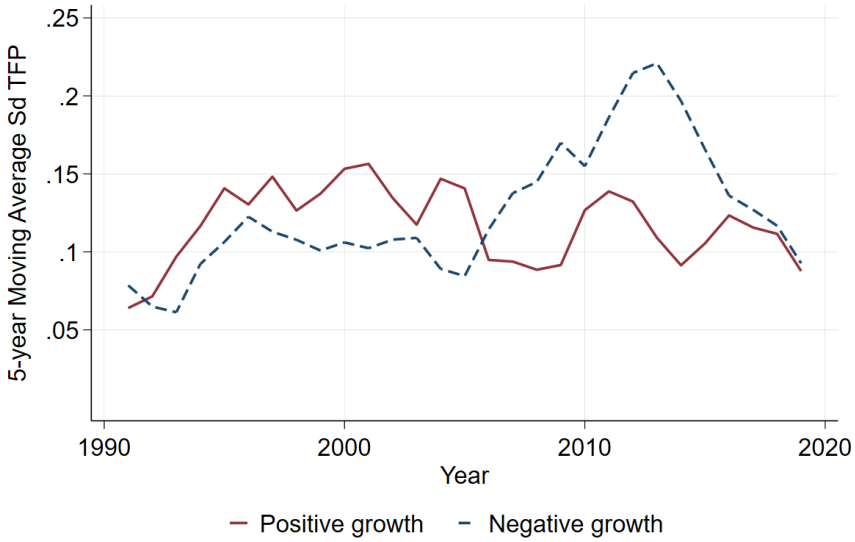
Appendix B.5 shows that these patterns are robust to alternative group classifications and aggregation methods. The results are similar when countries are kept in their growth groups from 2000 or 2019, or when we restrict the sample to countries that never change groups. The same pattern is observed using medians instead of simple averages. When weighting countries by GDP, the differences between the groups are less pronounced, reflecting the greater influence of larger economies. Note, this classification is purely illustrative, intended to highlight broad patterns in the data. None of our empirical or quantitative results depend on the particular classification used.

3.5 Volatility

The previous section documents that the disappearance of the negative relationship between growth and net public foreign assets coincided with a stark and substantial reduction in public external debt and an increase in international reserves among slower-growing countries. We now examine whether changes in the economic environment faced by these countries could help explain this pattern. In particular, we investigate changes in productivity volatility, which may affect a countries' incentives to borrow and accumulate reserves.

Using data from the Penn World Table and following Caselli and Feyrer (2007), we construct total factor productivity (TFP) for each country in our sample. We demean the TFP series and calculate their standard deviation using a five-year backward rolling window.

Figure 5: TFP Volatility: Negative Growth and Positive Growth Countries



Notes: This figure plots the average TFP volatility of negative growth and positive growth countries. Volatility is the standard deviation of demeaned TFP over a 5-year backward rolling window. In each year T, a country is a negative growth (positive growth) country if its average GDP per capita growth over the 1980 to T period is below (above) that of the U.S. The sample is the 40 countries with available TFP data. *Source:* Penn World Table and authors' calculations.

Figure 5 plots the average TFP volatility for negative and positive growth countries, where groups are defined according to average GDP per capita growth relative to the United States.

Figure 5 shows that the two groups experienced similar levels of TFP volatility until the early 2000s. However, after 2004, negative growth countries experienced an increase in volatility relative to positive growth countries. As a result, while negative growth countries were generally less volatile before the mid-2000s, they became more volatile in the subsequent period. *Appendix B.6* shows that this pattern is robust to alternative rolling windows, definitions of growth groups, and measures of productivity and capital returns. Again, this classification is purely illustrative and none of results depend on this particular classification.

The increase in relative volatility coincides with the reduction in public external debt and the accumulation of international reserves documented in the previous subsection. This pattern is consistent with a stronger precautionary motive among slower-growing countries, as greater uncertainty may reduce their willingness to borrow and increase their incentives to accumulate reserves.

3.6 Alternative Explanations

Several economic and institutional changes took place in emerging and low-income countries over the period we study, which could potentially account for the changing relationship between growth and net public foreign assets. For example, the commodity boom, changes in access to international capital markets, greater central bank independence, and debt relief initiatives may have affected countries' external positions. To examine whether our results are sensitive to these factors, we estimate equation (4) adding a set of controls,

$$\Delta \text{PuNFA}_{j,T} = \alpha_T + \beta_T \Delta \text{g}_{j,T} + \gamma_T X_{j,T} + \delta_T C_{j,T} + \epsilon_{j,T} \tag{5}$$

where, $C_{j,T}$ includes: the initial capital-output ratio, initial public external debt, average population growth, and average capital account openness following Gourinchas and Jeanne (2013). We then add one additional control, $X_{j,T}$, at a time. These include measures of commodity dependence, central bank independence, exchange rate regimes, sovereign defaults, banking and currency crises, IMF programs, political institutions, terms-of-trade growth, and export growth. *Table 2* reports the resulting coefficients for the 1980–2004 and 1980–2019 periods, together with the incremental R^2 from adding each control for 1980–2019. Since data availability varies across controls, *Appendix B.7* also reports the coefficients without controls and with only the base controls, estimated using the same sample of countries.

Table 2 shows that the negative relationship between growth and net public foreign assets during 1980–2004 remains statistically significant across all specifications, while the coefficient for 1980–2019 is close to zero and statistically insignificant throughout. Some controls help explain cross-country variation in public foreign asset positions, particularly exchange rate regimes and central bank independence, but none alters our main finding. Even when including all controls simultaneously, the coefficients remain -0.34 and 0.06, respectively. The results are also robust to excluding countries participating in the Heavily Indebted Poor Countries (HIPC) initiative (*Appendix B.1*), using the 1980–2000 period (*Appendix B.9*), and measuring annual flows rather than changes in stocks (*Appendix B.8*).

Hence, we find no evidence that overturns our proposed explanation for the changing relationship between net public foreign assets and growth. We therefore focus on quantifying the importance of this mechanism: increased productivity volatility and stronger precautionary savings motives. Other explanations, such as the HIPC initiative, could also be evaluated quantitatively within a model, but doing so is beyond the scope of this paper.

Table 2: Changing Relationship, PuNFA and Growth: Alternative Explanations

	1980-2004		1980-2019		1980-2019
Additional control	β	N	β	N	Incremental R^2
Base controls only	-0.353^{***}	59	0.008	55	–
	(0.098)		(0.043)		
HIPC	-0.238^{**}	59	0.014	55	0.001
	(0.100)		(0.055)		
Commodity exporter	-0.365^{***}	59	0.007	55	0.005
	(0.100)		(0.042)		
Central bank independence	-0.298^{***}	57	0.034	54	0.052
	(0.100)		(0.042)		
Floating exchange rate (share of years)	-0.365^{***}	59	0.001	55	0.060
	(0.100)		(0.039)		
Default (share of years)	-0.358^{**}	59	0.018	55	0.001
	(0.163)		(0.059)		
Banking crises (share of years)	-0.370^{***}	59	-0.002	55	0.012
	(0.100)		(0.043)		
Currency crises (share of years)	-0.450^{***}	59	-0.014	55	0.021
	(0.117)		(0.045)		
IMF programs (share of years)	-0.387^{***}	59	0.031	55	0.015
	(0.113)		(0.048)		
Polity2	-0.465^{***}	54	-0.024	50	0.024
	(0.110)		(0.052)		
Terms of trade growth	-0.370^{***}	56	0.010	53	0.002
	(0.104)		(0.044)		
Export growth	-0.272^{**}	56	0.026	53	0.005
	(0.122)		(0.045)		
Capital account openness only	-0.366^{***}	63	-0.007	59	–
	(0.091)		(0.046)		
All controls together	-0.340^{**}	50	0.057	47	0.185
	(0.166)		(0.071)		

Notes: This table reports the coefficient on growth β_T from equation (5) for $T = 2004$ and $T = 2019$, with the base controls and the additional control in each row. The dependent variable is the change in the net public foreign asset position. Base controls are the initial capital-output ratio, initial public external debt, average population growth, and average capital account openness. The row "Base controls only" includes no additional control, and the row "Capital account openness only" includes capital account openness and no other base control. The sample in each row is the countries with data on growth, the base controls, and the additional control, so it changes across rows; N is the number of countries. Incremental R^2 is the increase in R^2 from adding the additional control to the regression of the 1980-2019 period with growth and the base controls, both estimated on the same sample of countries. The coefficients without controls and with only the base controls on the sample of each row are in *Table B.7* in *Appendix B.7*. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

3.7 Discussion

The empirical analysis establishes three main findings. First, the historically negative relationship between growth and net public foreign assets has largely disappeared since the early 2000s. Second, this change coincided with a substantial reduction in public external debt and an accumulation of international reserves among slower-growing countries. Third, these same countries experienced an increase in productivity volatility relative to faster-growing countries.

Together, these findings suggest a simple explanation for the changing relationship between growth and net public foreign assets: stronger precautionary savings motives. Greater economic uncertainty may induce countries to reduce external borrowing and accumulate international reserves, weakening the historically negative relationship between growth and net public foreign assets. However, the empirical patterns alone cannot establish whether changes in volatility can account for the magnitude of this shift. To investigate this mechanism, we develop a stochastic small open economy growth model and quantify the extent to which changes in productivity volatility can explain the observed change.

4 Model

Time is discrete and the horizon is infinite. We consider a small open economy populated by a measure one of identical households, competitive firms, and a government. Both households and the government have access to international financial markets, where they can borrow and save through one-period non-contingent bonds at an exogenous world interest rate R^*.

Households own capital and firms in the economy and supply labor inelastically. They choose consumption, investment, and private external borrowing to maximize expected lifetime utility, discounting future consumption at rate β. Firms operate a neoclassical production technology subject to stochastic productivity shocks and exogenous technological growth.

The government chooses public external borrowing and makes lump-sum transfers to households. Its objective is to maximize the representative household's utility, but it discounts future consumption at rate $\beta_g = \beta(1+\tau_g)$. The model also features wedges on private investment and borrowing, denoted by τ_x and τ_q, respectively. The government cannot commit to future policies and reoptimizes each period.

The timing within each period is as follows:

1. The productivity shock z_t is realized.

2. The government chooses next-period public external debt D^g_{t+1} and lump-sum transfers T_t , anticipating the household's optimal response.

3. Given government policy, households choose consumption c_t, investment x_t, and next-period private capital k_{t+1} and external debt d_{t+1}.

We formulate the model recursively, with primes denoting next-period variables. The aggregate state is $s = (z, K, D, D^g, \Gamma)$, where z denotes stochastic productivity, K aggregate capital, D aggregate private external debt, D^g public external debt, and Γ the level of labor-augmenting productivity.

4.1 Firms

Firms operate a production technology using capital K and labor L:

$$Y = zF(K, \Gamma L) \tag{6}$$

where z is stochastic total factor productivity, and Γ represents labor-augmenting technological progress, which grows at the constant rate g:

$$\Gamma' = (1 + g)\Gamma$$

Productivity follows an autoregressive process:

$$\log z' = \rho \log z + \varepsilon' \qquad \varepsilon' \sim \mathcal{N}(0, \sigma_z^2)$$

where ρ governs productivity persistence and σ_z determines the volatility of productivity shocks.

Firms rent capital and hire labor in competitive markets. Profit maximization implies that factor prices equal their marginal products:

$$r = zF_K(K, \Gamma L) \qquad w = z\Gamma F_L(K, \Gamma L)$$

Labor supply is inelastic and normalized to $L = 1$.

4.2 Household's Problem

Households receive income from supplying labor and renting capital to firms, as well as lump-sum transfers from the government. They make their decisions after observing the government's current borrowing policy and anticipate future government policies, which

depend on the evolution of the economy's state variables. Taking government policies and factor prices as given, households choose consumption, private investment, and external borrowing to maximize expected lifetime utility.

We distinguish between individual household choices and aggregate variables. Lowercase letters denote individual household quantities, while uppercase letters denote their aggregate counterparts. In particular, households choose their own capital holdings k and private external debt d, taking aggregate capital K and private external debt D as given. Since households are identical and have unit mass, individual and aggregate quantities coincide in equilibrium, so that $k = K$ and $d = D$.

Let $s = (z, K, D, D^g, \Gamma)$ denote the aggregate state of the economy. The household's value function, conditional on the government's current borrowing decision $D^{g\prime}$, is given by

$$V^H(k, d; s, D^{g\prime}) = \max_{c,x,k',d'} \left\{ u(c) + \beta \mathbb{E}_{z'|z} \left[V^H(k', d'; s', G(s')) \right] \right\} \tag{7}$$

subject to the household's budget constraint,

$$\begin{aligned} c + (1 + \tau_x)x = {} & rk + wL + T - d \\ & + \frac{1 - \tau_q}{R^*} d' - \Phi(k, k') - \Psi(d', \bar{d}) \end{aligned}$$

the law of motion for private capital,

$$k' = (1 - \delta)k + x$$

and the aggregate laws of motion,

$$\begin{aligned} K' &= \mathcal{K}(s, D^{g\prime}) \\ D' &= \mathcal{D}(s, D^{g\prime}) \\ D^{g\prime\prime} &= \mathcal{G}(s') \\ \Gamma' &= (1 + g)\Gamma \\ s' &= (z', K', D', D^{g\prime}, \Gamma') \end{aligned}$$

Households take the government's future borrowing policy $D^{g\prime\prime} = \mathcal{G}(s')$ and transfers $T = \mathcal{T}(s, D^{g\prime})$ as given. Here, $\mathcal{K}$ and $\mathcal{D}$ denote the aggregate responses of private capital and borrowing to the government's current decision, while $\mathcal{T}$ and $\mathcal{G}$ denote the government's transfer and borrowing policies. Individual households do not internalize the effect of their decisions on aggregate outcomes or government policies.

The function $u(\cdot)$ is strictly increasing and strictly concave, and δ denotes the depreciation

rate of capital. The function $\Phi(\cdot)$ captures capital adjustment costs. Following Schmitt-Grohé and Uribe (2003), we introduce a cost associated with private external debt, $\Psi(\cdot)$, to induce stationarity in the economy's net foreign asset position. The wedges τ_x and τ_q affect the effective cost of investment and the proceeds from external borrowing, respectively.

4.3 Government's Problem

The government chooses public external borrowing and lump-sum transfers to maximize the representative household's expected lifetime utility. We allow the government to discount future consumption at a different rate from households, given by $\beta_g = \beta(1 + \tau_g)$, where τ_g captures differences in intertemporal preferences between the government and households.

The government's value function is

$$V^G(s) = \max_{D^{g\prime}} \left\{ u\big(\hat{c}(s, D^{g\prime})\big) + \beta_g \mathbb{E}_{z'|z} \left[V^G(s') \right] \right\} \tag{8}$$

subject to the government budget constraint,

$$T = \frac{D^{g\prime}}{R^*} - D^g + \tau_x X + \frac{\tau_q}{R^*} D' - \Psi_g(D^{g\prime}, \bar{D}^g)$$

the household's optimal response functions,

$$\begin{aligned} C &= \hat{c}(s, D^{g\prime}) \\ X &= \hat{x}(s, D^{g\prime}) \\ K' &= \mathcal{K}(s, D^{g\prime}) \\ D' &= \mathcal{D}(s, D^{g\prime}) \end{aligned}$$

and the evolution of the aggregate state,

$$\begin{aligned} \Gamma' &= (1 + g)\Gamma \\ s' &= (z', K', D', D^{g\prime}, \Gamma') \end{aligned}$$

Here, $\hat{c}$ and $\hat{x}$ denote the household's optimal consumption and investment responses to the government's borrowing decision, while $\mathcal{K}$ and $\mathcal{D}$ determine aggregate capital and private external debt in the following period. The government anticipates these responses when choosing public borrowing, taking future government policy rules as given.

The government finances transfers through external borrowing and revenues collected from the investment and private borrowing wedges. As with private borrowing, we introduce a cost associated with public external debt, $\Psi_g(\cdot)$, to induce stationarity in the government's external position.

4.4 Equilibrium

A Markov-perfect equilibrium consists of household policy functions, government borrowing and transfer policies, aggregate laws of motion, and factor prices, such that, for every aggregate state s:

1. **Household optimality:** Given current government policies, anticipated future government policy rules, aggregate laws of motion, and factor prices, household policy functions solve the household's Bellman equation.

2. **Government optimality:** In each period, the government chooses public borrowing to maximize its Bellman equation, anticipating the household's optimal response to every feasible borrowing choice and taking future equilibrium government policy rules as given.

3. **Firm optimality:** Firms maximize profits, and factor prices equal the marginal products of capital and labor.

4. **Market clearing and consistency:** Individual and aggregate allocations coincide, so that $k = K$, $d = D$, $c = C$, and $x = X$. Government transfers satisfy the government budget constraint, and the aggregate laws of motion and government policies are consistent with equilibrium household and government decisions.

5 Calibration

We calibrate the model to examine the role of productivity volatility and borrowing wedges in explaining the relationship between economic growth and international capital flows. We divide countries into five groups according to their average GDP per capita growth rates and calibrate a separate economy for each group. We first consider the period 1980–2004 and subsequently extend the analysis to 2005–2019.

For the quantitative analysis, we assume logarithmic utility, $u(c) = \log c$, and a Cobb-Douglas production function, $F(K, \Gamma L) = K^{\alpha}(\Gamma L)^{1-\alpha}$. We assume quadratic capital adjustment costs, $\Phi(k, k') = \frac{\phi}{2}\left(\frac{k'}{k} - (1+g)\right)^2 k$, and quadratic costs associated with private and public external debt positions, given by $\Psi(d', \bar{d}_q) = \Gamma\frac{\kappa_q}{2}\left(\frac{d'}{\Gamma'} - \bar{d}_q\right)^2$ and $\Psi_g(D^{g\prime}, \bar{d}_g) = \Gamma\frac{\kappa_g}{2}\left(\frac{D^{g\prime}}{\Gamma'} - \bar{d}_g\right)^2$, respectively. Capital adjustment costs are zero along the balanced growth path as in Aguiar and Gopinath (2007), while debt-position costs are minimized at their respective reference levels. Following Schmitt-Grohé and Uribe (2003), we introduce these debt costs to ensure stationarity in external positions.

We allow the growth rate, productivity volatility, and three wedges (τ_x, τ_q, τ_g) to differ across growth groups, while the remaining structural parameters are common across economies. In particular, we internally calibrate the capital adjustment cost ϕ and the private and public debt position cost parameters (κ_q, κ_g), together with the group specific wedges, to match average investment and capital flows and their volatility.

We solve the model assuming that productivity follows the stochastic process described above. However, rather than computing the calibration moments from the model's stationary distribution, we simulate the economy over the period 1980–2004. For each growth group, we initialize the model using the observed capital output ratio and private and public external debt positions at the end of 1979. We then use the historical sequence of productivity shocks for that group to generate paths for investment and capital flows. From these simulated paths, we compute the moments used in the calibration and compare them with their empirical counterparts.

5.1 External Calibration

We set the household discount factor to $\beta = 0.95$ and assume logarithmic utility. Following standard values in the literature, we set the capital share to $\alpha = 0.33$ and the annual depreciation rate to $\delta = 0.06$. The world interest rate is chosen to satisfy $\beta R^* = (1 + g^*)$, where g^* is the average annual growth rate of U.S. GDP per capita over 1980–2004. This implies a gross world interest rate of $R^* = 1.0736$. We estimate the persistence of productivity, $\rho = 0.8338$, from the TFP and impose a common value across groups. Table 3 summarizes the parameters.

Table 3: Externally Calibrated Parameters

Parameter	Value	Description	Source
β	0.95	Household Discount Factor	Standard
g^*	1.995%	U.S. GDP per capita growth rate	WEO
R^*	1.0736	World Interest Rate	Consistent with U.S. per capita growth
α	0.33	Capital Share	Standard
δ	0.06	Capital Depreciation Rate	Standard
ρ	0.8338	Persistence Productivity Shock	PWT 10.0

Notes: xxx.

We allow the growth rate to differ across the five growth groups. For each group, we set g equal to its average annual GDP per capita growth rate over the period. Table 4 summarizes the parameters for each group.

Table 4: Externally Calibrated Parameters Group Specific

Parameter	Q1	Q2	Q3	Q4	Q5
g %	-1.16	0.15	0.82	1.93	3.66

Notes: Growth rates are group averages of real per capita GDP growth.

Finally, we initialize each economy using the observed capital stock and private and public external debt positions at the end of 1979, together with the initial productivity level constructed from the data. We also set the reference levels for private and public external debt, $\bar{d}_q$ and $\bar{d}_g$, equal to their respective initial positions. Initial capital is measured relative to the group's reference capital stock, $k_\star$, using the observed capital output ratio in 1979 relative to its average over 1980–2004. Initial productivity, z_0, is constructed using the average deviation of log TFP from its estimated trend in 1980 for each growth group. Table 5 shows the initial starting point for all country groups.

Table 5: Initial state and reference levels, end of 1979

	Q1	Q2	Q3	Q4	Q5
Private position (% GDP)	14.2	9.3	12.0	8.8	12.0
Public position (% GDP)	22.2	12.8	24.9	20.2	15.3
Initial Capital k_0	0.924	0.875	0.902	0.850	0.869
Log TFP, $\log z_0$	-0.001	0.022	0.055	-0.052	-0.025

Notes: External positions are group averages at the end of 1979, expressed as percentages of GDP. Initial capital is measured as the ratio of the observed capital output ratio in 1979 to its average over 1980–2004. Initial capital is expressed relative to the model's reference capital stock. Initial conditions are constructed from the data and adjusted to be consistent with the model's normalization and calibrated productivity process.

5.2 Internal Calibration

We internally calibrate 23 parameters to match 23 moments from the data. These include three parameters that are common across the five growth groups: the capital adjustment cost parameter ϕ, and the private and public external debt cost parameters, κ_q and κ_g. We also allow the three wedges (τ_x, τ_q, τ_g) and the standard deviation of productivity innovations, σ_z, to differ across growth groups, giving us 20 additional parameters.

For each growth group, we target four moments: the average investment rate, average private capital flows, average public capital flows, and productivity volatility. The first three moments discipline the group-specific wedges, while productivity volatility determines σ_z. To calibrate the common adjustment-cost parameters, we target three additional moments: the volatility of investment, private capital flows, and public capital flows. Each volatility target is calculated as the average across the five growth groups of the standard deviation of the corresponding annual series over 1980–2004.

We implement the calibration in stages. We first choose σ_z for each growth group to match the output volatility For a given set of common parameters $(\phi, \kappa_q, \kappa_g)$, we then choose the wedges separately for each growth group to match its three average moments. We adjust the common parameters to minimize the differences between the model and data volatility moments, recalibrating the group-specific wedges at each step. Finally, we update σ_z to ensure that the calibrated model continues to reproduce the observed productivity volatility.

Table 6: Internally Calibrated Parameters, 1980–2004

Common parameters	Value
Capital adjustment cost, ϕ	0.963
Private debt cost, κ_q	0.1087
Public debt cost, κ_g	0.1091

Group-specific parameters	Q1	Q2	Q3	Q4	Q5
Investment wedge, τ_x	-0.0988	-0.0544	-0.0331	-0.0823	-0.0792
Private borrowing wedge, τ_q	-0.0579	-0.0339	-0.0334	-0.0169	0.0127
Government wedge, τ_g	-0.3450	-0.1464	-0.0826	-0.0725	0.0476
TFP innovation volatility, σ_z	0.0558	0.0250	0.0438	0.0486	0.0492

Notes: **Q1 denotes the slowest-growing group and Q5 the fastest-growing group. The common parameters are shared across groups, while the wedges and TFP innovation volatility are group-specific.**

Table 6 reports the internally calibrated parameters for 1980–2004. The investment wedge, τ_x, is negative for all five groups, implying an investment subsidy. The private borrowing wedge, τ_q, is also negative for the first four groups and increases with economic growth, becoming slightly positive for the fastest-growing group. These wedges affect the cost of private borrowing and allow the model to reproduce the relatively weak relationship between growth and private capital flows.

The government wedge, τ_g, displays a stronger relationship with growth. Governments in slower-growing economies discount future consumption more heavily than households, with $\tau_g = -0.345$ for the slowest-growing group. This wedge becomes progressively less negative and turns positive for the fastest-growing group. The calibrated government wedges are therefore consistent with greater incentives to borrow among slower-growing economies and greater incentives to save among faster-growing economies.

Table 7: Targeted Moments: Model and Data, 1980–2004

Moment		Q1	Q2	Q3	Q4	Q5
Investment rate	Data	19.01	19.99	20.30	22.71	23.64
	Model	19.01	19.99	20.32	22.70	23.69
Private flows	Data	1.06	0.72	1.36	1.42	1.13
	Model	1.06	0.73	1.37	1.42	1.05
Public flows	Data	3.18	1.40	1.78	1.87	0.70
	Model	3.22	1.30	1.69	1.94	0.87
TFP volatility	Data	0.1290	0.0580	0.1020	0.1130	0.1150
	Model	0.1288	0.0576	0.1019	0.1130	0.1147

Volatility (% of GDP)	Data	Model
Investment rate	2.56	2.78
Private flows	1.11	1.23
Public flows	2.88	2.19

Notes: Average moments are calculated over 1980–2004. Investment rate, private, and public flows are as % of GDP. The productivity volatility target is constructed from five-year rolling standard deviations of country-level TFP, while the model counterpart is the long-run standard deviation of output relative to its mean. Volatility is the average across growth groups of the standard deviation of the corresponding annual series.

Table 7 compares the targeted moments in the model and the data. The model closely reproduces the average investment rate and private and public capital flows across the five growth groups. In particular, the model generates substantially larger public capital inflows for slower-growing economies, while private capital flows vary much less systematically with growth.[5]

The fit is less precise for the volatility moments. The model generates slightly higher volatility of private capital flows and investment than observed in the data. In contrast, it generates a standard deviation of public capital flows of 2.19 percentage points of GDP, compared with 2.88 in the data. Thus, although the model reproduces the differences in

[5]We construct capital flows in the model to be consistent with their empirical counterparts, which are measured as changes in external positions adjusted for changes in nominal GDP. Since the model is expressed in detrended units, we account for trend growth and use the corresponding nominal GDP and population growth adjustments when computing private and public capital flows as a share of GDP.

average capital flows across growth groups, it understates the volatility of public borrowing.

Table 8: Untargeted Moments: Model and Data, 1980–2004

Moment		Q1	Q2	Q3	Q4	Q5
Net Private position	Data	16.4	9.4	12.0	14.6	12.8
	Model	24.5	16.2	22.0	17.4	14.8
Net Public position	Data	58.2	34.8	37.0	32.4	13.4
	Model	57.9	27.7	33.9	30.1	13.3
Current account deficit	Data	4.69	2.22	5.35	3.06	1.63
	Model	4.27	2.03	3.06	3.36	1.91

Notes: All variables are expressed as percentages of GDP and averaged over 1980–2004.The private and public positions are levels.

Table 8 reports several moments that are untargeted in the calibration. The model reproduces the broad pattern in public external positions: slower-growing economies accumulate substantially larger public liabilities than faster-growing economies. For the slowest-growing group, the model generates an average public position of 57.9% of GDP, compared with 58.2% in the data. The model also produces relatively low public debt positions for the fastest-growing group, although it understates public liabilities somewhat in the intermediate groups.

The model generates somewhat higher private external liabilities than observed in the data, although it reproduces the average private capital flows across growth groups. It also captures the broad pattern of current account deficits, with the largest difference between the model and the data occurring in the third group.

Table 9: Relationship Between Growth and International Capital Flows, 1980–2004

Dependent Variable	Data	Model
Public capital flows	-0.412	-0.373
Private capital flows	0.054	0.039
Current account deficit	-0.535	-0.334

Notes: **Coefficients are obtained from regressions of the five growth-group averages of each variable on average GDP per capita growth over 1980–2004. The coefficients are not directly targeted in the calibration.**

Table 9 compares the relationship between growth and international capital flows in the model and the data. The model reproduces the negative relationship between growth and public capital flows, with a coefficient of -0.373, compared with -0.412 in the data. In contrast, the relationship between growth and private capital flows is close to zero in both the model and the data. The model also captures the negative relationship between growth and current account deficits, although the estimated coefficient is smaller in magnitude. Overall, these results suggest that the model reproduces the main patterns in the data, particularly the stronger relationship between growth and public rather than private capital flows.

6 Quantitative Analysis

We now use the model to investigate the forces behind the changing relationship between economic growth and international capital flows. In particular, we seek to understand the relative importance of changes in productivity volatility and changes in the wedges affecting investment, private borrowing, and government borrowing decisions. The distinction between public and private external debt allows us to examine how these forces affect the accumulation of foreign assets and liabilities across sectors.

6.1 Changes in the Calibrated Economies

We begin by extending the calibration to the period 2005–2019, following the same procedure described in Section 5. As in the earlier period, we divide countries into five groups according to their average GDP per capita growth rates and calibrate the model to reproduce differences in investment, private capital flows, and public capital flows across groups.

Comparing the calibrated economies across the two periods allows us to identify changes in the productivity process and in the wedges governing saving and investment decisions. In particular, we examine whether the observed changes in public external borrowing are associated with changes in productivity risk, government borrowing incentives, or both. We also evaluate the model's ability to reproduce the changing relationship between growth and public external positions, as well as the corresponding patterns in private capital flows and the current account.

6.2 Decomposing the Changing Relationship

To quantify the contribution of different forces, we conduct a series of counterfactual exercises that separately vary productivity volatility and the calibrated wedges across periods. We begin with the economy calibrated to 1980–2004 and examine how its predictions change when we introduce the parameters estimated for 2005–2019.

Our first counterfactual replaces the group-specific productivity volatility parameters from the earlier period with those from the later period, holding the wedges fixed. This exercise isolates the role of changes in productivity risk in shaping public and private external borrowing decisions. In particular, it allows us to investigate whether changes in uncertainty alter governments' incentives to accumulate external liabilities or foreign assets.

In the second counterfactual, we hold productivity volatility at its earlier-period values and introduce the wedges calibrated for 2005–2019. This exercise captures the contribution of changes in investment incentives, private borrowing conditions, and government intertemporal preferences. We subsequently vary the wedges individually to investigate which margins are most important for the evolution of public and private external positions.

Finally, we allow productivity volatility and all three wedges to change simultaneously. Comparing these counterfactuals allows us to assess their relative contributions and the extent to which their effects interact. Since the model is nonlinear, the contribution of each component may depend on the order in which parameters are changed.

Throughout these exercises, we focus on the relationship between economic growth and the accumulation of public external positions, which constitutes the main empirical finding of the paper. We also examine the responses of private capital flows and the current account to understand how adjustments in public borrowing interact with household saving and investment decisions. The objective is to determine whether changes in productivity risk and borrowing incentives can account for the disappearance of the negative relationship between growth and public external positions.

The calibration for 2005–2019 and the corresponding counterfactual exercises are currently underway. The quantitative results will be presented in a subsequent version of the paper.

7 Conclusion

This paper documents a substantial change in the relationship between economic growth and international capital flows in developing countries. We show that the negative relationship between growth and net public foreign asset positions observed during the 1980s and 1990s has disappeared over time. This change reflects important adjustments in public external debt and international reserves, while private capital flows have followed a different pattern. We also document changes in economic volatility across growth groups.

To investigate the forces behind these findings, we develop a stochastic small open economy model that distinguishes between public and private external borrowing. Ongoing quantitative exercises will assess the relative importance of changes in productivity volatility and borrowing wedges in explaining the evolution of public external positions.

References

Aguiar, Mark and **Manuel Amador**, "Growth in the Shadow of Expropriation", *The Quarterly Journal of Economics* 126 (2011), 651–697.

Aguiar, Mark and **Gita Gopinath**, "Emerging Market Business Cycles: The Cycle Is the Trend", *Journal of Political Economy* 115 (2007), 69–102.

Alfaro, Laura, **Sebnem Kalemli-Ozcan**, and **Vadym Volosovych**, "Sovereigns, Upstream Capital Flows, and Global Imbalances", *Journal of the European Economic Association* 12 (2014), 1240–1284.

Capelle, Damien and **Bruno Pellegrino**, *Unbalanced Financial Globalization*, NBER Working Paper, National Bureau of Economic Research, 2025.

Caselli, Francesco and **James Feyrer**, "The Marginal Product of Capital", *The Quarterly Journal of Economics* 122 (2007), 535–568.

Chinn, Menzie D. and **Hiro Ito**, "What Matters for Financial Development? Capital Controls, Institutions, and Interactions", *Journal of Development Economics* 81 (2006), 163–192.

Feenstra, Robert C., **Robert Inklaar**, and **Marcel P. Timmer**, "The Next Generation of the Penn World Table", *American Economic Review* 105 (2015), 3150–3182.

Garriga, Ana Carolina, "Central Bank Independence in the World: A New Data Set", *International Interactions* 42 (2016), 849–868.

Gourinchas, Pierre-Olivier and **Olivier Jeanne**, "Capital Flows to Developing Countries: The Allocation Puzzle", *Review of Economic Studies* 80 (2013), 1484–1515.

Horn, Sebastian, **Carmen M. Reinhart**, and **Christoph Trebesch**, "Hidden Defaults", *AEA Papers and Proceedings* 112 (2022), 531–535.

Lane, Philip R. and **Gian Maria Milesi-Ferretti**, "The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970-2004", *Journal of International Economics* 73 (2007), 223–250.

— "The External Wealth of Nations Revisited: International Financial Integration in the Aftermath of the Global Financial Crisis", *IMF Economic Review* 66 (2018), 189–222.

Schmitt-Grohé, Stephanie and **Martín Uribe**, "Closing Small Open Economy Models", *Journal of International Economics* 61 (2003), 163–185.

Online Appendix

Appendix A Data Sources and Sample Selection

Data sources. Public external debt data come from the World Bank's International Debt Statistics (IDS), which reports long-term external public and publicly guaranteed debt for emerging and low-income countries. We use both total debt stocks and their breakdown by creditor type: official creditors (multilateral and bilateral lenders) and private creditors (commercial banks, bonds, and other creditors). International reserves come from the IMF's International Financial Statistics (IFS).

Private capital flows are constructed using the External Wealth of Nations database of Lane and Milesi-Ferretti (2007), updated by Lane and Milesi-Ferretti (2018). We define the net private foreign asset position as foreign direct investment and portfolio equity liabilities minus the corresponding assets, expressed as a share of GDP in U.S. dollars. Private flows are the annual change in this position. Current account data come from the IMF's World Economic Outlook (WEO).

We construct total factor productivity (TFP) following Caselli and Feyrer (2007), using output, capital stocks, population, and labor shares from the Penn World Table, version 10.0 (Feenstra et al., 2015). When labor shares are unavailable, we use data from the International Labour Organization. As an alternative measure, we use the welfare-relevant TFP series reported by the Penn World Table. TFP can be constructed for 40 of the 63 countries in our sample. Investment data come from the WEO, while GDP per capita comes from the World Development Indicators and the WEO.

The controls used in *Section 3.6* come from several sources. Capital account openness is measured using the index of Chinn and Ito (2006), central bank independence using Garriga (2016), and sovereign default episodes and the duration of market exclusion using Horn et al. (2022). Banking and currency crises come from the Global Macro Database, participation in the Heavily Indebted Poor Countries initiative from the IMF's country classification, and terms of trade and export growth from the WEO.

Sample selection. Our sample covers 1980–2019. We exclude the COVID-19 pandemic because emergency financing, debt relief, and additional Special Drawing Rights allocations by the IMF and World Bank may have temporarily altered the dynamics of public capital flows.

We begin with emerging and low-income countries reporting external debt to the World Bank. We require observations on public external debt, international reserves, and GDP

in U.S. dollars in both 1980 and 2000, yielding 68 countries. We exclude five countries due to missing data: Sudan, which does not report international reserves in later years; Zimbabwe, Myanmar, and Mauritania, which lack GDP per capita data; and St. Vincent and the Grenadines, for which current account data begin only in 2014. The resulting sample comprises 63 countries, listed in *Table B.1*.

The IDS removes the entire history of countries that graduate to high-income status, excluding countries such as Korea, Chile, Malaysia, and Uruguay. In *Appendix B.4*, we use the data of Alfaro et al. (2014), updated in October 2020, which retain public external debt observations for these countries until they stopped reporting to the World Bank.

Appendix B Additional Figures and Tables

Table B.1: Sample of countries used in regression analysis

Country	Country	Country	Country
Algeria	Ecuador	Jamaica	Paraguay
Argentina	Egypt	Jordan	Peru
Bangladesh	El Salvador	Kenya	Philippines
Belize	Eswatini	Lebanon	Republic of Congo
Bolivia	Ethiopia	Lesotho	Rwanda
Botswana	Fiji	Madagascar	Samoa
Brazil	Gabon	Malawi	Sierra Leone
Burundi	The Gambia	Maldives	Solomon Islands
Cameroon	Ghana	Mauritius	Sri Lanka
Central African Republic	Grenada	Mexico	Tanzania
Chad	Guatemala	Morocco	Thailand
Colombia	Guyana	Nepal	Tunisia
Comoros	Haiti	Nicaragua	Turkey
Costa Rica	Honduras	Nigeria	Uganda
Democratic Republic of Congo	India	Pakistan	Zambia
Dominican Republic	Indonesia	Papua New Guinea	

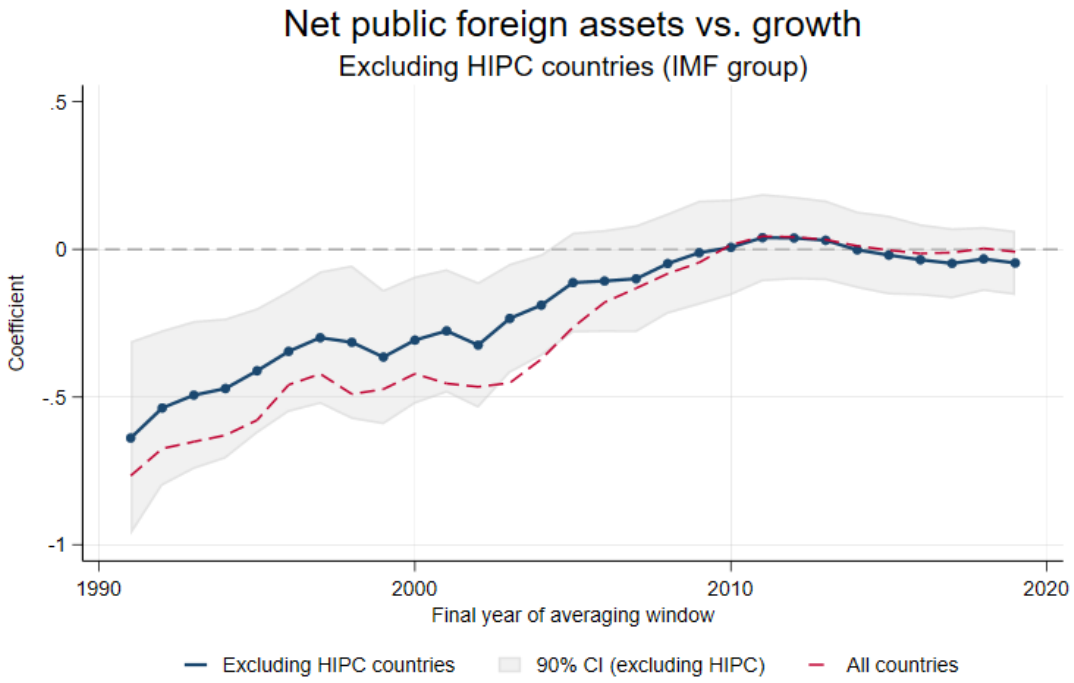
Notes: The sample has 63 countries.

B.1 Heavily Indebted Poor Countries Initiative

In 1996 the IMF and the World Bank launched the Heavily Indebted Poor Countries (HIPC) initiative to ensure that no low-income country faced an unmanageable debt burden. The aim of the program was to provide debt relief to a select group of countries meeting a set

of strict criteria. Over 30 countries participated in the initiative and reduced their debt levels significantly. Given that the HIPC initiative was targeted to low-income developing countries, the reduction in debt levels seen in the late 1990s and early 2000s (as a consequence of the HIPC initiative) could potentially explain the change in the relationship between net public foreign asset position and growth observed in *Figure 1*.

Figure B.1: Relationship between Net Public Foreign Assets and Growth Over Time Excluding HIPC Participants



Notes: This figure plots the resulting coefficient β_T from equation (4) excluding countries that participated in the HIPC initiative (41 countries). The gray area is a 90 percent confidence interval. The dashed line is the coefficient for all countries in *Figure 1*.

To examine the role of the HIPC initiative, we reestimate our baseline regression excluding the 22 countries (see *Table B.2*) that participated in the program. *Figure B.1* shows that the negative relationship between growth and net public foreign assets remains present in the earlier period. The estimated coefficient is −0.41 for 1980–1995 and −0.31 for 1980–2000, both statistically significant. Although the magnitude of the relationship is smaller than in the full sample, the coefficient gradually approaches zero and is no longer statistically significant from approximately 2010 onward.

These results suggest that the HIPC initiative may have contributed to the magnitude

of the negative relationship observed in the earlier period, but the disappearance of this relationship is not driven exclusively by countries that received debt relief. Even among countries that did not participate in the initiative, the negative relationship between growth and net public foreign assets disappears over time.

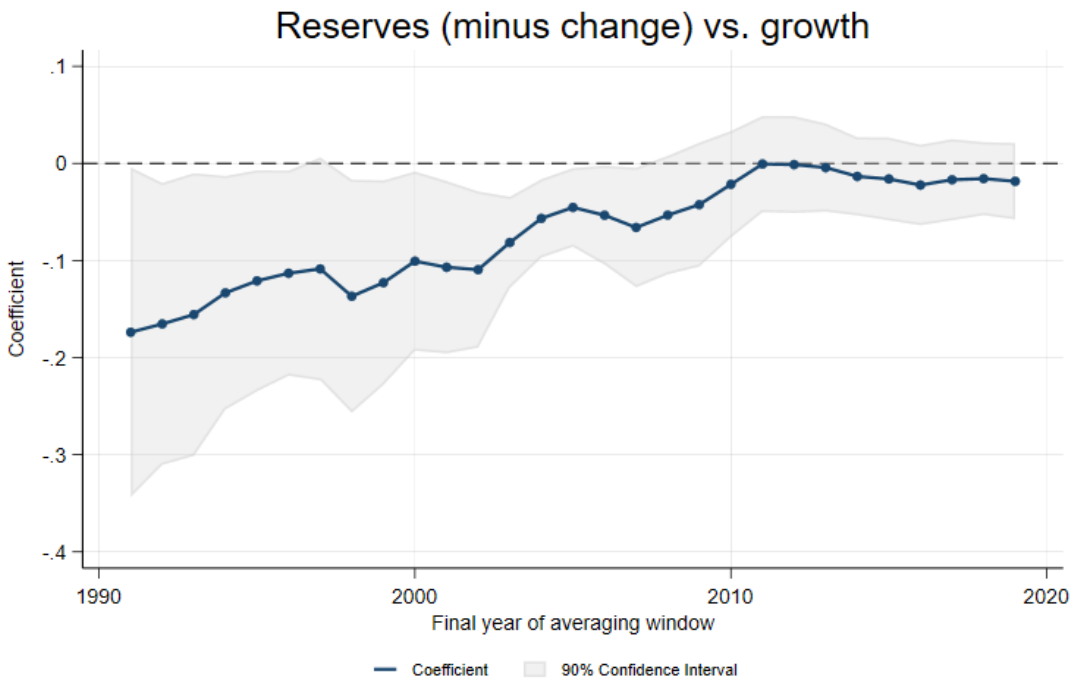
Table B.2: Countries in our sample that participated in the HIPC initiative

Country	Country	Country	Country
Bolivia	Democratic Republic of Congo	Honduras	Rwanda
Burundi	Ethiopia	Madagascar	Sierra Leone
Cameroon	The Gambia	Malawi	Tanzania
Central African Republic	Ghana	Nicaragua	Uganda
Chad	Guyana	Republic of Congo	Zambia
Comoros	Haiti		

Notes: 22 of the 63 countries in our sample participated in the Heavily Indebted Poor Countries initiative, according to the IMF's classification. *Figure B.1* excludes these countries.

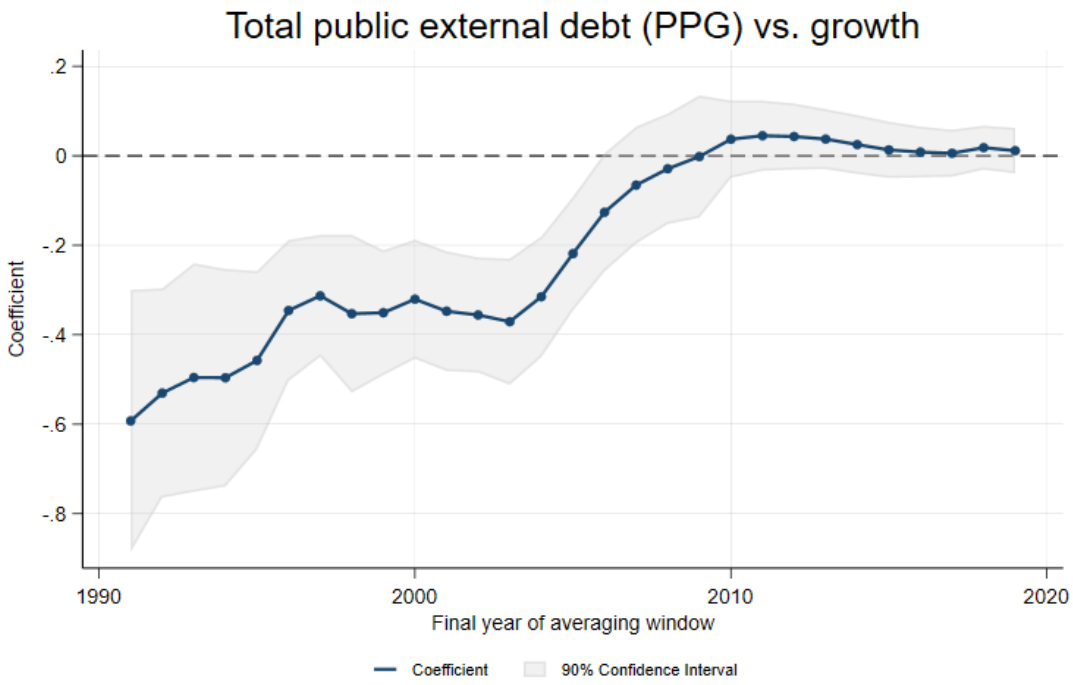
B.2 Components of Net Public Foreign Assets

Figure B.2: Relationship between (Negative) International Reserves and Growth Over Time



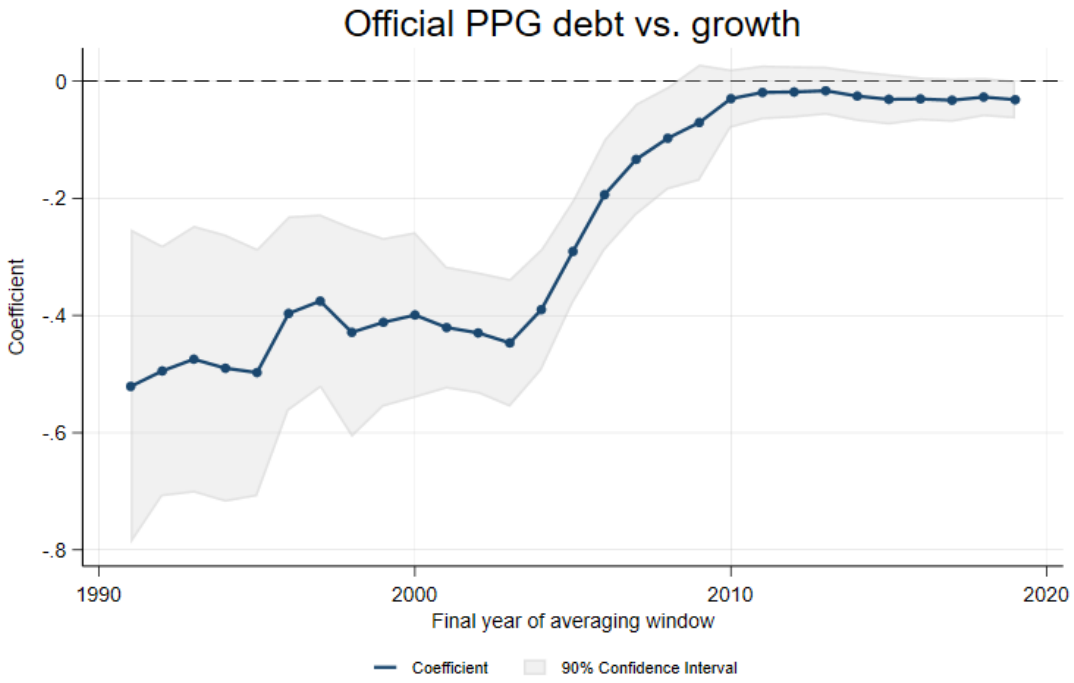
Notes: This figure plots the resulting coefficient β_T from equation (4) when the dependent variable is the negative of international reserves. The gray area is a 90 percent confidence interval.

Figure B.3: Relationship between Public External Debt and Growth Over Time



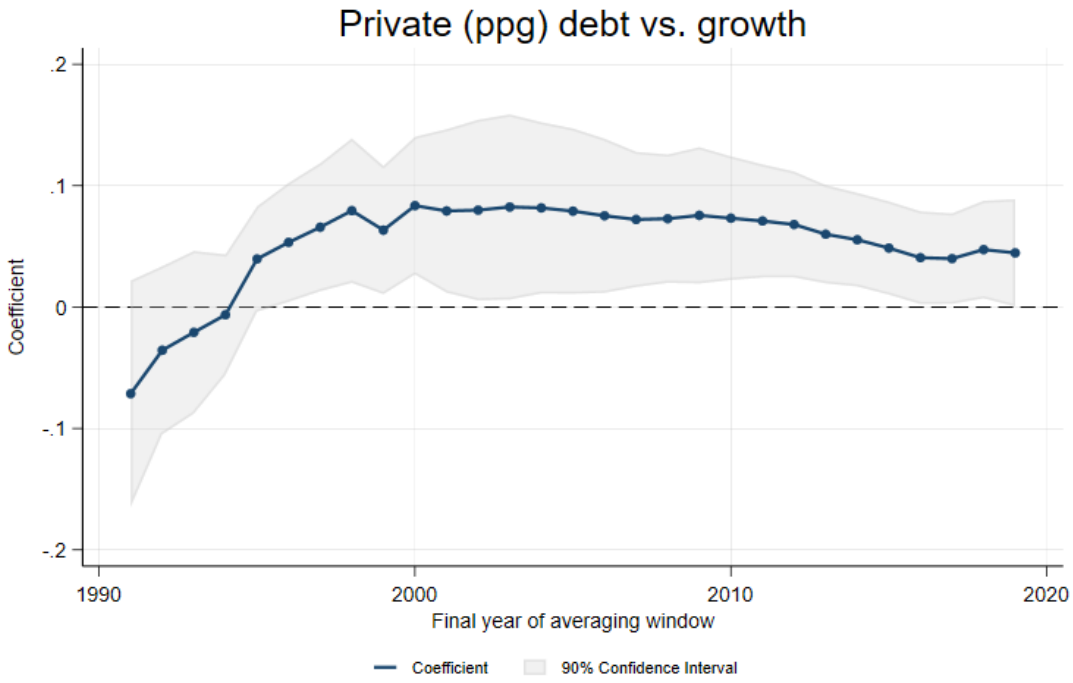
Notes: This figure plots the resulting coefficient β_T from equation (4) when the dependent variable is public external debt. The gray area is a 90 percent confidence interval.

Figure B.4: Relationship between Public External Debt (Official Creditors) and Growth Over Time



Notes: This figure plots the resulting coefficient β_T from equation (4) when the dependent variable is public external debt from official creditors. The gray area is a 90 percent confidence interval.

Figure B.5: Relationship between Public External Debt (Private Creditors) and Growth Over Time

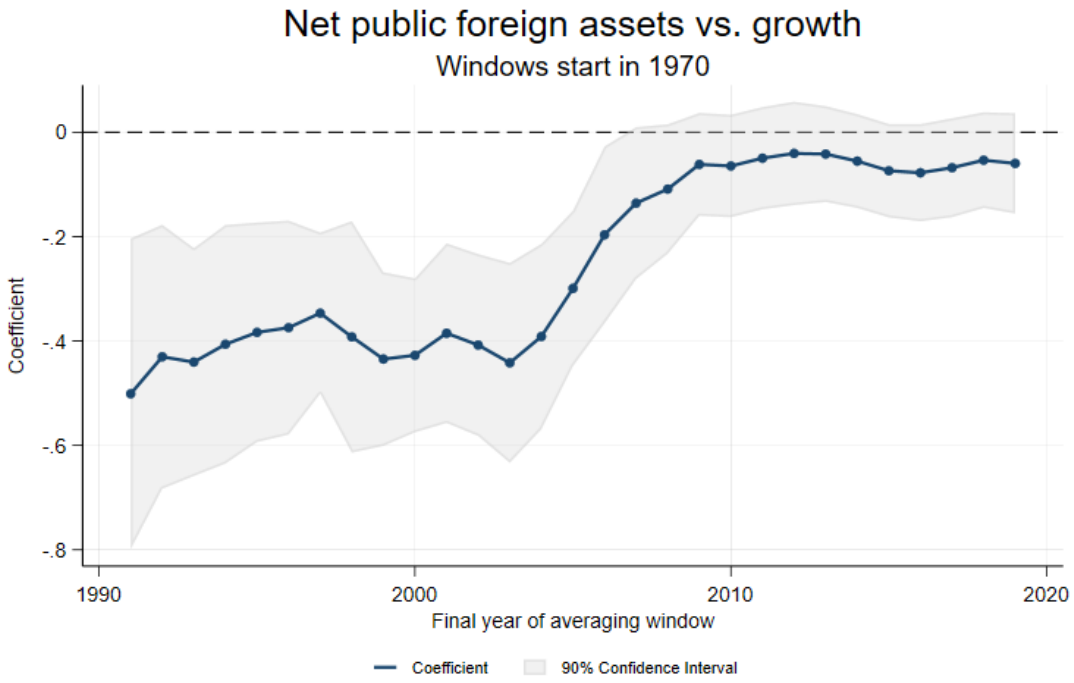


Notes: This figure plots the resulting coefficient β_T from equation (4) when the dependent variable is public external debt from private creditors. The gray area is a 90 percent confidence interval.

B.3 Base Year, Rolling Window, and Outliers

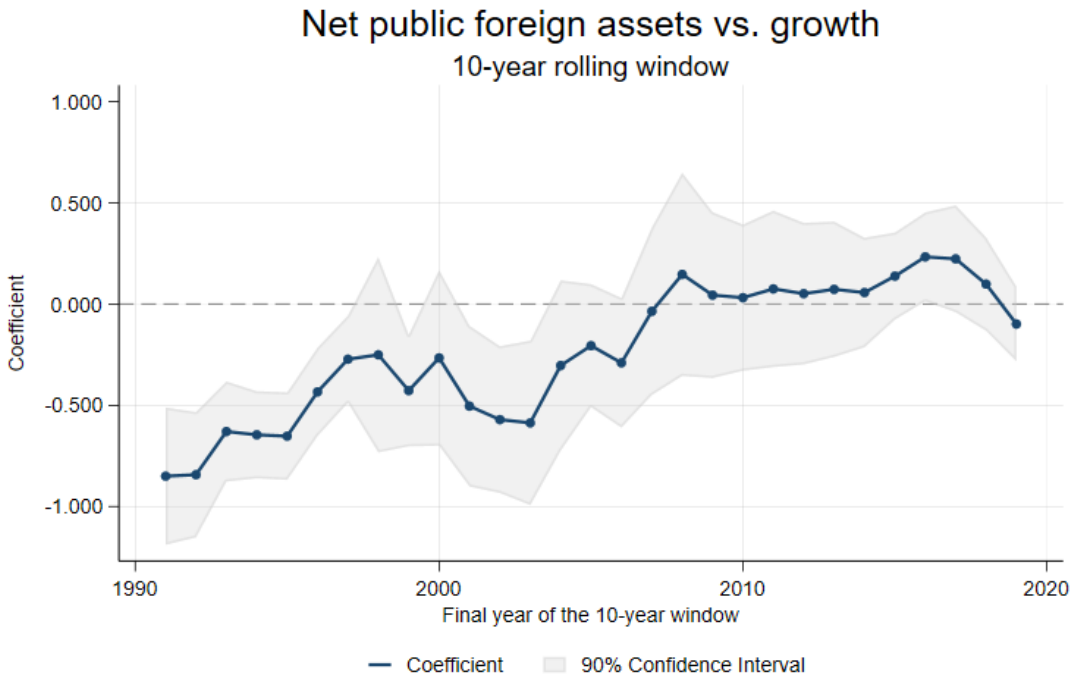
In this section we show that the relationship in *Figure 1* does not depend on the base year, on the length of the time period, on a small number of countries, or on how average growth is computed.

Figure B.6: Relationship between Net Public Foreign Assets and Growth Over Time, base year 1970



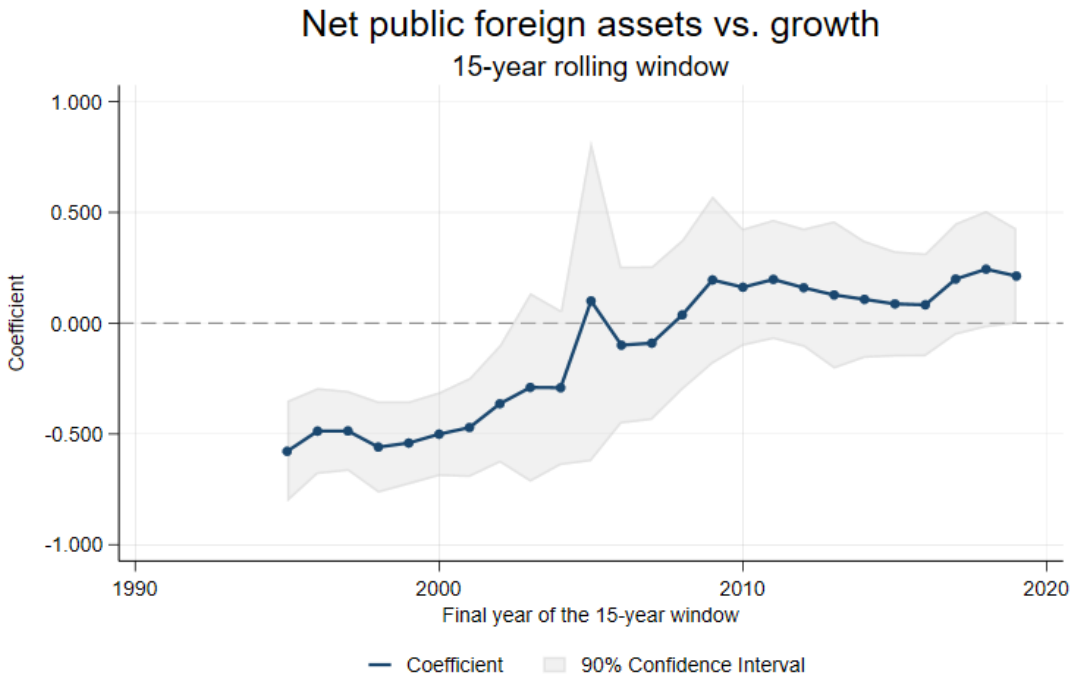
Notes: This figure plots the resulting coefficient β_T from equation (4) when the base year is 1970. The gray area is a 90 percent confidence interval. The sample is the 42 countries with data in 1970.

Figure B.7: Relationship between Net Public Foreign Assets and Growth Over Time, 10 year Rolling Regression



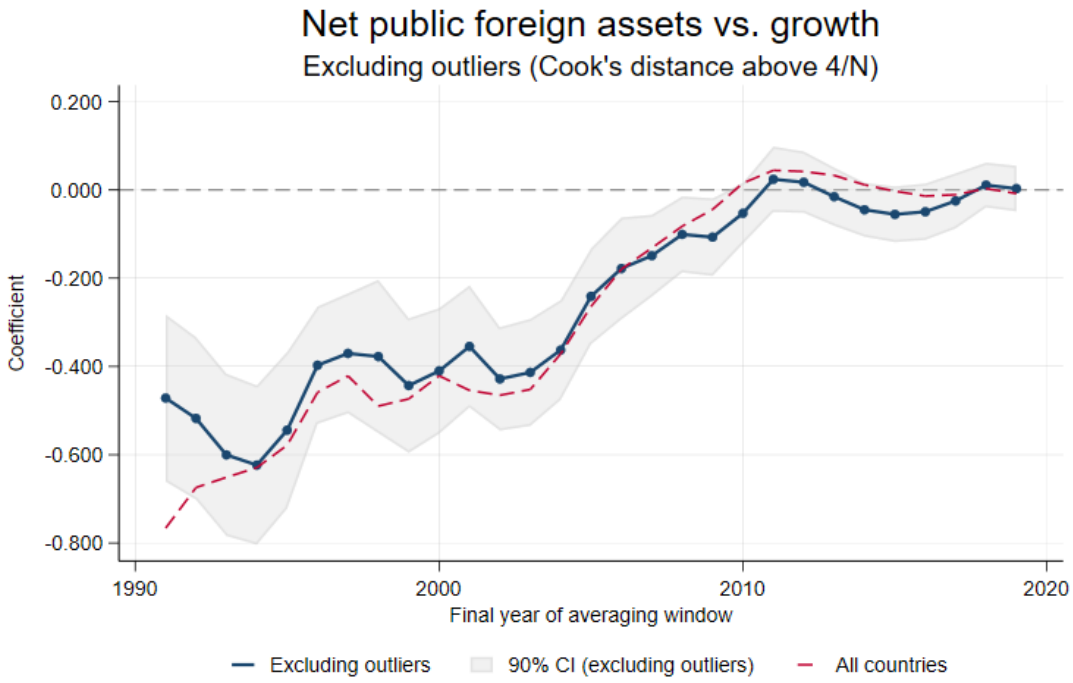
Notes: This figure plots the resulting coefficient β_T from equation (4) when the time period is kept constant at 10 years. That is, the reference year to calculate the net public foreign asset position and the average growth rate of a country changes to maintain a 10 year window. The first point is the 1981-1991 period and the last point is the 2009-2019 period. The gray area is a 90 percent confidence interval.

Figure B.8: Relationship between Net Public Foreign Assets and Growth Over Time, 15 year Rolling Regression



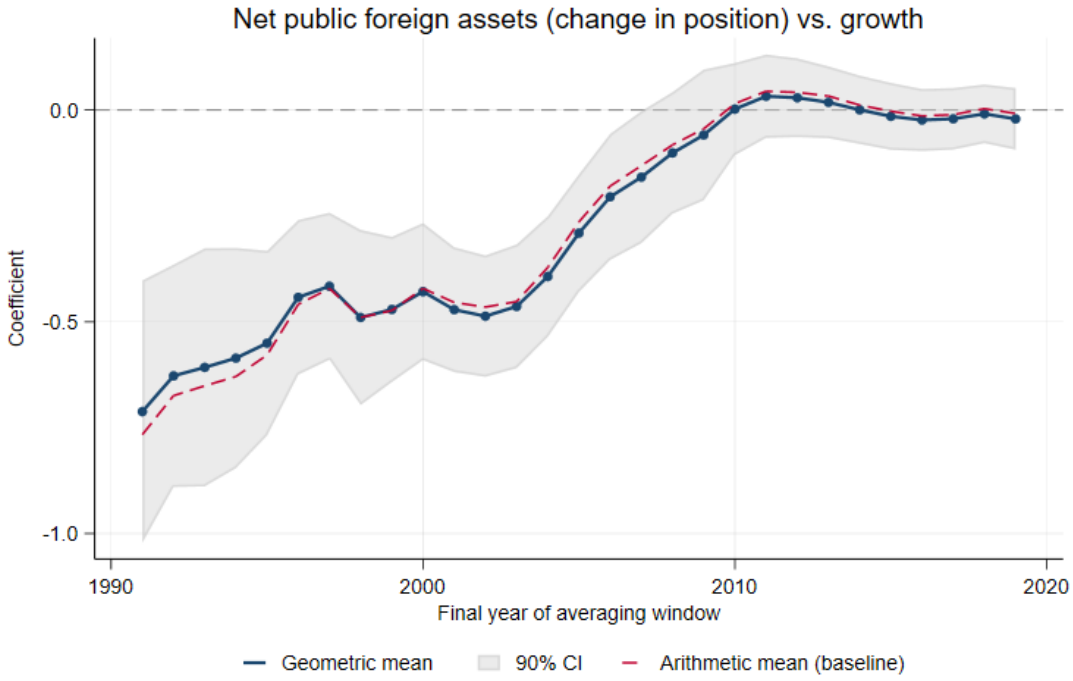
Notes: This figure plots the resulting coefficient β_T from equation (4) when the time period is kept constant at 15 years. The first point is the 1980-1995 period and the last point is the 2004-2019 period. The gray area is a 90 percent confidence interval.

Figure B.9: Relationship between Net Public Foreign Assets and Growth Over Time, removing Outliers



Notes: This figure plots the resulting coefficient β_T from equation (4) when outliers are removed using Cook's distance with the standard threshold $4/N$. Outliers are identified separately for each regression. The gray area is a 90 percent confidence interval. The dashed line is the coefficient for all countries in *Figure 1*.

Figure B.10: Relationship between Net Public Foreign Assets and Growth Over Time, Geometric Mean



Notes: This figure plots the resulting coefficient β_T from equation (4) when the average growth rate of each country and of the U.S. over the 1980 to T period is computed as a geometric mean (the compound annual growth rate) instead of an arithmetic mean. The gray area is a 90 percent confidence interval. The dashed line is the coefficient with arithmetic means in *Figure 1*.

Points to make:

- Base year 1970: the coefficient is around -0.4 until 2004 (-0.39 for the 1970-2004 period) and goes to -0.06 for the 1970-2019 period, not significantly different from zero. The sample is smaller since fewer countries have data in 1970.
- 10 year rolling regression: the coefficient is negative for every window ending before 2007 (-0.65 for 1985-1995, significantly different from zero) and it is close to zero for the windows ending after 2007. With a window of 10 years the coefficient is noisier: it is -0.27 for 1990-2000 and -0.30 for 1994-2004, and neither is significantly different from zero.
- 15 year rolling regression (*Figure B.8*): the coefficient is -0.58 for 1980-1995 and -0.50 for 1985-2000, both significantly different from zero. It crosses zero for the windows

ending around 2008 and it is positive afterwards (0.21 for 2004-2019), not significantly different from zero.

- Removing outliers: on average five countries are removed in each regression. The coefficient is almost the same as with all countries: −0.41 for 1980-2000, −0.36 for 1980-2004, and 0.00 for 1980-2019. The countries removed most often are the Democratic Republic of the Congo, Nicaragua, Algeria, Botswana, and Burundi.

- Geometric mean (*Figure B.10*): the two lines are almost the same. The coefficient is −0.39 for 1980-2004, significant at the 1 percent level, and −0.02 for 1980-2019. In the two-period test the coefficient goes from −0.39 for 1980-2004 to 0.20 for 2005-2019, and the change is significant at the 1 percent level.

Table B.3 reports the same exercises for the four relationships in *Section 3*.

Table B.3: Relationship between Capital Flows and Growth: Base Year, Rolling Window, Outliers, and Geometric Mean

	1980-2004	1980-2019
Panel A: Change in the net public foreign asset position		
Baseline	−0.371*** (0.091)	−0.008 (0.046)
Base year 1970	−0.391*** (0.108)	−0.060 (0.058)
10 year rolling regression	−0.303 (0.256)	−0.098 (0.112)
Removing outliers	−0.363*** (0.069)	0.003 (0.031)
Geometric mean	−0.393*** (0.087)	−0.021 (0.044)
Panel B: Net public foreign asset flows		
Baseline	−0.296* (0.163)	−0.111 (0.127)
Base year 1970	−0.365* (0.218)	−0.200 (0.170)
10 year rolling regression	−0.223** (0.109)	0.094 (0.135)
Removing outliers	−0.382*** (0.113)	−0.069 (0.085)
Geometric mean	−0.293* (0.156)	−0.107 (0.121)
Panel C: Private flows		
Baseline	0.084 (0.072)	0.031 (0.116)
Base year 1970	0.091 (0.066)	0.025 (0.117)
10 year rolling regression	0.232* (0.126)	−0.096 (0.159)
Removing outliers	0.071 (0.049)	−0.052 (0.094)
Geometric mean	0.071 (0.070)	0.000 (0.116)
Panel D: Current account		
Baseline	−0.314 (0.270)	−0.356 (0.359)
Base year 1970	−0.317 (0.305)	−0.424 (0.358)
10 year rolling regression	0.168 (0.288)	−0.510 (0.405)
Removing outliers	−0.262 (0.161)	−0.562** (0.251)
Geometric mean	−0.439 (0.297)	−0.502 (0.399)

Notes: This table reports the coefficient on growth β_T from equation (4) for $T = 2004$ and $T = 2019$. Baseline is the regression in the main text, with the time period starting in 1980. Base year 1970 starts the time period in 1970. In the 10 year rolling regression the time period is kept constant at 10 years, so the columns correspond to 1994-2004 and 2009-2019. Removing outliers excludes the countries with a Cook's distance above $4/N$ in each regression. Geometric mean computes the average growth rate of each country and of the U.S. as the compound annual growth rate. Flows are winsorized at the 1st and 99th percentiles. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Points to make:

- Net public foreign assets (Panels A and B): the coefficient is negative for the period ending in 2004 and close to zero for the period ending in 2019 in every row. In the 10 year rolling regression the coefficient for 1994-2004 is negative but imprecisely estimated for the position. For flows, the negative coefficient becomes more precisely estimated when outliers are removed.

- Private flows (Panel C): the coefficient is positive for the period ending in 2004 and around zero for the period ending in 2019 in every row.

- Current account (Panel D): the coefficient is not significantly different from zero, with one exception: when outliers are removed the coefficient for the 1980-2019 period is -0.56 and significant at the 5 percent level.

B.4 Alternative Data Source

In this section we estimate the relationships in *Section 3* with the data of Alfaro et al. (2014) (AKV hereafter), in the version updated by the authors in October 2020. AKV construct the net public flow as the flow of public and publicly guaranteed external debt from the World Bank's debt statistics minus reserve accumulation from the IMF balance of payments. Private flows are net foreign direct investment and portfolio equity flows, built from the same External Wealth of Nations stocks we use, and the current account comes from the IMF balance of payments. All are measured as a share of GDP and positive values are net inflows.

These data have two differences with ours. First, AKV report flows but not stocks, so we compare them with the flow version of our results (Panel B of *Table 1*) and not with the change in the net public foreign asset position. Their public series end in 2018 and their equity series in 2015, so the later period is 2005-2018 (2005-2015 for private flows). Second, the current release of the World Bank's debt statistics drops the whole history of countries that became high income, while the AKV data keep the public external debt of these countries up to the years in which they stopped reporting to the World Bank.

Sample. 85 countries have the AKV net public flow in 1980 (after the same exclusions as in our sample). 30 of them are not among our 63 countries (*Table B.4* lists all 85 and the last year of data for each):

- 12 graduated to high income and have no public external debt data at all in the current release: Barbados, Chile, Korea, Malaysia, Malta, Oman, Panama, Portugal,

Seychelles, St. Kitts and Nevis, Trinidad and Tobago, and Uruguay. Their AKV public data end between 1992 (Portugal) and 2014 (Panama).

- 9 have public external debt in our data only after 1980: Afghanistan, Bulgaria, Cabo Verde, Dominica, Mozambique, South Africa, St. Lucia, Syria, and Tonga.
- 9 do not have reserves in our data in 1980 or 2000: seven members of the West African Economic and Monetary Union (Benin, Burkina Faso, Côte d'Ivoire, Mali, Niger, Senegal, and Togo), whose reserves are pooled at the regional central bank, as well as Iran and Somalia.

Table B.4: Countries with AKV Net Public Foreign Asset Flows in 1980 and Last Year of Data

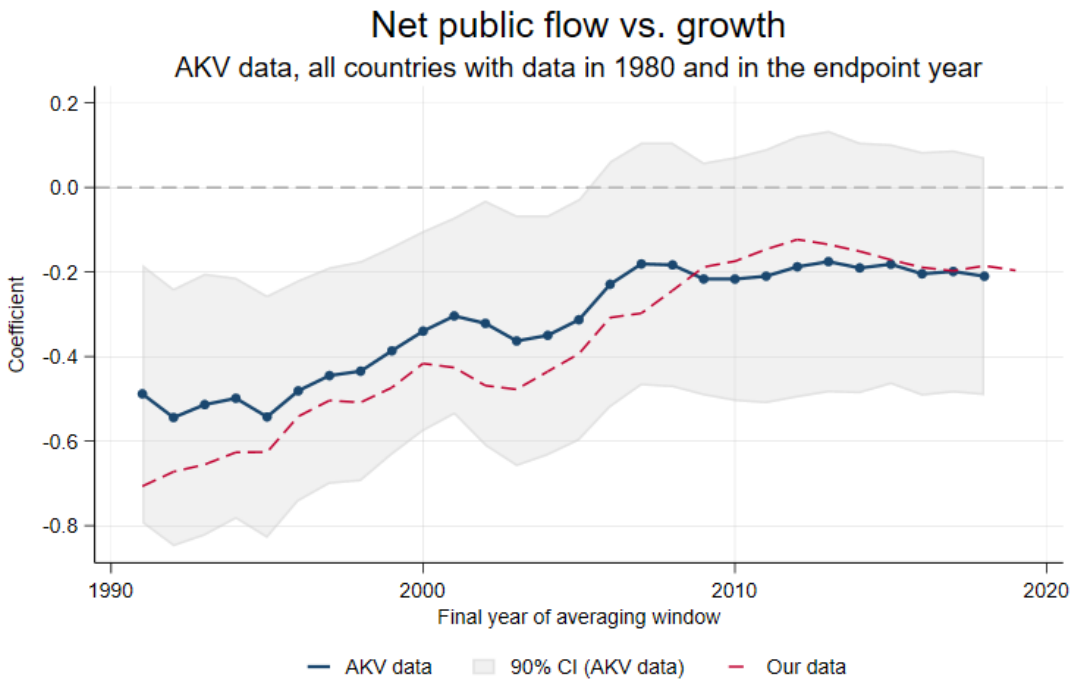
Country	Last year	Country	Last year	Country	Last year
Afghanistan[b]	2018	Grenada	2018	Papua New Guinea	2018
Algeria	**2017**	Guatemala	2018	Paraguay	2018
Argentina	2018	Guyana	2018	Peru	2018
Bangladesh	2018	Haiti	2018	Philippines	2018
Barbados[a]	**2005**	Honduras	2018	Portugal[a]	**1992**
Benin[c]	2018	India	2018	Republic of Congo	**2016**
Bolivia	2018	Iran[c]	**2000**	Rwanda	2018
Botswana	2018	Jamaica	2018	Senegal[c]	2018
Brazil	2018	Jordan	2018	Seychelles[a]	**2013**
Bulgaria[b]	2018	Kenya	2018	Sierra Leone	2018
Burkina Faso[c]	2018	Korea[a]	**2001**	Solomon Islands	2018
Cabo Verde[b]	2018	Lesotho	2018	Somalia[c]	**1989**
Cameroon	2018	Madagascar	2018	South Africa[b]	2018
Central African Republic	**1994**	Malawi	2018	Sri Lanka	2018
Chad	**1994**	Malaysia[a]	**2014**	St. Kitts and Nevis[a]	**2010**
Chile[a]	**2011**	Maldives	2018	St. Lucia[b]	2018
Colombia	2018	Mali[c]	2018	Syria[b]	**2010**
Comoros	2018	Malta[a]	**2001**	Thailand	2018
Costa Rica	2018	Mauritius	2018	The Gambia	2018
Côte d'Ivoire[c]	2018	Mexico	2018	Togo[c]	2018
Dominica[b]	2018	Morocco	2018	Tonga[b]	2018
Dominican Republic	2018	Mozambique[b]	2018	Trinidad and Tobago[a]	**2005**
Ecuador	2018	Nepal	2018	Tunisia	2018
Egypt	2018	Nicaragua	2018	Turkey	2018
El Salvador	2018	Niger[c]	2018	Uganda	2018
Eswatini	2018	Nigeria	2018	Uruguay[a]	**2011**
Fiji	2018	Oman[a]	**2006**	Zambia	2018
Gabon	**2015**	Pakistan	2018		
Ghana	2018	Panama[a]	**2014**		

Notes: This table lists the 85 countries with the net public foreign asset flow of Alfaro et al. (2014) in 1980 and the last year with data. The AKV public series end in 2018; years in bold are countries whose data end earlier (20 countries). Countries without a mark are in our sample of 63 countries. [a] Graduated to high income; no public external debt data in the current release of the World Bank's debt statistics. [b] Public external debt in our data only after 1980. [c] No international reserves in our data in 1980 or 2000.

In the AKV data some countries stop reporting before 2018 (20 of the 85, mostly the countries that graduated to high income), and a few start after 1980. With the time periods in equation (4), which always start in 1980, a country whose data stop in 2001 would enter the regressions for every later year with its 1980-2001 average, so the early relationship is carried into every

later coefficient. A country whose data start late enters with a short average.[6] For this reason, in the AKV regressions a country is included in the regression for the 1980-T period only if it has data in 1980 and in T.

Figure B.11: Relationship between Net Public Foreign Asset Flows and Growth Over Time, AKV Data



Notes: This figure plots the resulting coefficient β_T from equation (4) when the dependent variable is the net public foreign asset flow from Alfaro et al. (2014), winsorized at the 1st and 99th percentiles. The sample is all countries with AKV data in 1980, and a country is included in the regression for the 1980-T period only if it has data in T (76 countries for 1980-2004 and 65 for 1980-2018). The gray area is a 90 percent confidence interval. The dashed line is the same regression with our net public foreign asset flows for the countries in this sample with our data.

[6] In our 63 countries, the AKV net public flow of the Democratic Republic of the Congo starts in 2005 because the reserve flow is missing before that year. It enters the regression for the 1980-2005 period with a single year, and the coefficient moves from −0.52 for 1980-2004 to −0.18 for 1980-2005.

Table B.5: Relationship between Net Public Foreign Asset Flows and Growth by Period, AKV Data

	1980-2004	2005-2018	Change	Countries
Panel A: Our 63 countries				
Our data	−0.296* (0.163)	0.137 (0.104)	0.432** (0.186)	63 / 63
AKV data	−0.519** (0.228)	0.219 (0.134)	0.738*** (0.262)	63 / 61
AKV data, both periods	−0.514** (0.234)	0.223 (0.134)	0.736*** (0.268)	60 / 60
Panel B: All countries with AKV data in 1980				
AKV data	−0.454*** (0.165)	0.162 (0.160)	0.617*** (0.221)	85 / 78
AKV data, both periods	−0.345** (0.173)	0.162 (0.160)	0.507** (0.226)	78 / 78
AKV data, long series	−0.395** (0.197)	0.078 (0.126)	0.474** (0.207)	65 / 65
Our data	−0.387* (0.207)	0.090 (0.109)	0.477** (0.214)	66 / 64

Notes: This table reports the coefficient on growth from a regression of the average net public foreign asset flow on average growth relative to the U.S., estimated on two observations per country (1980-2004 and 2005-2018), as in Panel B of *Table 1*. The column Change is the difference between the two coefficients. Flows are winsorized at the 1st and 99th percentiles. "Both periods" keeps the countries with data in both periods; "Long series" keeps the countries with at least 20 years of data in 1980-2004 and 10 in 2005-2018. In Panel B, "Our data" uses our net public foreign asset flows for the countries in the sample that have them. The column Countries reports the number of countries in the first and in the second period. Standard errors clustered by country in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Points to make:

- The AKV data give the same result as our data. In *Figure B.11* the coefficient is −0.54 for 1980-1995 and −0.35 for 1980-2004, both significantly different from zero, and it is not significantly different from zero from 2006 onwards (−0.21 for 1980-2018). With our data for the same countries the coefficient goes from −0.63 to −0.19. The coefficient for the 1980-2018 period is not zero because every period starts in 1980; the coefficient for the later period alone is in *Table B.5*.

- The early negative relationship holds when the countries that became high income are included (Panel B of *Table B.5*): −0.45 for 1980-2004, significant at the 1 percent level. So the relationship in Gourinchas and Jeanne (2013) is not a product of using the current release of the World Bank's debt statistics.

- The change after 2004 is positive and significant in every row. It is also significant when we keep only the countries with data in both periods, so it is not explained

by countries leaving the sample. The countries that leave the sample are those that grew fast and became high income, so the samples with data in both periods are tilted towards slower growing countries. The result holds in all of them.

- In our 63 countries the AKV coefficients are larger in absolute value than ours (−0.52 against −0.30 for 1980-2004). Part of the difference comes from the years with data: restricted to the country-years with AKV data, our coefficient is −0.39 and the change is 0.56. The rest comes mostly from 1980-1995 public debt flows of HIPC countries, which are higher in the AKV data, and from reserve accumulation, which AKV measure from the balance of payments (without valuation changes) and we measure from the change in the stock. The correlation between the two annual series is 0.87. **[To do:** decide whether to keep this point or move it to a footnote.]

Table B.6 reports the same estimates for the other measures with the AKV data.

Table B.6: Relationship between Capital Flows and Growth by Period, AKV Data

	1980-2004	2005-2018	Change
Panel A: Our 63 countries			
Net public foreign asset flows	−0.519** (0.228)	0.219 (0.134)	0.738*** (0.262)
(Negative of) reserve accumulation	−0.362** (0.179)	0.087 (0.100)	0.449** (0.209)
Public external debt	−0.135 (0.155)	0.158 (0.097)	0.293 (0.177)
Official creditors	−0.274* (0.141)	0.120 (0.074)	0.394** (0.152)
Private creditors	0.139*** (0.050)	0.038 (0.051)	−0.101 (0.068)
Private flows	0.183* (0.108)	−0.280 (0.203)	−0.463** (0.226)
Current account	−0.553 (0.374)	−0.223 (0.437)	0.330 (0.486)
Panel B: All countries with AKV data in 1980			
Net public foreign asset flows	−0.454*** (0.165)	0.162 (0.160)	0.617*** (0.221)
Private flows	0.339** (0.134)	0.042 (0.201)	−0.297 (0.245)
Current account	−0.361 (0.300)	0.417 (0.445)	0.779 (0.503)

Notes: Same as *Table B.5* for each measure from Alfaro et al. (2014). For private flows the later period is 2005-2015, the last year of the AKV equity data. Net public foreign asset flows, private flows, and the current account are winsorized at the 1st and 99th percentiles; the components of net public foreign asset flows are not. Standard errors clustered by country in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Points to make:

- Components (Panel A): as in our data, within public external debt the early negative relationship comes from debt with official creditors, while debt with private creditors goes the other way. In the AKV data reserve accumulation accounts for a larger part of the early relationship than in ours. After 2004 all of them are close to zero.

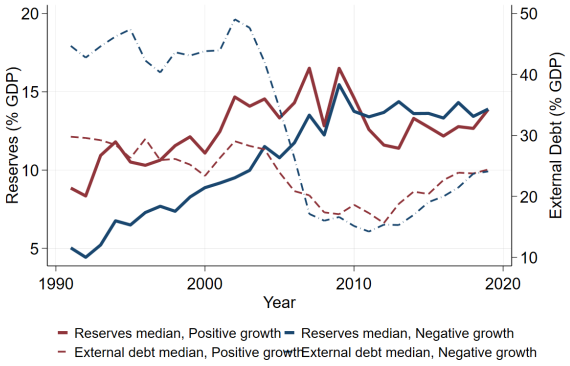
- Private flows: positive before 2004 and negative but not significantly different from zero after, with a change that is significant at the 5 percent level in our 63 countries. In all countries with AKV data in 1980 the coefficient is positive and significant before 2004 (0.34) and close to zero after (0.04), but the change is not significantly different from zero.

- Current account: not significantly different from zero in either period, as in our data.

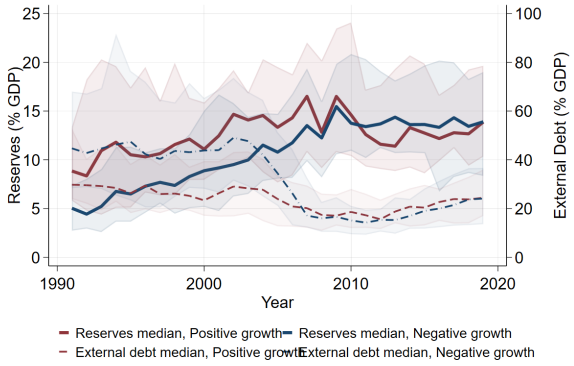
B.5 International Reserves and Public External Debt

Figure B.12: International Reserves and Public External Debt to GDP: Other Statistics

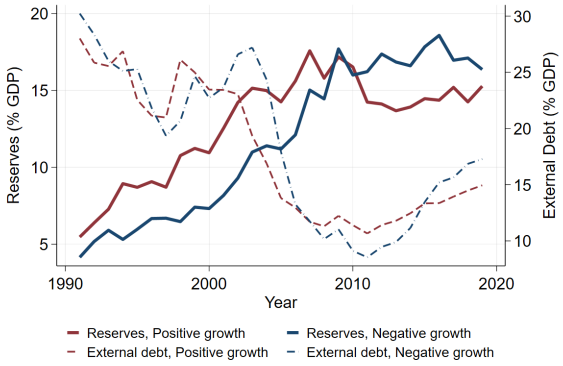
(a) Median



(b) Median and interquantile range



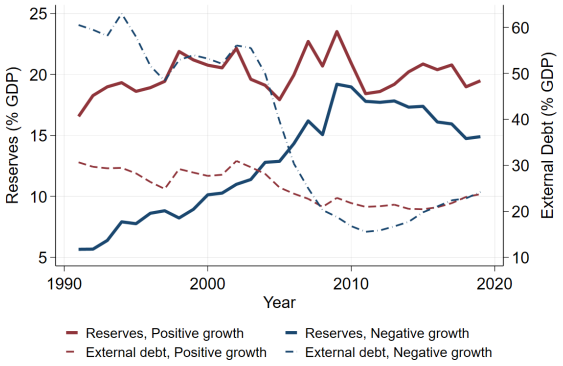
(c) Weighted average



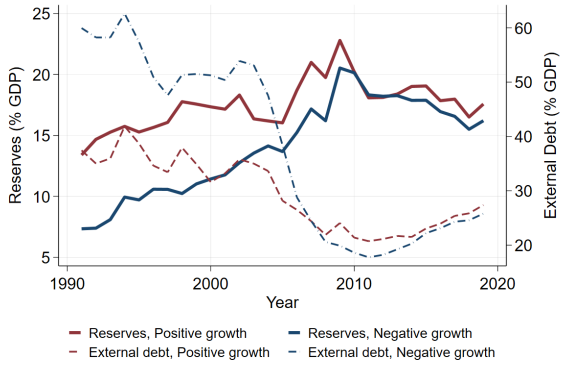
Source: IDS World Bank, WDI World Bank, IFS IMF, and authors' calculations. The weighted average uses GDP as weights.

Figure B.13: International Reserves and Public External Debt to GDP: Alternative Groups of Countries

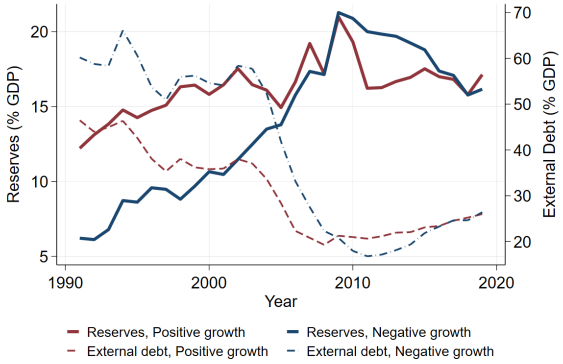
(a) Countries that never change group



(b) Groups fixed in 2000



(c) Groups fixed in 2019



Notes: Simple averages, as in *Figure 4*. In panel (a) the sample is the 44 countries that are in the same group in every year between 1991 and 2019 (31 negative growth and 13 positive growth countries). In panels (b) and (c) each country stays in the group it belonged to in 2000 (46 negative growth and 17 positive growth countries) or in 2019 (34 and 29). *Source:* IDS World Bank, WDI World Bank, IFS IMF, and authors' calculations.

Points to make: the median shows the same pattern as the simple average. With GDP weights the two groups look similar throughout, since the weighted average is dominated by a few large economies. The pattern is the same when countries are kept in the group they belonged to in 2000 or in 2019, and when the sample is restricted to the countries that never change group, so it is not driven by countries moving between groups. In the last sample, reserves of negative growth countries converge only partly: they reach 19% of GDP in 2010 and fall to 15% by 2019, against about 19% for positive growth countries.

Figure B.12 examines whether the patterns documented in *Figure 4* depend on how we aggregate countries. The median shows a similar pattern to the simple average, with

differences in public external debt and international reserves between negative and positive growth countries narrowing over time. However, when using GDP-weighted averages, the two groups have similar levels throughout the sample, as the averages are dominated by a few large economies.

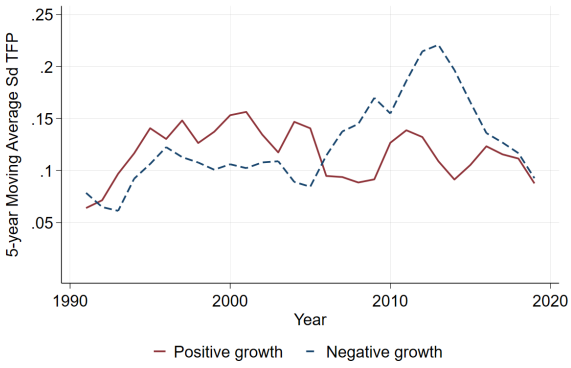
Figure B.13 examines whether the results are driven by countries moving between growth groups over time. We consider three alternative classifications: restricting the sample to countries that remain in the same group throughout 1991–2019, and fixing group membership according to average growth relative to the United States in either 2000 or 2019. The overall pattern remains similar across these specifications. Negative growth countries substantially reduce their public external debt and increase their international reserves, narrowing the differences with positive growth countries. When restricting the sample to countries that never change groups, however, the convergence in reserves is less pronounced. Reserves of negative growth countries reach 19% of GDP in 2010 but decline to 15% by 2019, compared with approximately 19% for positive growth countries.

B.6 Volatility

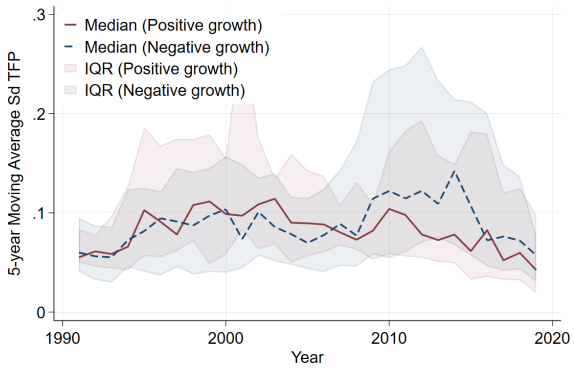
[**To do:** choose which of these figures stay. All of them are in the review folder.]

Figure B.14: TFP Volatility: Negative Growth and Positive Growth Countries

(a) Simple average



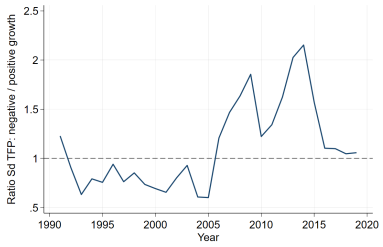
(b) Median and interquantile range



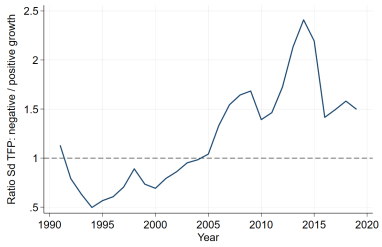
Notes: Standard deviation of demeaned TFP over a 5-year backward rolling window. *Source:* Penn World Table and authors' calculations.

Figure B.15: Relative TFP Volatility: Rolling Windows and Country Groups

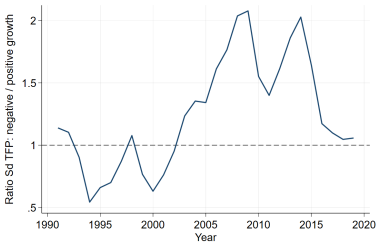
(a) 5 years, time-varying groups



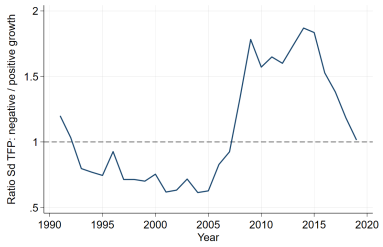
(b) 5 years, groups in 2000



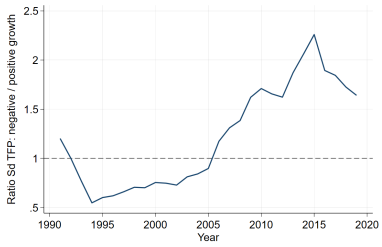
(c) 5 years, groups in 2019



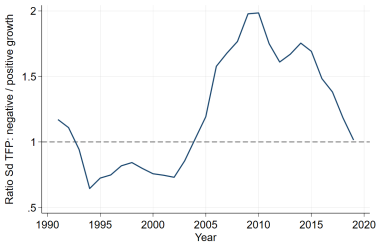
(d) 7 years, time-varying groups



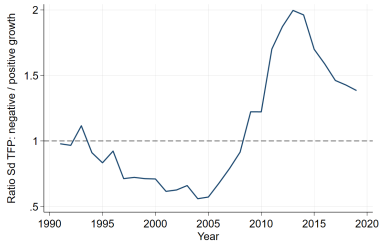
(e) 7 years, groups in 2000



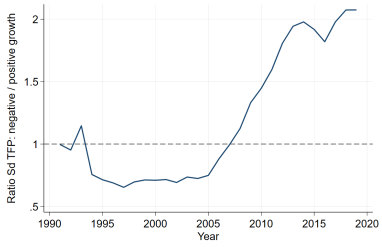
(f) 7 years, groups in 2019



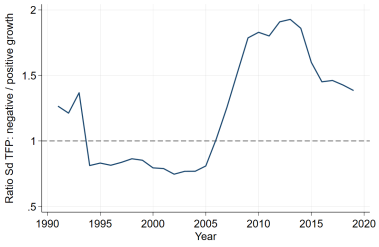
(g) 10 years, time-varying groups



(h) 10 years, groups in 2000

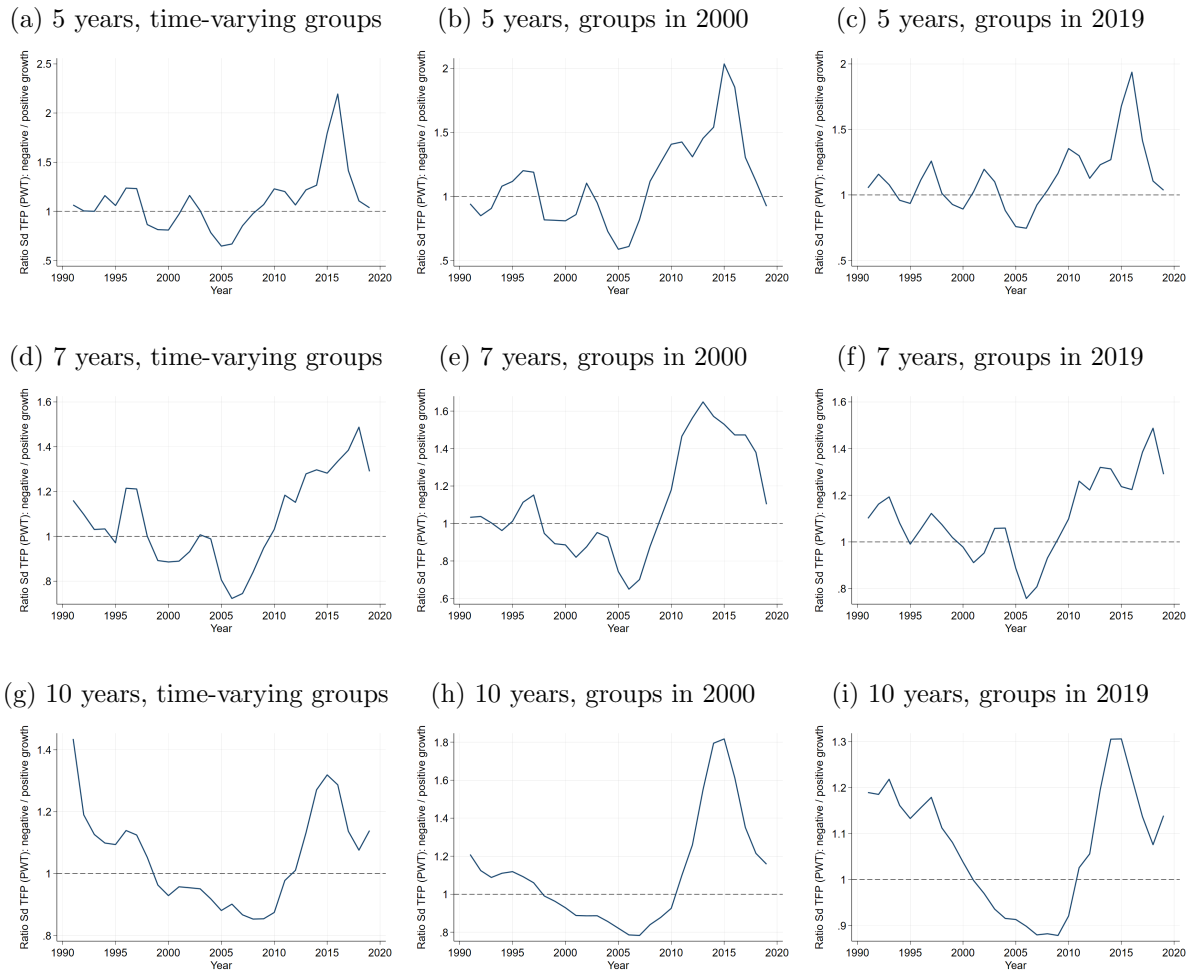


(i) 10 years, groups in 2019



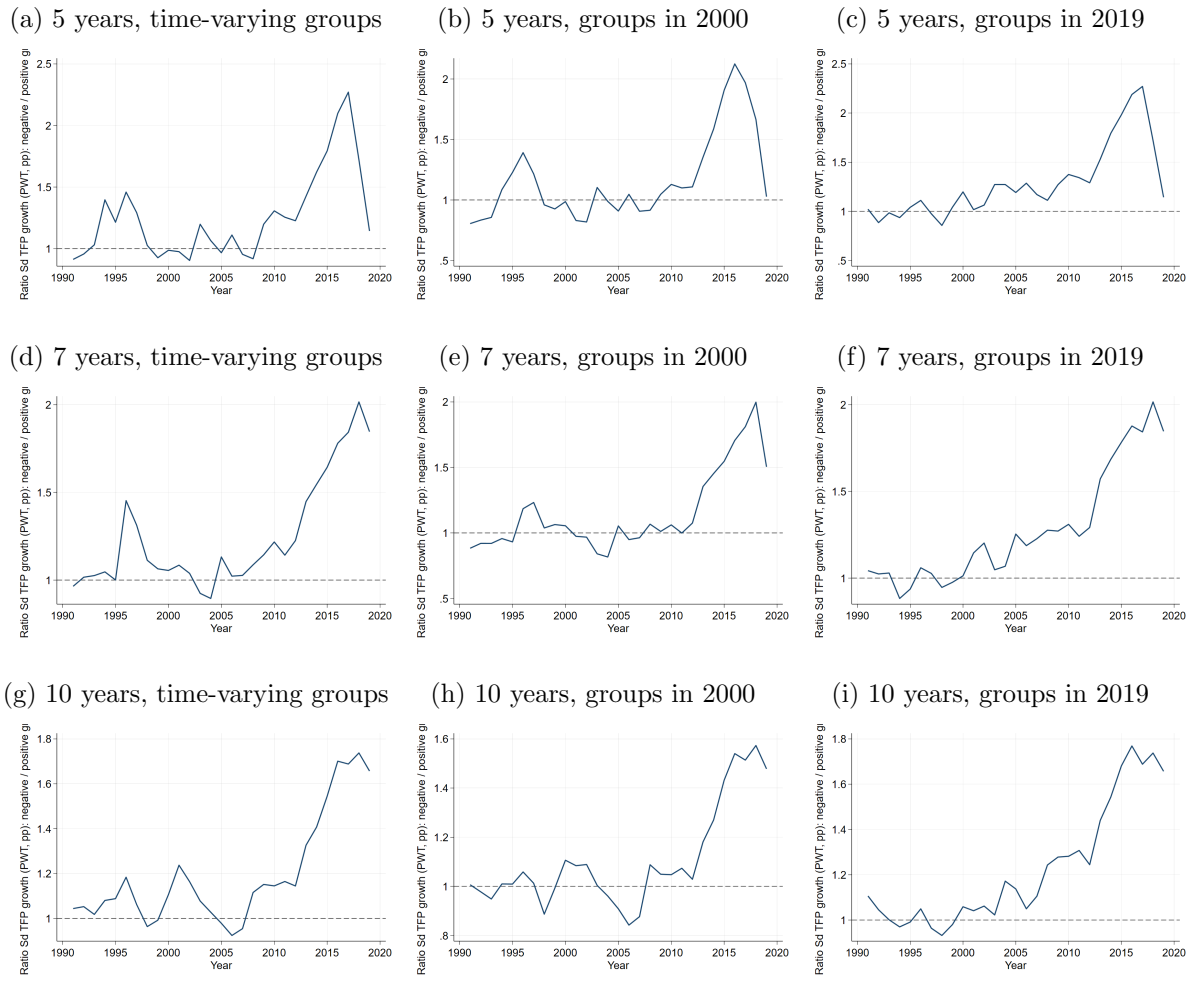
Notes: Ratio of the average TFP volatility of negative growth countries to positive growth countries, as in *Figure 5*. Rows change the length of the rolling window. Columns change the definition of the groups: growth relative to the U.S. up to each year, up to 2000, and up to 2019.

Figure B.16: Relative TFP Volatility: Penn World Table TFP



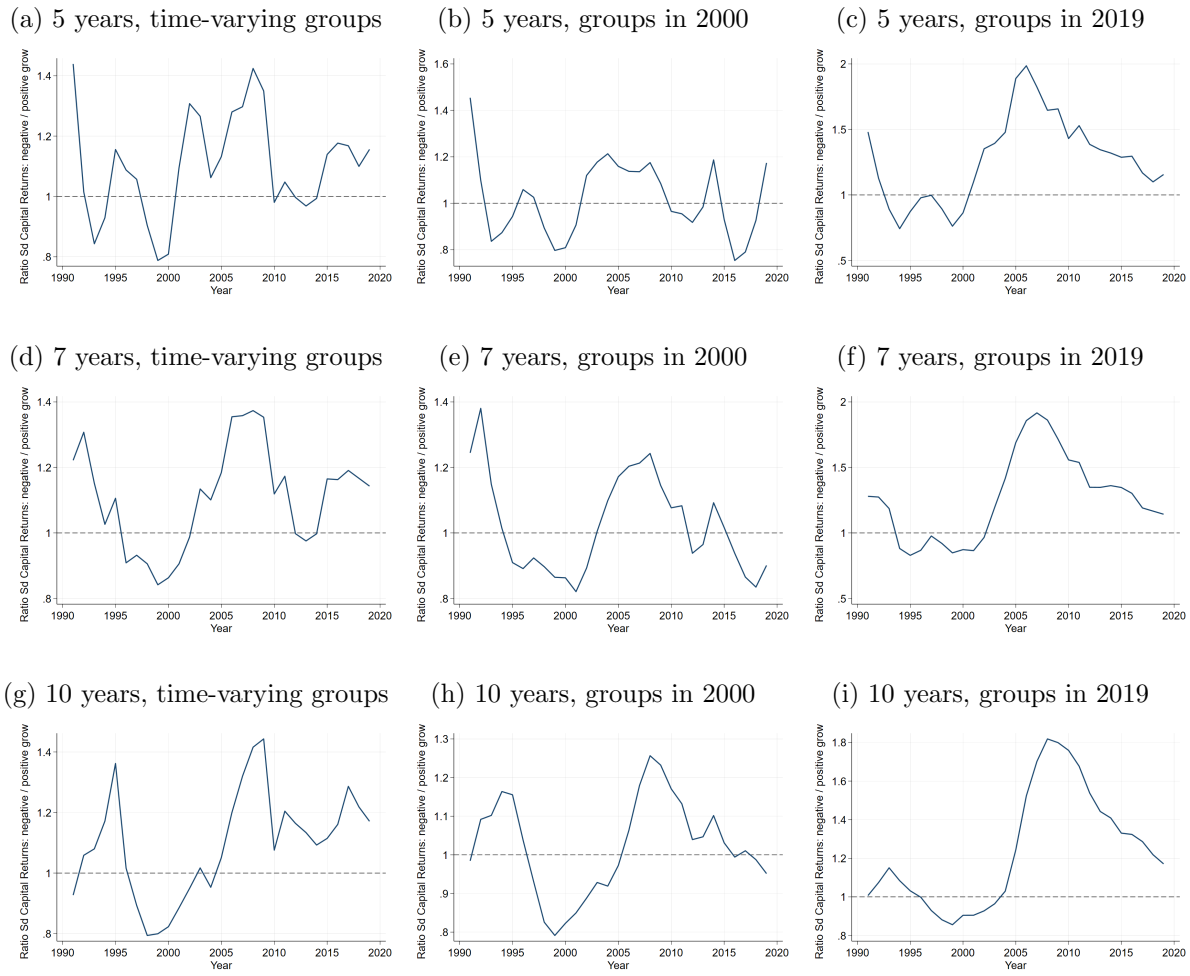
Notes: Same as *Figure B.15* using the welfare-relevant TFP at constant national prices reported by the Penn World Table (38 countries). Volatility is the standard deviation of demeaned TFP over the rolling window.

Figure B.17: Relative TFP Volatility: Penn World Table TFP Growth



Notes: Same as *Figure B.16* when volatility is the standard deviation of annual TFP growth over the rolling window.

Figure B.18: Relative Volatility of Capital Returns



Notes: Same as *Figure B.15* using the marginal product of capital (56 countries).

B.7 Robustness: Detailed Results

Table B.7 reports, for each row of *Table 2*, the coefficient on growth without controls and with only the base controls, estimated on the same sample of countries as the regression with the additional control.

Table B.7: Relationship between Net Public Foreign Assets and Growth: Robustness, Detailed Results

	1980-2004				1980-2019			
Additional control	No controls	Base controls	Base + control	N	No controls	Base controls	Base + control	N
None (base controls only)	−0.372***	−0.353***	−0.353***	59	−0.006	0.008	0.008	55
			(0.098)				(0.043)	
HIPC	−0.372***	−0.353***	−0.238**	59	−0.006	0.008	0.014	55
			(0.100)				(0.055)	
Commodity exporter	−0.372***	−0.353***	−0.365***	59	−0.006	0.008	0.007	55
			(0.100)				(0.042)	
Central bank independence	−0.367***	−0.352***	−0.298***	57	−0.007	0.007	0.034	54
			(0.100)				(0.042)	
Floating exchange rate (share of years)	−0.372***	−0.353***	−0.365***	59	−0.006	0.008	0.001	55
			(0.100)				(0.039)	
Default (share of years)	−0.372***	−0.353***	−0.358**	59	−0.006	0.008	0.018	55
			(0.163)				(0.059)	
Banking crises (share of years)	−0.372***	−0.353***	−0.370***	59	−0.006	0.008	−0.002	55
			(0.100)				(0.043)	
Currency crises (share of years)	−0.372***	−0.353***	−0.450***	59	−0.006	0.008	−0.014	55
			(0.117)				(0.045)	
IMF programs (share of years)	−0.372***	−0.353***	−0.387***	59	−0.006	0.008	0.031	55
			(0.113)				(0.048)	
Polity2	−0.419***	−0.477***	−0.465***	54	−0.011	−0.025	−0.024	50
			(0.110)				(0.052)	
Terms of trade growth	−0.394***	−0.368***	−0.370***	56	−0.007	0.010	0.010	53
			(0.104)				(0.044)	
Export growth	−0.394***	−0.368***	−0.272**	56	−0.007	0.010	0.026	53
			(0.122)				(0.045)	
Capital account openness only	−0.371***	–	−0.366***	63	−0.008	–	−0.007	59
			(0.091)				(0.046)	
All controls together	−0.422***	−0.493***	−0.340**	50	−0.014	−0.026	0.057	47
			(0.166)				(0.071)	

Notes: This table reports the detailed results of *Table 2*: the coefficient on growth β_T from equation (5) for $T = 2004$ and $T = 2019$. The dependent variable is the change in the net public foreign asset position. The column "No controls" reports the coefficient from equation (4) and the column "Base controls" the coefficient with only the base controls, both estimated on the same sample of countries as the column "Base + control". Base controls are the initial capital stock, initial public external debt, average population growth, and average capital account openness. The row "Capital account openness only" includes capital account openness and no other base control. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

B.8 Robustness for Net Public Foreign Asset Flows

Table B.8: Relationship between Net Public Foreign Asset Flows and Growth: Robustness

	1980-2004				1980-2019			
Additional control	No controls	Base controls	Base + control	N	No controls	Base controls	Base + control	N
None (base controls only)	−0.296*	−0.273	−0.273	59	−0.124	−0.055	−0.055	59
			(0.183)				(0.137)	
HIPC	−0.296*	−0.273	−0.127	59	−0.124	−0.055	0.007	59
			(0.183)				(0.147)	
Commodity exporter	−0.296*	−0.273	−0.308*	59	−0.124	−0.055	−0.073	59
			(0.179)				(0.135)	
Central bank independence	−0.283	−0.260	−0.180	57	−0.119	−0.050	0.030	58
			(0.181)				(0.132)	
Floating exchange rate (share of years)	−0.296*	−0.273	−0.289	59	−0.124	−0.055	−0.055	59
			(0.177)				(0.135)	
Default (share of years)	−0.296*	−0.273	−0.248	59	−0.124	−0.055	0.008	59
			(0.238)				(0.172)	
Banking crises (share of years)	−0.296*	−0.273	−0.288	59	−0.124	−0.055	−0.071	59
			(0.175)				(0.130)	
Currency crises (share of years)	−0.296*	−0.273	−0.403**	59	−0.124	−0.055	−0.094	59
			(0.197)				(0.136)	
IMF programs (share of years)	−0.296*	−0.273	−0.198	59	−0.124	−0.055	0.069	59
			(0.160)				(0.125)	
Polity2	−0.583***	−0.574**	−0.563***	54	−0.237*	−0.193	−0.192	54
			(0.207)				(0.157)	
Terms of trade growth	−0.313*	−0.298	−0.300	56	−0.123	−0.065	−0.071	57
			(0.189)				(0.145)	
Export growth	−0.313*	−0.298	−0.211	56	−0.123	−0.065	−0.067	57
			(0.213)				(0.162)	
Capital account openness only	−0.296*	–	−0.299*	63	−0.111	–	−0.110	63
			(0.161)				(0.129)	
All controls together	−0.577***	−0.591**	−0.323	50	−0.235	−0.205	0.058	51
			(0.197)				(0.166)	

Notes: Same as *Table B.7* when the dependent variable is the average of annual net public foreign asset flows, winsorized at the 1st and 99th percentiles. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Points to make: the coefficients have the same sign and a similar size as in *Table 2* but flows are noisier and most coefficients are not significantly different from zero.

B.9 Robustness for the 1980-2000 Period

Table B.9 repeats *Table 2* for the 1980-2000 period, which is the sample period in Gourinchas and Jeanne (2013).

Table B.9: Relationship between Net Public Foreign Assets and Growth: Robustness for the 1980-2000 Period

Additional control	No controls	Base controls	Base + control	N
None (base controls only)	−0.419***	−0.398***	−0.398***	59
			(0.131)	
HIPC	−0.419***	−0.398***	−0.239*	59
			(0.122)	
Commodity exporter	−0.419***	−0.398***	−0.410***	59
			(0.138)	
Central bank independence	−0.419***	−0.395***	−0.332**	55
			(0.130)	
Floating exchange rate (share of years)	−0.419***	−0.398***	−0.407***	59
			(0.130)	
Default (share of years)	−0.419***	−0.398***	−0.402**	59
			(0.171)	
Banking crises (share of years)	−0.419***	−0.398***	−0.413***	59
			(0.131)	
Currency crises (share of years)	−0.419***	−0.398***	−0.530***	59
			(0.151)	
IMF programs (share of years)	−0.419***	−0.398***	−0.404***	59
			(0.134)	
Polity2	−0.548***	−0.587***	−0.536***	54
			(0.127)	
Terms of trade growth	−0.431***	−0.416***	−0.417***	55
			(0.135)	
Export growth	−0.436***	−0.418***	−0.346**	56
			(0.136)	
Capital account openness only	−0.421***	–	−0.413***	63
			(0.104)	
All controls together	−0.572***	−0.611***	−0.328*	48
			(0.177)	

Notes: Same as *Table B.7* for $T = 2000$. The dependent variable is the change in the net public foreign asset position. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Points to make: the results are the same as for the 1980-2004 period. The coefficient is negative and significant in every row, and participation in the HIPC initiative is the control that changes it the most (from -0.40 to -0.24).

Appendix C Detrended Model

This appendix presents the stationary representation of the model described in *Section 4*. We detrend variables by the level of labor-augmenting productivity, Γ_t, which grows at the constant rate g.

C.1 Detrending and Production

For any variable a_t that grows with the economy, we define its detrended counterpart as

$$\tilde{a}_t = \frac{a_t}{\Gamma_t} \tag{C.1}$$

Since $\Gamma_{t+1} = (1+g)\Gamma_t$, the aggregate state in detrended units is

$$\tilde{s} = (z, \tilde{K}, \tilde{D}, \tilde{D}^g) \tag{C.2}$$

Using constant returns to scale, the production function becomes

$$\tilde{Y} = zF(\tilde{K}, L) \tag{C.3}$$

Factor prices satisfy

$$r = zF_K(\tilde{K}, L) \qquad \tilde{w} = zF_L(\tilde{K}, L) \tag{C.4}$$

where $\tilde{w} = w/\Gamma$. The rental rate of capital is already stationary.

The productivity process remains

$$\log z' = \rho \log z + \varepsilon', \qquad \varepsilon' \sim \mathcal{N}(0, \sigma_z^2) \tag{C.5}$$

C.2 Adjustment and Debt-Position Costs

Capital adjustment costs in levels are

$$\Phi(k, k') = \frac{\phi}{2}\left(\frac{k'}{k} - (1+g)\right)^2 k \tag{C.6}$$

Dividing by Γ and using $k' = (1+g)\Gamma\tilde{k}'$, we obtain

$$\tilde{\Phi}(\tilde{k}, \tilde{k}') = \frac{\phi(1+g)^2}{2}\left(\frac{\tilde{k}'}{\tilde{k}} - 1\right)^2 \tilde{k} \tag{C.7}$$

Private and public debt-position costs in detrended units are

$$\tilde{\Psi}(\tilde{d}', \bar{d}_q) = \frac{\kappa_q}{2}(\tilde{d}' - \bar{d}_q)^2 \tag{C.8}$$

and

$$\tilde{\Psi}_g(\tilde{D}^{g\prime}, \bar{d}_g) = \frac{\kappa_g}{2}(\tilde{D}^{g\prime} - \bar{d}_g)^2 \tag{C.9}$$

The reference positions $\bar{d}_q$ and $\bar{d}_g$ are expressed in detrended units.

C.3 Household's Problem

Dividing the household's budget constraint by Γ, we obtain

$$\begin{aligned}\tilde{c} + (1+\tau_x)\tilde{x} = {} & r\tilde{k} + \tilde{w}L + \tilde{T} - \tilde{d} \\ & + \frac{(1-\tau_q)(1+g)}{R^*}\tilde{d}' - \tilde{\Phi}(\tilde{k}, \tilde{k}') - \tilde{\Psi}(\tilde{d}', \bar{d}_q)\end{aligned} \tag{C.10}$$

The detrended capital accumulation equation is

$$(1+g)\tilde{k}' = (1-\delta)\tilde{k} + \tilde{x} \tag{C.11}$$

The stationary household Bellman equation is

$$\begin{aligned}&\tilde{V}^H(\tilde{k}, \tilde{d}; \tilde{s}, \tilde{D}^{g\prime}) \\ &\quad = \max_{\tilde{c}, \tilde{x}, \tilde{k}', \tilde{d}'} \left\{\log \tilde{c} + \beta \mathbb{E}_{z'|z}\left[\tilde{V}^H\left(\tilde{k}', \tilde{d}'; \tilde{s}', \tilde{\mathcal{G}}(\tilde{s}')\right)\right]\right\},\end{aligned} \tag{C.12}$$

subject to the detrended household budget constraint, capital accumulation, and the aggregate laws of motion.

The stationary aggregate laws of motion are

$$\begin{aligned}\tilde{K}' &= \tilde{\mathcal{K}}(\tilde{s}, \tilde{D}^{g\prime}) \\ \tilde{D}' &= \tilde{\mathcal{D}}(\tilde{s}, \tilde{D}^{g\prime}) \\ \tilde{D}^{g\prime\prime} &= \tilde{\mathcal{G}}(\tilde{s}') \\ \tilde{s}' &= (z', \tilde{K}', \tilde{D}', \tilde{D}^{g\prime})\end{aligned} \tag{C.13}$$

Households take aggregate policies and laws of motion as given.

C.4 Government's Problem

The detrended government budget constraint is

$$\begin{aligned}\tilde{T} = \frac{1+g}{R^*}\tilde{D}^{g\prime} - \tilde{D}^{g} \\ + \tau_x \tilde{X} + \frac{\tau_q(1+g)}{R^*}\tilde{D}' - \tilde{\Psi}_g(\tilde{D}^{g\prime}, \bar{d}_g)\end{aligned} \tag{C.14}$$

The government discounts future consumption at rate $\beta_g = \beta(1+\tau_g)$. The stationary government Bellman equation is

$$\begin{aligned}\tilde{V}^G(\tilde{s}) = \max_{\tilde{D}^{g\prime}} \Big\{ \log \hat{\tilde{c}}(\tilde{s}, \tilde{D}^{g\prime}) \\ + \beta_g \mathbb{E}_{z'|z}\left[\tilde{V}^G(\tilde{s}')\right] \Big\}\end{aligned} \tag{C.15}$$

subject to its detrended budget constraint, the optimal household responses

$$\begin{aligned}\tilde{C} &= \hat{\tilde{c}}(\tilde{s}, \tilde{D}^{g\prime}) \\ \tilde{X} &= \hat{\tilde{x}}(\tilde{s}, \tilde{D}^{g\prime}) \\ \tilde{K}' &= \tilde{\mathcal{K}}(\tilde{s}, \tilde{D}^{g\prime}) \\ \tilde{D}' &= \tilde{\mathcal{D}}(\tilde{s}, \tilde{D}^{g\prime})\end{aligned} \tag{C.16}$$

and the evolution of the stationary aggregate state,

$$\tilde{s}' = (z', \tilde{K}', \tilde{D}', \tilde{D}^{g\prime}) \tag{C.17}$$

The government chooses current public borrowing, anticipating the household's optimal response and taking future equilibrium government policy rules as given.

C.5 Stationary Equilibrium

A stationary Markov-perfect equilibrium consists of household policies, government borrowing and transfer policies, aggregate laws of motion, and factor prices such that:

1. Given current and anticipated government policies, household policies solve the stationary household Bellman equation.

2. The government chooses public borrowing to maximize its stationary Bellman equation, anticipating household responses.

3. Firms maximize profits, and factor prices equal marginal products.

4. Individual and aggregate allocations coincide:

$$\tilde{k} = \tilde{K}, \qquad \tilde{d} = \tilde{D}, \qquad \tilde{c} = \tilde{C}, \qquad \tilde{x} = \tilde{X}$$

5. Government transfers, aggregate laws of motion, and future policy rules are consistent with household and government decisions.

C.6 Computational Algorithm

We solve the model separately for each growth group using the following algorithm.

1. Set the model parameters, discretize the state space $(z, \tilde{K}, \tilde{D}, \tilde{D}^g)$, and specify the convergence tolerances.

2. Initialize the equilibrium objects:

   (a) The government's value function, $\tilde{V}_0^G(\tilde{s})$.

   (b) The household's marginal value functions, $\lambda_{k,0}$ and $\lambda_{d,0}$.

   (c) The aggregate policy functions for private capital, private debt, and public debt, $(\mathcal{K}_0, \mathcal{D}_0, \mathcal{G}_0)$.

3. Given the current guesses, perform the following iteration:

   (a) Compute the household's expected marginal values, given the current aggregate policies.

   (b) For each state $\tilde{s}$ and each feasible government borrowing choice $\tilde{D}^{g\prime}$, solve the household's Euler equations to obtain optimal private capital and debt, $(\tilde{K}', \tilde{D}')$, and implied consumption.

   (c) Given these household responses, solve the government's Bellman equation:

$$\tilde{V}_{n+1}^G(\tilde{s}) = \max_{\tilde{D}^{g\prime}} \left\{ \log \hat{\tilde{c}} + \beta_g \mathbb{E}\left[\tilde{V}_{n+1}^G(\tilde{s}') \right] \right\}$$

   (d) Update the aggregate policy functions $(\mathcal{K}, \mathcal{D}, \mathcal{G})$ and recompute government transfers using the government budget constraint.

(e) Evaluate convergence of the government value function, household marginal values, and capital policy. Verify that the household Euler equation errors are below the prescribed tolerances.

If the convergence criteria are satisfied, stop. Otherwise, update the equilibrium objects and return to step 3(a).

Appendix D Robustness

In this section we present robustness checks in addition to those presented in *Section* **??**. *Appendix B* reports further robustness analysis.

D.1 Alternate Estimation of Wedges

Updating the data used in Gourinchas and Jeanne (2013) allows us to estimate the savings and capital wedges following identical methodology. We show that using these estimated wedges leads to the same conclusion as in our main quantitative illustration with the calibrated wedges. *Section 4* of Gourinchas and Jeanne (2013) describes the model with wedges that generates a negative correlation between net foreign asset and growth. This correlation is generated through the introduction of "wedges" that distort the agent's first-order conditions. See *Section 4* for details.

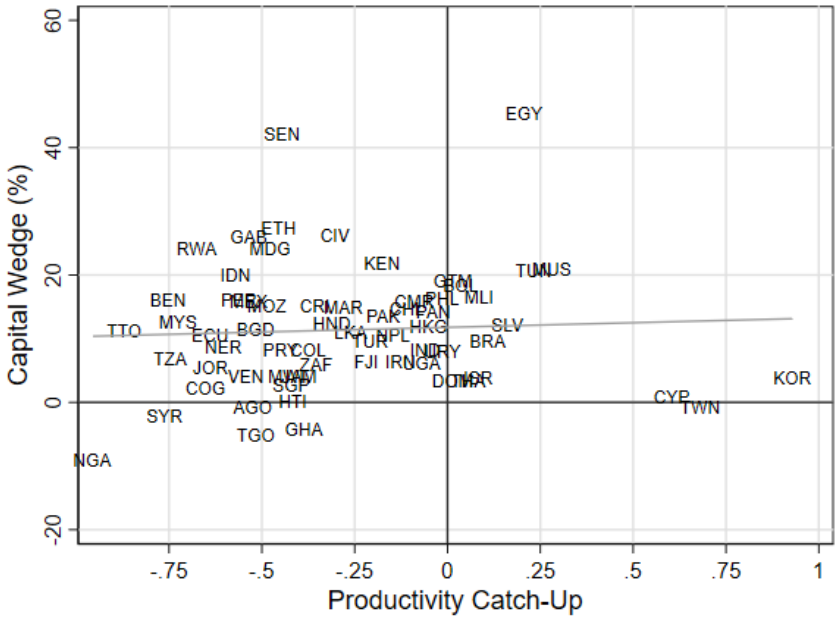
The household decision and hence model's predicted level of net foreign assets D_t and investment rate I_t are a function of τ_s and τ_k. *Proposition 2* in Gourinchas and Jeanne (2013) gives a closed form solution that can be used to solve for the capital wedge τ_k.

Figure D.1 shows the estimated capital wedges τ_k which range from -9.0% (Nigeria) to 45.4% (Egypt) with an average of 11.7%. The estimated capital wedges are close to the wedges originally estimated by Gourinchas and Jeanne (2013). *Figure D.1* plots the relationship between the capital wedges and productivity catch-up.[7] We find that capital wedges (with the updated data) display no relationship with productivity catch-up. This further validates our findings when we estimated capital wedges from the quantitative model.

Section 1 in the Online Appendix of Gourinchas and Jeanne (2013) describes the closed form solution used to solve for the savings wedges τ_s. The estimated saving wedges τ_s are plotted in *Figure D.2*. The savings wedges range from -7.1% (Botswana) to 14.8% (Nigeria) with an average wedge of 2.3%. As in the original paper, the saving wedge is

[7]Productivity catch-up is defined in Gourinchas and Jeanne (2013) to capture the gap between domestic productivity and U.S. productivity. That is, productivity catch up for country j at time t is given by, $\pi_{j,t} \equiv \frac{A_{j,t}}{A_{us,t}} - 1$. As previously discussed, Alfaro et al. (2014) show that our analysis using growth rates is equivalent to that of Gourinchas and Jeanne (2013) using productivity catch-ups.

Figure D.1: Productivity Catch-up and Capital Wedge



Source: Authors' calculations based on Gourinchas and Jeanne (2013).

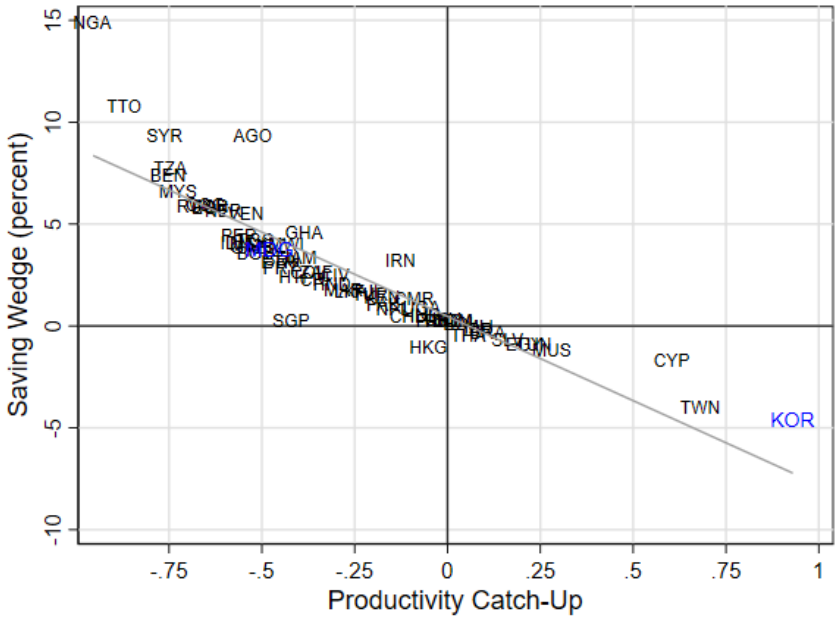
negatively correlated with productivity catch-up. Again, this validates the results of the internal calibration used in our quantitative model and counterfactual exercise.

D.2 Allocation Puzzle

Using the replication package provided by Gourinchas and Jeanne (2013) we update their data to the data used in this paper. We verify that we can use our updated data to replicate the figures of Gourinchas and Jeanne (2013). This section discusses the data used as well as the replicated figures. All data used in Gourinchas and Jeanne (2013) is publicly available. The only variables that are no longer available are the variables from the Penn World Table that have been discontinued after the version 8 update. Gourinchas and Jeanne (2013) used version 6.1. To replicate their figures, we use the Penn World Table version 10.0. For the purpose of replicating their figures we make use of the nearest variables now reported in the Penn World Tables. *Figure D.3* replicates *Figure 1* in Gourinchas and Jeanne (2013) and finds a negative correlation between NFA and productivity growth, as in the original paper.

Figure 7 in Gourinchas and Jeanne (2013) breaks down the components of the net foreign asset position between public and private flows. We replicate their figures and show that with the updated data we find the same correlations. *Figure D.4* shows that for the year

Figure D.2: Productivity Catch-up and Savings Wedge



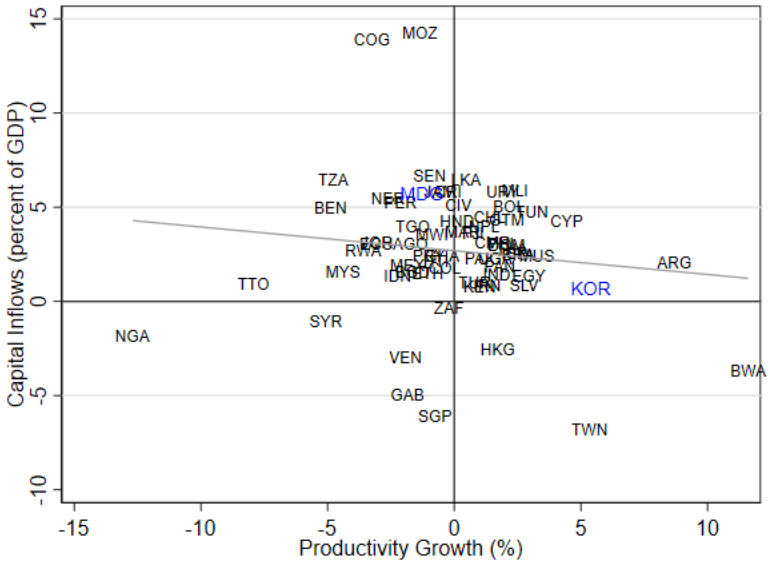
Source: Authors' calculations based on Gourinchas and Jeanne (2013).

2000 there is a negative correlation between net public foreign asset position and productivity catch up. There is a positive relationship between private net foreign asset position and productivity catch up (*Figure D.5*). Finally, breaking net public foreign asset position between public external debt and international reserves shows that both components are negatively correlated with growth, but the coefficient associated with international reserves is much larger, suggesting that the correlation is mainly driven by international reserves.[8]

One difference between the sample in Gourinchas and Jeanne (2013) and ours, is that the former includes some advance economies in their analysis of net public foreign assets (i.e., Korea, Israel, Singapore). The IDS does not report data on public external debt for advanced economies. The replication package shows that for these countries the authors replace the stock of public external debt to be zero. Note that in *Figure D.6* these countries have a change in their public and publicly guaranteed external debt of zero.

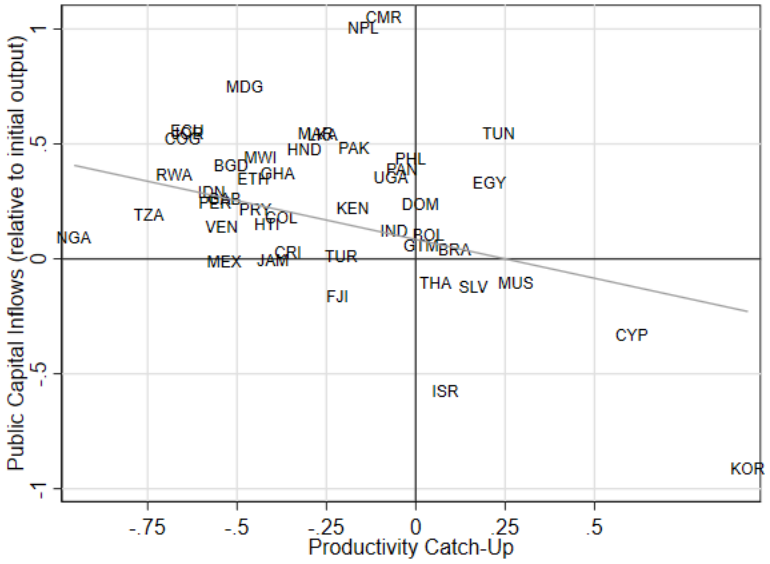
[8] As Gourinchas and Jeanne (2013) we remove Botswana and Singapore from the plots as they are outliers, including them in the figures only strengthens the relationship. In the updated data Argentina is also an outlier, so we remove it from the plots in the breakdown. As with Botswana and Singapore including them in the plots only strengthens the relationship.

Figure D.3: Average Productivity Growth and Average Capital Inflows between 1980 and 2000



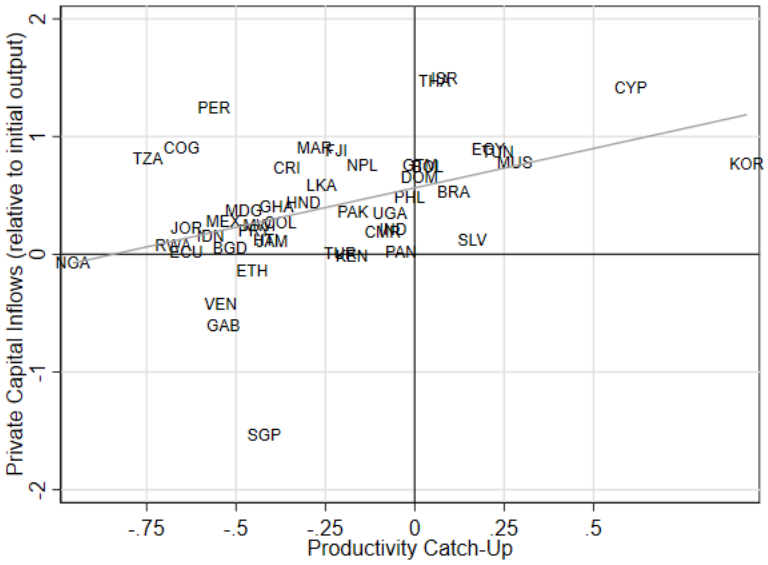
Source: Authors' calculations based on Gourinchas and Jeanne (2013).

Figure D.4: Productivity Catch-up and Change in Public External Debt



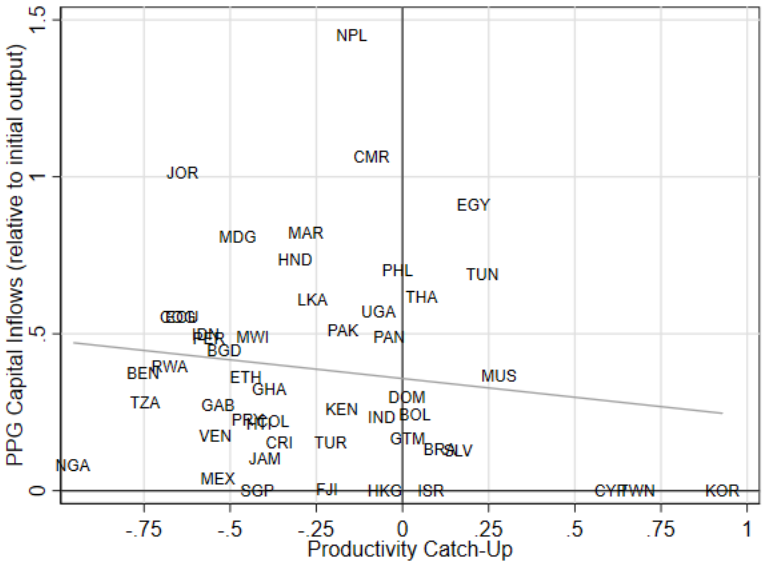
Source: Authors' calculations based on Gourinchas and Jeanne (2013).

Figure D.5: Productivity Catch-up and Change in Private External Debt



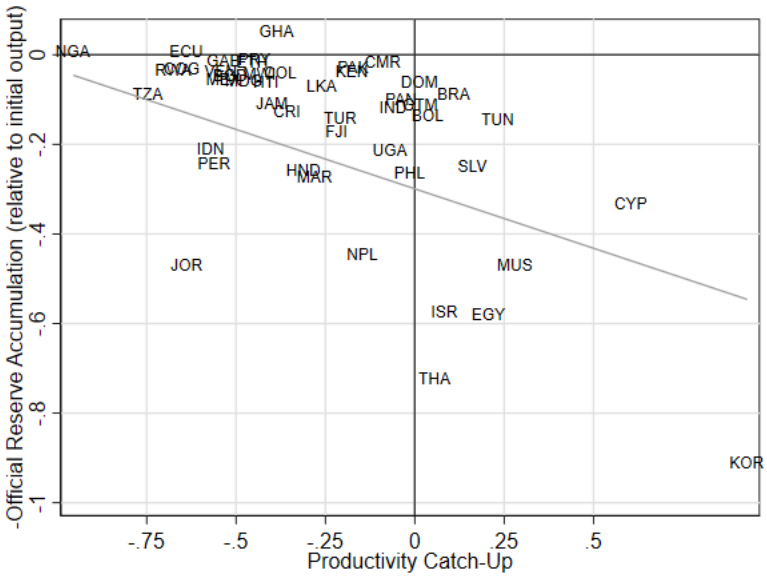
Source: Authors' calculations based on Gourinchas and Jeanne (2013).

Figure D.6: Productivity Catch-up and Change in Public and Publicly Guaranteed External Debt



Source: Authors' calculations based on Gourinchas and Jeanne (2013).

Figure D.7: Productivity Catch-up and Change in International Reserves



Source: Authors' calculations based on Gourinchas and Jeanne (2013).

D.3 Sample of Countries

The sample of countries used in our analysis differs from the sample in Gourinchas and Jeanne (2013). *Table D.1* lists every country that is not in our sample and the reason why it was excluded from our analysis. As a robustness check we dropped all countries from our sample that are not in Gourinchas and Jeanne (2013) and all results remain unchanged.

Including China in the sample by assuming the level of public external debt in 1980 is the level observed in 1981, does not alter any results. Hence, we also conclude, China cannot explain changing trends in the correlation between growth and net public foreign assets.

Table D.1: Countries in Gourinchas and Jeanne (2013) sample that are absent in our sample

Country	Reason for exclusion
Angola	External debt data begins in 1989 and reserves data begins in 1995
Benin	Missing international reserve data
Chile	Missing external debt data
China	External debt data begins in 1981
Ivory Coast	Missing international reserve data
Iran	Missing international reserves data after 1982
Mali	Missing international reserves data
Mozambique	Missing External debt and international reserves data after 1984
Niger	Missing international reserves data
Senegal	Missing international reserves data
Syria	Missing external debt before 2008 and international reserves data after 2010
Togo	Missing international reserves data
Trinidad & Tobago	Missing external debt data
Uruguay	Missing external debt data
Venezuela	Missing GDP data after 2015 and international reserves data after 2017
South Africa	Missing external debt data before 1994
South Korea	Missing external debt data
Hong Kong	Missing external debt data
Taiwan	Missing external debt data
Singapore	Missing external debt data
Cyprus	Missing external debt data