Globalization and the Increasing Correlation between Capital Inflows and Outflows

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Abstract

The correlation between capital inflows and outflows has increased substantially over time in a sample of 127 advanced and developing countries. We provide evidence that this is a result of an increase in financial globalization (stock of external assets and liabilities). This dominates the effect of an increase in trade globalization (exports plus imports), which reduces the correlation between capital inflows and outflows. In the context of a two-country model with 8 shocks we show that the theoretical impact of financial and trade globalization on the correlation between capital inflows and outflows is consistent with the data.

Keywords: capital inflows and outflows, financial globalization, trade globalization

JEL classification: F3, F4

1. Introduction

Broner et al. (2013) document that capital inflows and outflows have become significantly more correlated in countries of all income levels from the 1980s to the 2000s and are highest in high-income countries. The objective of this paper is to shed light on what drives this

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phenomenon of increasingly correlated inflows and outflows.

There has been some discussion in the literature about why capital inflows and outflows would be positively correlated at all. Broner et al. (2013) argue that one would expect a negative correlation in a model with time-varying expected returns, as for example in RBC models with productivity shocks. A higher expected return in the United States should lead both US and foreign investors to shift their portfolio to the US, leading to larger US capital inflows and lower outflows. The same negative correlation between inflows and outflows can be expected when there are changes in the relative riskiness of US assets.

Tille and Van Wincoop (2010) provide a broader perspective on the relationship between capital inflows and outflows from a portfolio perspective. Capital flows have a portfolio growth component (associated with saving) and a portfolio reallocation component (e.g. due to changes in expected returns and risk). The portfolio growth component can generate a positive correlation between inflows and outflows when saving is positively correlated across countries. Portfolio reallocation generates a negative correlation between inflows and outflows when domestic and foreign agents face the same portfolio problem and therefore shift their portfolios in the same direction, as in the examples above. Broner et al. (2013) therefore emphasize that asymmetries across countries are needed to generate a positive correlation between inflows and outflows across countries.

Many examples of such asymmetries have been developed in the literature, leading to differences in expected returns and risk from the perspective of domestic and foreign investors and contributing to a positive correlation between capital inflows and outflows. Expected returns may be different across countries due to information asymmetries (Tille and Van Wincoop (2014), Brennan and Cao (1997)) or to costs associated with investing abroad. Foreign assets may be perceived to be riskier due to exchange rate risk (Broner et al. (2013)) or expropriation risk (Gourio et al. (2015)). An increase in global risk or risk-aversion will then lead to a general retrenchment towards domestic assets, lowering both inflows and outflows.

Such a global retrenchment is documented by Milesi-Ferretti and Tille (2011) for the 2008-2009 global financial crisis.[1] Tille and Van Wincoop (2010) show that inflows and outflows become positively correlated due to various types of time-varying risk that impact foreign and domestic investors differently. This may be due to a different optimal hedge against inflation or future expected returns or non-asset income.[2]

The aim of this paper is to shed light on the increasingly positive correlation between capital inflows and outflows in both developed and developing countries, as well as the much higher correlation in developed countries. For example, in Table 2 we report that for industrialized countries the average time series correlation between capital inflows and capital outflows, normalized by external assets and liabilities, rose from 0.46 during 1975-1989 to 0.83 during 1990-2015. For the emerging markets the increase was from 0.25 to 0.53.

The explanation for this phenomenon does not require larger asymmetries across countries, as the discussion above might suggest. It also does not require a larger size of the shocks that are responsible for a positive correlation between capital inflows and outflows, such as larger global risk shocks. The explanation is much simpler. We argue that it is a simple corollary of financial globalization, measured as the sum of external assets and liabilities as a fraction of GDP. We have seen a spectacular take-off of financial globalization, especially in advanced countries since the early 1990s. As pointed out by Lane and Milesi-Ferretti (2008),

[1] Further evidence of retrenchment during the global financial crisis is in Giannetti and Laeven (2012) for the syndicated loan market. Rey (2015) casts this more broadly as part of a global financial cycle, with changes in risk or risk-aversion leading to global waves of capital flows. Gourio et al. (2015) provide evidence that an increase in global risk reduces capital inflows and outflows of emerging markets. Forbes and Warnock (2012) find that changes in global risk are associated with extreme capital flow episodes. A sudden stop of capital inflows is increasingly accompanied by reduced outflows (retrenchment). Similarly, large capital flight (outflows) is increasingly accompanied by a surge in capital inflows.

[2] Another, very different, reason for different portfolio shifts of domestic and foreign agents that lead inflows and outflows to be positively correlated is associated with official capital flows. When capital inflows lead to an accumulation of reserves, they are combined with official outflows. We find this to be an important contributor to the correlation between total inflows and outflows of emerging markets. See also Bianchi et al. (2012). Yet another explanation is bank liquidity management, suggested by Davis (2015), where banks reduce outflows to manage liquidity when faced with a drop in inflows.

this has been driven by factors such as capital account liberalization, financial deregulation, falling communication costs as well as financial innovation (e.g. securitization).

We confirm this explanation empirically by considering a sample of 127 countries with annual data from 1970 to 2015. We show both in cross section and panel data that financial globalization generates a higher correlation between capital inflows and outflows. We show that trade globalization, measured as exports plus imports as a fraction of GDP, has the exact opposite effect, but financial globalization has significantly outpaced trade globalization over the past four decades. We also show in the next section that the correlation between capital inflows and outflows is directly connected to the volatility of gross capital flows relative to the volatility of net capital flows. Net capital flows are defined as capital outflows minus inflows, while gross capital flows are the sum of capital outflows and capital inflows. We document empirically that financial globalization has indeed raised the volatility of gross flows relative to net flows, while trade globalization has done the exact opposite.

After documenting the empirical evidence, we develop a simple two period, two country model to shed light on the empirical findings. The objective is to keep the model as simple as possible in order to obtain clean analytical solutions. The model contains a wide variety of shocks: saving shocks, investment shocks, expected dividend shocks and portfolio shocks. Both global and relative shocks are included. There is a single parameter that measures international financial integration, related to the cost of investing abroad. Similarly, there is a single parameter measuring trade frictions. We obtain closed form solutions of gross and net capital flows as a function of the model shocks, with the coefficients depending on the financial and trade integration parameters.

The results in the model are consistent with the data. Financial globalization raises the volatility of gross flows relative to net flows and therefore raises the correlation between capital inflows and outflows, while trade globalization does the opposite. When scaled by the stock of external assets and liabilities, we find that neither financial nor trade globalization

affect the volatility of gross capital flows. But trade integration increases the volatility of net flows, while financial integration reduces the volatility of net flows.

The remainder of the paper is organized as follows. Section 2 presents the stylized facts in the data. Section 3 describes the model. Section 4 discusses the results implied by the model. Section 5 concludes.

2. Empirical Evidence

In this section we consider the empirical relationship between various capital flow moments and financial and trade globalization. Financial globalization is measured as the sum of external assets and liabilities divided by GDP, while trade globalization is measured as exports plus imports divided by GDP. There are 127 countries in the sample, split into groups of 21 advanced economies and 106 emerging and developing economies. The full list of countries is presented in Table 1.

In what follows we present results from both panel and cross-sectional regressions. The cross-sectional regressions use data from the 1990-2015 period, and all 127 countries on the list are included in the cross-sectional regressions. In the panel data regressions, and when presenting descriptive statistics, we restrict our attention to countries that have a sufficient time-series of capital flows data in both the 1975-1989 and 1990-2015 subperiods. This limits the number of countries in the sample. There are 69 countries in the more restrictive panel sample, including 15 advanced and 54 emerging market and developing countries. These countries are listed in bold in Table 1.

Capital flow moments are calculated using annual data from 1975 to 2015. Gross capital inflow and outflow data, as well as export and import data, are from the IMF's International Financial Statistics database. Data for the stock of external assets and liabilities are from Lane and Milesi-Ferretti (2007), using their data update through 2015. In addition we will consider an annual index of capital account restrictions from Chinn and Ito (2006) that has

also been updated through 2015.

2.1. Descriptive statistics

We denote $OF = outflows$ and $IF = inflows$. Net outflows are $NF = OF - IF$ and gross flows are $GF = OF + IF$. Table 2 provides four moments: the time-series correlation between capital inflows and outflows, the time-series standard deviations of net and gross capital flows and their ratio. In the top panel of the table, capital outflows and inflows in each country are normalized by the previous year's sum of external assets and liabilities. In the bottom panel the same capital flows are normalized by GDP in the previous year. All moments in Table 2 are first computed for individual countries based on the sample of annual data and then averaged across countries.

The table also presents total external assets and liabilities as a share of GDP, total trade (exports plus imports) as a share of GDP, and the average value of the Chinn-Ito capital account restriction index (normalized where 0 denotes no capital account restrictions and 1 denotes a closed capital account).

These statistics are presented for the 1975-1989 and 1990-2015 sub-periods for both the advanced economies and the emerging markets. To ensure that the post-1990 results are not driven by the 2008 financial crisis, we also present these same statistics calculated over the 1990-2007 subperiod.

Turning first to the advanced economy sample, under both normalizations there is a sizable increase in the correlation between capital outflows and inflows from the pre- to the post-1990 period. The increase is from 0.46 to 0.83 when scaled by external assets and liabilities, and from 0.52 to 0.87 when scaled by GDP.

To see how the correlation between capital inflows and outflows is related to the relative

volatility of gross and net capital flows, we can write:

$$OF = 0.5GF + 0.5NF$$

$$IF = 0.5GF - 0.5NF$$

From this it is simple to derive:

$$corr(OF, IF) = c\frac{\frac{var(GF)}{var(NF)} - 1}{\frac{var(GF)}{var(NF)} + 1} \quad (1)$$

where c is a parameter that depends on the variance of outflows relative to the variance of inflows.[3] As we document in the Online Appendix, changes in this correlation are almost entirely driven by changes in the ratio on the right hand side of (1), which depends on the volatility of gross flows relative to the volatility of net flows. Table 2 indeed confirms that together with the sharp increase in the correlation between inflows and outflows there is a large increase in the standard deviation of gross flows relative to the standard deviation of net flows from the pre- to post-1990 periods.

The value of $Std\left(GF\right)/Std\left(NF\right)$, as well its change between sub-samples, is similar regardless of how we normalize capital flows. However, the normalization does affect the standard deviations of gross and net flows individually. When normalizing by the sum of external assets and liabilities, the standard deviation of gross flows barely changes between the two sub-samples and there is a sizable fall in the standard deviation of net flows. When normalizing by GDP, there is little change in the standard deviation of net flows, but there is a sizable increase in the standard deviation of gross flows across the two periods.

Emerging markets and developing countries also experienced an increase in the correlation between capital inflows and outflows across the sub-samples, though both the level of the correlation and its change are smaller than for advanced economies. The same is the case

[3] Specifically, $c = \frac{1+\alpha}{2\alpha^{0.5}}$, where $\alpha = \frac{var(OF)}{var(IF)}$. This derivation, and some discussion about the constant c is presented in the Online Appendix.

for the standard deviation of gross flows relative to the standard deviation of net flows.[4]

The bottom of Table 2 shows that between the earlier and later periods the stock of external assets and liabilities as a share of GDP more than tripled in the advanced economies, whereas it increased by about 60% in the emerging markets. Both country groups saw a similar, and much smaller, increase in the level of trade as a share of GDP. In addition, the advanced economies basically eliminated capital account restrictions in the post-1990 period, and the average Chinn-Ito index fell from 0.42 to 0.09. In the emerging markets there was some capital account liberalization, but not as much, and the Chinn-Ito index fell from 0.74 to 0.57. There are very few changes to any of the post-1990 statistics when we instead consider the 1990-2007 subperiod.

The results in Table 2 are calculated over a pre-1990 period and a post-1990 period. Alternatively we can calculate the same moments in a rolling window. Figure 1 presents the correlation between inflows and outflows, the standard deviation of net flows, and the standard deviation of gross flows in the advanced economies with a 10-year rolling window. The window spans the 10 years prior to the date on the horizontal axis, so the first observation in 1984 calculates moments over the window 1975-1984 and the last observation in 2015 calculates moments over the window 2006-2015. The left-hand column in the figure presents the results when capital flows are normalized by the stock of external assets and liabilities, while the right-hand column presents the results when capital flows are normalized by GDP.

The figure shows that the correlation has nearly monotonically increased over time. Furthermore, when normalizing by the stock of external assets and liabilities, the standard deviation of gross flows is nearly constant over the entire sample, but the standard deviation of net flows is nearly monotonically decreasing. When normalizing by GDP the standard deviation of net flows is nearly constant over the entire sample period, but the standard deviation of gross flows is increasing over time.

[4]Details and results from hypothesis tests to determine the significance of the statistics in Table 2 are presented in the Online Appendix.

A possible explanation for the increase in the correlation between capital inflows and outflows between the pre- and post-1990 periods, as well as the higher correlation in advanced countries, is the higher degree of financial globalization. The change over time in financial globalization, trade globalization, and capital account restrictions are illustrated in Figures 2 and 3. Figure 2 compares the two sub-periods for individual countries, while Figure 3 shows the time series for the average of both sets of countries.

The top panel of Figure 2 shows that between the pre- and post-1990 periods, there was a large increase in the stock of external assets and liabilities as a share of GDP in every advanced country, and while there was an increase in most emerging markets, the gain was not as dramatic. The middle panel shows that the increase in trade integration in both sets of countries was much more modest, and trade integration actually fell in some countries in the sample. The bottom panel shows that in every advanced country the index of capital account restrictions fell, and in some cases it fell to zero. There was some easing of capital account restrictions in most emerging market countries, but the change was not as dramatic, and some emerging market countries actually tightened capital controls between the two subperiods.

The time series plot in Figure 3 shows that the average stock of external assets and liabilities to GDP in the advanced economies took off in the early to mid 1990s, but there was no such "take-off" in the emerging markets. The pace of trade integration was much more modest and was similar in both the advanced and emerging markets. Meanwhile capital account restrictions were basically cut to zero in the advanced economies. The emerging markets took steps towards capital account liberalization in the 1990s, but this trend towards liberalization stalled in the 2000s, and there has been some move towards tightening capital restrictions in the emerging markets in the wake of the 2008 crisis.

Another possible explanation for the increasing correlation between inflows and outflows is that there was a shift in the composition of capital flows towards more highly correlated

types of flows. This explanation cannot be ruled out ex-ante, and certain components of capital flows, like banking flows, show a higher correlation between inflows and outflows than other components, like FDI.

We address this concern in the Online Appendix. We show that there has been an increase in the correlation between all the different components of capital flows from the pre- to the post-1990 periods. The composition of capital flows has actually shifted from highly correlated banking flows to less correlated FDI flows between these two periods. We consider a formal decomposition of the correlation between inflows and outflows into the part that is driven by a shift in the composition of capital flows and the part that is driven by an increase in the correlation between the components of inflows and outflows. We show that the observed shift in the composition alone would lead to a decrease in the correlation, and that the increase in the correlation between the components of capital inflows and outflows explains the increasing correlation between total inflows and outflows.

2.2. Regression results

We now consider regressions of various capital flows moments on measures of financial and trade globalization. We consider both cross-sectional and panel data regressions. These regression specifications are as follows:

$$\text{Cross-section}: \quad X_i = \alpha_c + \beta_c \log F_i + \gamma_c \log T_i + \varepsilon_i$$

$$\text{Panel}: \quad X_{i,t} = \alpha_p + \mu_i + \beta_p \log F_{i,t} + \gamma_p \log T_{i,t} + \varepsilon_{i,t}$$

where X_i is either the time-series correlation between inflows and outflows in country i, the time-series standard deviation of gross flows, the time-series standard deviation of net flows, or the ratio of the standard deviation of gross flows to the standard deviation of net flows; F is a measure of financial globalization in country i, the stock of external assets plus liabilities

as a share of GDP; and T_i is a measure of trade globalization in country i, exports plus imports as a share of GDP. In the cross-sectional regression the two globalization measures, F and T, are calculated as the average value over the 1990-2015 period and the moments X are calculated as time-series moments over the same period. In the panel data regression there are two values per country, one calculated over the 1975-1989 period and one calculated over the 1990-2015 period. The panel data regression includes a country fixed effect μ_i. The cross section regressions include the wide set of 127 countries. The panel regressions include a smaller set of 69 countries, where data of a sufficient length exists over both the pre- and post-1990 periods.

The two regressions use two approaches to answer the same question. Both ask what is the effect of a higher stock of external assets and liabilities or a greater trade share on the correlation between capital inflows and outflows or the volatility of gross and net capital flows. Specifically, the cross-sectional regression asks if across a sample of 127 countries, countries with a higher stock of external assets and liabilities tend to have more volatile gross capital flows and a greater correlation between capital inflows and outflows. The panel data regression with country fixed effects instead asks if within a country, a change in the stock of external assets and liabilities or a change in the trade share leads to a change in the capital flow moments.

Table 3 presents results from multivariate regressions of the capital flow moments on the logs of financial and trade globalization. The top half of the table presents the results from the cross-sectional regression, and the bottom half presents the results from the panel data regression.

We will begin by presenting the results from an OLS regression of capital flow moments on the stock of external assets and liabilities or the trade share. But the ordinary least squares regression (OLS) may suffer from endogeneity. There may be a potential reverse causality. Specifically, an exogenous factor that leads to high correlation between capital

inflows and outflows may also have an effect on the stock of external assets and liabilities. In the theoretical model in the next section, countries are affected by common shocks and idiosyncratic shocks. An increase in the relative strength of common shocks will lead to an increase in the correlation between inflows and outflows. But an increase in the share of common shocks also makes agents less inclined to hold foreign assets since the benefits from diversification are smaller. Thus the same exogenous factor that leads to a higher correlation between capital inflows and outflows tends to reduce the stock of external assets and liabilities. This biases down the OLS regression coefficient.

To address such possible endogeneity, we run the same regression with two-stage-least-squares (2SLS), where the Chinn-Ito capital account openness index is used as an instrument for the stock of external assets and liabilities. In addition we instrument for trade integration with a proxy based on gravity variables. We follow the framework laid out in Frankel and Romer (1999) to create one proxy for aggregate trade integration in a country based on bilateral gravity variables like distance, population, and land areas. The construction of this proxy is discussed in the Online Appendix. This proxy for trade integration is based on non-time varying gravity variables, so it can only serve as an instrument in the cross-section regression. In the panel data regression we only instrument for the stock of external assets and liabilities. The results from the first-stage regressions of the stock of external assets and liabilities or the trade share on the capital account openness index or the gravity based trade proxy are presented in the Online Appendix.

First consider the OLS cross section results. In line with our earlier intuition, financial globalization has a positive and significant effect on both the correlation between outflows and inflows and the closely related ratio of the standard deviations of gross flows and net flows. While the positive impact of financial globalization on the ratio of the standard deviations of gross and net flows is independent of the normalization of capital flows, the impact on the standard deviations of gross and net flows individually does depend on the normalization.

When capital flows are normalized by the stock of external assets and liabilities, financial globalization has a negative effect on both the standard deviation of net flows and gross flows. But taking into account the fact that gross flows are much more volatile than net flows (almost 6 times in advanced countries), the negative impact on the volatility of net flows is much larger. When instead capital flows are normalized by GDP, financial globalization has no effect on the standard deviation of net flows and a positive effect on the standard deviation of gross flows.

Meanwhile, an increase in trade integration has a negative effect on the correlation between capital inflows and outflows. An increase in the trade share has a positive effect on the standard deviation of net capital flows, and thus leads to a fall in the correlation between capital inflows and outflows.

To address potential endogeneity, we turn to the 2SLS results. In the cross-section, the Chinn-Ito capital account openness index and the gravity-based trade proxy from Frankel and Romer (1999) serve as instruments. In line with our earlier intuition that reverse causality may bias the coefficient of financial integration downward, in the 2SLS results the correlation between inflows and outflows depends on financial integration with a coefficient that is even larger than in the OLS regression and still significant. The coefficient of trade integration is also larger (in absolute value) when the gravity based trade proxy serves as an instrument for trade integration.

The panel regression results are presented in the bottom half of Table 3. In the panel data regression the set of countries is smaller, and the sample of countries is skewed towards the advanced economies (since having a sufficient time series of data available in the pre-1990 period is a requirement to be included in the panel data regression). Thus financial globalization tends to be higher in these countries and the correlation between inflows and outflows closer to one. The nonlinearity of the correlation coefficient when it approaches one means that standard errors can be high in the panel data regression of the correlation

between inflows and outflows. In this panel data regression, it is best to focus on the ratio of the standard deviation of gross flows and net flows, which is closely related to the correlation between inflows and outflows and does not suffer from the same nonlinearity. The impact of financial and trade globalization on this ratio are the same as in the cross-section regression. An increase in the stock of external assets and liabilities raises this ratio and an increase in trade integration reduces it.

The results continue to hold when addressing potential endogeneity through a 2SLS regression. The gravity-based trade proxy used as an instrument for trade integration is time-invariant and thus cannot be used in the panel regression with country-fixed effects. So in the panel data regression, the only instrument is the financial openness index that is used as an instrument for the stock of external assets and liabilities.

We can summarize the results from this section in the form of a few stylized facts.

Stylized Fact 1 *Financial globalization raises the correlation between capital inflows and outflows and raises the standard deviation of gross flows relative to the standard deviation of net flows.*

Stylized Fact 2 *When capital flows are normalized by external assets and liabilities, financial globalization lowers the volatility of net flows while the effect on gross flows is either statistically insignificant or small. When capital flows are normalized by GDP, financial globalization has an effect on net flows that is either statistically insignificant or small, while it raises the volatility of gross flows.*

Stylized Fact 3 *Trade globalization lowers the correlation between capital inflows and outflows and the ratio of the volatilities of gross flows and net flows.*

These results are also consistent with the findings from Table 2. They explain the higher correlation between capital inflows and outflows of advanced countries and the increase in

the correlation over time. Stylized Fact 2 also explains the dependence on normalization of the changes in gross and net capital flow volatilities reported in Table 2 and Figure 1.

2.3. Robustness

In the Online Appendix we present the results from several robustness exercises. First, instead of using the Chinn-Ito capital account openness index as an instrument for financial globalization, we use a measure of domestic financial liberalization. Even when using a de jure measure of capital account openness like the Chinn-Ito index as an instrument, the regression may suffer from endogeneity. An increase in the relative strength of idiosyncratic shocks increases the volatility of net capital flows (the current account). To smooth these fluctuations in the current account, a government may impose capital account restrictions. And thus the increase in the relative volatility of idiosyncratic shocks would reduce the correlation between inflows and outflows and also, through a political economy channel, increase a de jure measure of capital account restrictions.

To address this potential endogeneity, instead of using the Chinn-Ito capital account restrictions index as an instrument we use a measure of domestic financial sector liberalization from Abiad et al. (2010). This measure captures the financial deregulation that is listed by Lane and Milesi-Ferretti (2008) as one of the key drivers of financial globalization. The Abiad et al. measure contains both a domestic and international component of financial sector liberalization. We restrict our focus to the domestic component. The country coverage using the Abiad measure is less, and the sample ends in 2005. The Online Appendix shows that the results are unchanged when we use this domestic financial liberalization index as an instrument.

Next, the we consider other measures of de jure capital account restrictions. Fernandez et al. (2016) construct separate measures of inflow and outflow restrictions. These capital control measures are highly correlated with the Chinn-Ito index. But whereas the Chinn-Ito

index is just one index capturing all current and capital account restrictions, the Fernandez et al. measure distinguishes between inflow and outflow restrictions. The country and time coverage is smaller with the Fernandez et al. measures, and the data only covers the years 1995-2015. Thus we can only use these inflow and outflow restrictions as an instrument in the cross-sectional, not the panel data regression. The Online Appendix shows that the results from the cross-sectional regression using the Fernandez et al. measures as an instrument are nearly identical to the results using the Chinn-Ito index as an instrument.

Next, we run the same regressions that were presented in Table 3, but where the sample is limited to the advanced economies. This severely limits the number of observations in the regression, to 21 countries in the cross section and 15 countries in the panel, but the results from the wider set of countries continues to hold in this reduced set of advanced countries.

Lastly there is the concern that the results may be affected by the increased correlation of capital inflows during the 2008 financial crisis. For this reason we consider the regression results where the sample ends in 2007, before the crisis. The cross section results are based on the 1990-2007 sample, while the panel results are based on 1975-1989 and 1990-2007 samples. The Online Appendix shows that the regression results are not affected by the change in the end date.

3. The Model

The model aims to shed light on the impact of financial and trade globalization on the correlation between capital inflows and outflows. There are two countries (Home and Foreign) and two periods. The extent of financial globalization results from a financial friction that captures the cost of investment abroad. The extent of trade globalization is driven by a quadratic trade cost function analogous to Backus et al. (1992). The objective is to investigate how an increase in financial and trade globalization affects the volatility of gross and net capital flows in response to various shocks, and therefore the correlation

between capital inflows and outflows. There will be a total of 8 shocks (4 types of shocks in both Home and Foreign).

3.1. Production and Investment

There is a single good. Production in period $i = 1, 2$ is equal to productivity times the capital stock:

$$Y_{Hi} = \theta_{Hi} K_{Hi} \tag{2}$$

$$Y_{Fi} = \theta_{Fi} K_{Fi} \tag{3}$$

We normalize the capital stock to 1 in period 1 in both countries: $K_{H1} = K_{F1} = 1$. Capital accumulates due to new investment:

$$K_{H2} = 1 + I_H \tag{4}$$

$$K_{F2} = 1 + I_F \tag{5}$$

There is no depreciation. We also normalize productivity to 1 in period 1: $\theta_{H1} = \theta_{F1} = 1$. We abstract from period 1 productivity shocks. If present, they would affect saving, but we already have saving shocks in the form of time discount rate shocks discussed below. Productivity in period 2 is

$$\theta_{H2} = 1 + \varepsilon_{H2} \tag{6}$$

$$\theta_{F2} = 1 + \varepsilon_{F2} \tag{7}$$

where ε_{H2} and ε_{F2} are Home and Foreign productivity shocks with mean 0. Changes in the expectations $E(\varepsilon_{H2})$ and $E(\varepsilon_{F2})$ will be referred to as expected dividend shocks as they affect expected asset payoffs. They are a type of news shock.

Capital goods are supplied by competitive installment firms. In the Home country they produce I_H new capital goods in period 1 and sell them to firms at the price Q_H. Producing I_H capital goods requires

$$(1-\varepsilon_H^I)I_H + \frac{\xi}{2}(I_H)^2 \tag{8}$$

consumption goods. Let consumption goods be the numeraire. The installment firms therefore maximize

$$\Pi_H = Q_H I_H - \left[(1-\varepsilon_H^I)I_H + \frac{\xi}{2}(I_H)^2\right] \tag{9}$$

This gives

$$I_H = \frac{1}{\xi}\left(Q_H - 1 + \varepsilon_H^I\right) \tag{10}$$

This is the Tobin Q model of investment. For the Foreign country we have analogously

$$I_F = \frac{1}{\xi}\left(Q_F - 1 + \varepsilon_F^I\right) \tag{11}$$

The shocks ε_H^I and ε_F^I will be referred to as investment shocks. If positive, they raise investment for a given price of capital.

3.2. Saving and Portfolio Allocation

Home agents maximize

$$ln(C_{H1}) + \beta_H E ln(C_{H2}) \tag{12}$$

Analogously, Foreign agents maximize

$$ln(C_{F1}) + \beta_F E ln(C_{F2}) \tag{13}$$

We assume that

$$\beta_H = 1 + \varepsilon_H^\beta \tag{14}$$

$$\beta_F = 1 + \varepsilon_F^\beta \tag{15}$$

These time discount rate shocks lead to period 1 saving shocks. A higher time discount rate raises saving.

Agents start out with claims on a fraction $\bar{z}$ of domestic assets and $1-\bar{z}$ of foreign assets. The wealth of Home and Foreign investors in period 1 is then

$$W_H = \bar{z}Y_H + (1-\bar{z})Y_F + \bar{z}Q_H + (1-\bar{z})Q_F + \Pi_H \tag{16}$$

$$W_F = (1-\bar{z})Y_H + \bar{z}Y_F + (1-\bar{z})Q_H + \bar{z}Q_F + \Pi_F \tag{17}$$

Here we assume that the profits from the installment firms go to the domestic investors. This term drops out in the solution as it is second-order, so this is more of a technicality.

The budget constraint for Home agents is

$$C_{H2} = \left(W_H - C_{H1} - 0.5\tau X^2\right)\left(R^{p,H} + T_H\right) \tag{18}$$

This budget constraint requires some explanation. In period 1 agents purchase assets equal to $W_H - C_{H1} - 0.5\tau X^2$. Here $0.5\tau X^2$ is a trade cost that is quadratic in net exports

$$X = Y_{H1} - C_{H1} - (1+\varepsilon_H^I)I_H - \frac{\xi}{2}I_H^2 - 0.5\tau X^2 \tag{19}$$

The quadratic trade cost specification is analogous to Backus et al. (1992).[5] For simplicity we assume that this trade cost only applies to period 1 as our focus is on period 1 capital flows. The parameter τ captures the degree of trade integration.

The portfolio return of Home agents is

$$R^{p,H} = z_H R_H + (1-z_H)e^{-\zeta_H}R_F \tag{20}$$

[5] If trade costs are proportional to trade, the solution is significantly complicated by the fact that trade only takes place when there is a sufficiently large asymmetry across countries. With a quadratic trade cost, the marginal cost is zero when $X = 0$, so that any asymmetry that generates trade flows in the absence of trade costs will also generate trade flows with trade costs.

Here R_H and R_F are the return from period 1 to period 2 on Home and Foreign assets, which are claims on period 2 output per unit of capital:

$$R_H = \frac{1+\varepsilon_{H2}}{Q_H} \tag{21}$$

$$R_F = \frac{1+\varepsilon_{F2}}{Q_F} \tag{22}$$

The share invested in Home assets by Home agents is denoted z_H. The variable ζ_H in (20) represents a cost of investing abroad, which drives the degree of financial integration. This is a commonly used feature in the literature to generate portfolio home bias.[6] This cost does not affect resources as the aggregate of the cost is reimbursed to the agents through T_H in (18), which the agents take as given. Therefore

$$\tilde{R}^{p,H} = R^{p,H} + T_H = z_H R_H + (1-z_H) R_F \tag{23}$$

Optimal period 1 consumption, taking into account the effect on trade costs, is

$$C_{H1} = \frac{1}{1+\beta_H(1-\tau X)}\left(W_H - 0.5\tau X^2\right) \tag{24}$$

The wealth that is invested in assets in period 1 is denoted $A_H = W_H - C_{H1} - 0.5\tau X^2$:

$$A_H = \frac{\beta_H(1-\tau X)}{1+\beta_H(1-\tau X)}(W_H - 0.5\tau X^2) \tag{25}$$

The Euler equation for optimal portfolio choice is

$$E\frac{1}{\tilde{R}^{p,H}}\left(R_H - e^{-\zeta_H} R_F\right) = 0 \tag{26}$$

In terms of logs this is

$$Ee^{r_H - \tilde{r}^{p,H}} = Ee^{r_F - \tilde{r}^{p,H} - \zeta_H} \tag{27}$$

[6] Examples are Bacchetta and Van Wincoop (2017), Tille and van Wincoop (2010, 2014), Bhamra et al. (2014) and Martin and Rey (2004).

Using the linear approximation $\tilde{r}^{p,H} = z_H r_H + (1 - z_H) r_F$, defining the excess return $er = r_H - r_F$, and assuming normality of log returns, we can solve for the optimal portfolio:

$$z_H = 0.5 + \frac{\zeta_H}{\sigma^2} + \frac{E(er)}{\sigma^2} \tag{28}$$

where $\sigma^2 = var(er)$.

Changes in ζ_H imply portfolio shocks. In the absence of such shocks, $\zeta_H = \bar{\zeta}_H$. We define $\bar{z} = 0.5 + (\bar{\zeta}_H/\sigma^2)$ as the fraction invested in the domestic asset in the absence of shocks. We assume that shocks to ζ_H imply a portfolio shift of $1 - z_H$ of the form $-(1 - \bar{z})\varepsilon_H^z$, such that

$$z_H = \bar{z} + \frac{E(er)}{\sigma^2} + (1 - \bar{z})\varepsilon_H^z \tag{29}$$

where ε_H^z is an exogenous portfolio shifter. The specification implies that portfolio shifts ε_H^z lead to a proportional change in the the fraction invested in the foreign country. It is sensible that when agents invest a larger fraction abroad, portfolio shocks are proportionally larger as well. While here the portfolio shocks are the result of changes in the cost of investing abroad, we will think of them more broadly as any type of financial shocks generating portfolio shifts. Depending on the specification, this can take the form of liquidity trade, noise trade, time-varying risk (Tille and Van Wincoop (2010,2014)), time-varying risk-bearing capacity (Gabaix and Maggiori (2015)), time-varying costs of investment abroad (Bacchetta and Van Wincoop (2017)) or time-varying private investment opportunities (Wang (1994)).[7]

Consumption and portfolio choice for Foreign agents is analogous:

$$C_{F1} = \frac{1}{1 + \beta_F(1 + \tau X)} \left(W_F - 0.5\tau X^2\right) \tag{30}$$

$$z_F = 1 - \bar{z} + \frac{E(er)}{\sigma^2} - (1 - \bar{z})\varepsilon_F^z \tag{31}$$

[7] Itskhoki and Mukhin (2017) argue that such financial shocks can explain most puzzles associated with nominal and real exchange rates.

Here z_F is the fraction invested in the Home asset by Foreign investors. A simultaneous increase in ε_H^z and ε_F^z implies global retrenchment to domestic assets and therefore a decrease in capital inflows and outflows.

Capital outflows and inflows are equal to

$$OF = (1 - z_H)A_H - (1 - \bar{z})Q_F \tag{32}$$

$$IF = z_F A_F - (1 - \bar{z})Q_H \tag{33}$$

These are equal to the value of external positions in period 1 minus the value of these positions at the start of period 1, before new assets are purchased.

3.3. Market Clearing Conditions

The asset market clearing conditions are

$$z_H A_H + z_F A_F = Q_H \left(1 + I_H\right) \tag{34}$$

$$(1 - z_H)A_H + (1 - z_F)A_F = Q_F \left(1 + I_F\right) \tag{35}$$

By Walras' Law, we can ignore the goods market clearing conditions as they are satisfied once the asset market clearing conditions hold.

3.4. Shocks

There are a total of 8 shocks, which are listed in Table 4. For convenience of the analysis, we will rewrite all shocks as global shocks and relative shocks. For example, we transform the saving shocks ε_H^β and ε_F^β into a global saving shock and a relative saving shock:

$$\varepsilon^{\beta,A} = 0.5(\varepsilon_H^\beta + \varepsilon_F^\beta)$$

$$\varepsilon^{\beta,D} = \varepsilon_H^\beta - \varepsilon_F^\beta$$

Throughout we will use the superscript A to denote an average across countries and superscript D to denote the difference (Home minus Foreign variable).

3.5. Solution

After substituting the expressions for wealth, investment and portfolio shares, we log linearize the asset market clearing conditions around the values that the variables take in the absence of shocks. Omitting time subscripts, in the absence of shocks $Y_H = Y_F = A_H = A_F = Q_H = Q_F = 1$, $W_H = W_F = 2$, $I_H = I_F = X = 0$ and $z_H = 1 - z_F = \bar{z}$. We then take the average and difference of the market clearing conditions across countries. Denoting logs of variables with lower case letters, we solve for the average asset price $q^A = 0.5(q_H + q_F)$ and the relative asset price $q^D = q_H - q_F$.

We leave all algebraic details to the Online Appendix. The average asset market clearing condition can be used to solve for the average asset price as a function of several shocks:

$$q^A = \frac{1}{1+\frac{2}{\xi}}\left(\varepsilon^{\beta,A} - \frac{2}{\xi}\varepsilon^{I,A}\right) \tag{36}$$

Intuitively, a global saving shock (positive $\varepsilon^{\beta,A}$) raises global saving and therefore asset demand, which raises the average asset price. A global investment shock (positive $\varepsilon^{I,A}$) raises the global asset supply, which lowers the average asset price. Portfolio shocks do not affect the average asset price as they lead to portfolio shifts from one asset to another. The same is the case for expected dividend shocks.

The Home minus Foreign asset market clearing condition can be used to solve for the relative asset price:

$$q^D = \frac{4(2+\tau)}{\sigma^2 D}E(\varepsilon_2^D) + \frac{2(1-\bar{z})(2+\tau)}{D}\varepsilon^{z,D} + \frac{2\bar{z}-1}{D}\varepsilon^{\beta,D} - \frac{2}{\xi D}(1+\tau(1-\bar{z}))\varepsilon^{I,D} \tag{37}$$

where

$$D = 1 + 4(1+\tau)\bar{z}(1-\bar{z}) + \frac{4(2+\tau)}{\sigma^2} + \frac{2}{\xi}(1+\tau(1-\bar{z})) > 0 \tag{38}$$

The intuition is as follows. An increase in $E(\varepsilon_2^D)$ implies a higher expected relative return of the Home asset, which leads to a portfolio shift to the Home asset and raises its relative price. An increase in $\varepsilon^{z,D}$ implies a portfolio shift to the Home asset as well, again increasing its relative price. A rise in $\varepsilon^{\beta,D}$ implies a relative increase in Home saving. As a result of portfolio Home bias ($\bar{z} > 0.5$), this raises relative demand for the Home asset and therefore its relative price. Finally, an increase in $\varepsilon^{I,D}$ raises relative Home investment. This raises the relative supply of the Home asset, lowering its relative price.

3.6. Gross and Net Capital Flows

Since capital outflows of one country are the capital inflows of the other country, symmetry of the model implies that capital inflows and outflows have the same volatility. Then the parameter c in (1) is then equal to 1 and the correlation between capital inflows and outflows is entirely determined by the volatility of gross flows relative to the volatility of net flows. In the analysis that follows we will therefore focus on the determinants of gross and net flows and specifically the role of trade and financial integration.

Using the solution for q^A, we have a closed form solution for gross flows $GF = OF + IF$ as a fraction of external assets:

$$\frac{GF}{External\ Assets} = \frac{2}{2+\xi}\left(\varepsilon^{\beta,A} + \varepsilon^{I,A}\right) - 2\varepsilon^{z,A} \tag{39}$$

Three shocks drive gross flows. The first shock, $\varepsilon^{\beta,A}$, raises global saving, which raises gross capital flows through a portfolio growth effect. Without a change in portfolio allocation, higher saving leads to an increase in demand of both domestic and foreign assets. The second shock, the global investment shock $\varepsilon^{I,A}$, reduces the average asset price q^A, which lowers consumption and therefore also raises global saving. The last shock, $\varepsilon^{z,A}$, is a global portfolio shift towards domestic assets (retrenchment), which reduces gross capital flows. An example of this is a global increase in risk or risk-aversion that leads to a retrenchment towards domestic assets. Using the now popular terminology introduced by Rey (2015), one

can think of these as shocks to the global financial cycle.

Using the solution for q^D, net capital flows $NF = OF - IF$ can be solved as

$$\frac{NF}{External\ Assets} = a_1 E(\varepsilon_2^D) + a_2 \varepsilon^{z,D} + a_3 \varepsilon^{\beta,D} + a_4 \varepsilon^{I,D} \tag{40}$$

where

$$\begin{aligned} a_1 &= -\frac{1}{\sigma^2 D} \frac{2(2\bar{z}-1) + \frac{4}{\xi}}{1-\bar{z}} \\ a_2 &= -\frac{1}{D}\left((2\bar{z}-1) + \frac{2}{\xi}\right) \\ a_3 &= \frac{1}{D}\left(2\bar{z} + \frac{2}{(1-\bar{z})\sigma^2} + \frac{1}{\xi}\right) \\ a_4 &= -\frac{1}{\xi D}\left(\bar{z} + 0.5 + \frac{2}{(1-\bar{z})\sigma^2}\right) \end{aligned}$$

It is immediate that $a_1 < 0$, $a_2 < 0$, $a_3 > 0$ and $a_4 < 0$.

The intuition is as follows. An increase in $E(\varepsilon_2^D)$ raises the expected relative return of the Home asset, leading to a portfolio shift to the Home asset. This implies net capital inflows for the Home country. Net outflows $NF = OF - IF$ will then drop. An increase in $\varepsilon^{z,D}$ also implies a portfolio shift to the Home country, lowering net outflows. A rise in $\varepsilon^{\beta,D}$ raises relative Home saving, which raises capital outflows of the Home country due to portfolio growth relative to capital outflows of the Foreign country. Home net outflows therefore rise. Finally, an increase in $\varepsilon^{I,D}$ raises relative Home investment. This lowers the relative price of the Home asset, which raises its relative expected return. This leads to a portfolio shift to the Home country, lowering net outflows NF.

4. Model Implications for Capital Flow Moments

We have seen that the correlation between capital inflows and outflows is higher the larger the volatility of gross flows and the lower the volatility of net flows. Using the results from the previous section, we will now investigate the impact of financial and trade integration

on the volatility of gross and net flows and therefore the correlation between capital inflows and outflows. The total value of external assets (in the absence of shocks) is $1 - \bar{z}$. So a lower value of $\bar{z}$ implies a higher level of financial globalization. Trade globalization is driven by τ, with a lower value of τ implying more trade globalization. In contrast to the data, in the model there are only net trade flows since there is only one good. We therefore cannot compute an analogue in the model to the empirical measure of trade integration, which is exports plus imports divided by GDP. The advantage of capturing trade integration with τ in the model is that the one-good framework allows for an analytically tractable solution. In the Online Appendix we present a version of this model with two traded goods, a home country good and a foreign country good, combined in a CES aggregator with a finite elasticity of substitution. We obtain analogous results for the impact of trade integration in a two-good model. The drawback of this two-good model is that a numerical approach is needed to evaluate the role of trade integration. We therefore leave this two-good version of the model to the Online Appendix.

The first result is immediate from (39):

Result 1 *When gross flows are scaled by external assets, neither financial nor trade globalization affect the volatility of gross flows.*

(39) shows that gross capital flows do not depend on either $\bar{z}$ or τ. The intuition is as follows. First, the trade friction by construction only affects net trade flows, which equals net capital flows. Even in the previous draft of this paper referred to above, where trade frictions affect both gross trade flows (exports plus imports) and net trade flows, they do not affect gross capital flows. Second, financial globalization expands global external positions, but not the percentage changes in these positions in response to shocks. Consider for example global portfolio growth, due to a rise in global saving. Capital outflows are equal to the fraction $1-\bar{z}$ invested abroad times the increase in saving. The impact of a shock to global saving on gross capital flows is therefore proportional to $1 - \bar{z}$ and therefore proportional to external

positions. Scaled by external positions, gross flows therefore do not depend on financial globalization. Without scaling, gross flows are proportional to financial globalization and therefore the standard deviation is proportional to financial globalization as well.

The second result follows from (40):

Result 2 *When net flows are scaled by external assets, financial globalization lowers the volatility of net capital flows, while trade globalization raises the volatility of net capital flows.*

It is easy to check that D depends positively on τ and negatively on $\bar{z}$. It is then immediate that all coefficients a_1, a_2, a_3 and a_4 are larger in absolute value when $\bar{z}$ is larger and smaller in absolute value when τ is larger. Financial globalization (lower $\bar{z}$) therefore reduces the volatility of net flows, while trade globalization (lower τ) does the opposite.

In order to provide some intuition behind Result 2, it is useful to realize that the relative asset market clearing condition is exactly the same condition as

$$Saving - Investment = Net\ Capital\ Outflows \tag{41}$$

As shown in the Online Appendix, we can write both saving minus investment and net capital outflows of the Home country as a linear function of the relative asset price q^D and shocks. Equating them leads to the solution (37) for q^D. The $Saving - Investment$ schedule is negatively sloped in q^D as a rise in q^D raises relative Home consumption (lowering relative saving) and also raises relative Home investment. The NF schedule is positively sloped in q^D. A rise in q^D lowers the relative expected return on Home assets, which leads to net capital outflows.

As an illustration, consider the two schedules when there are only portfolio shocks $\varepsilon^{z,D}$.

In the Online Appendix we show that

$$\frac{NF}{External\ Assets} = \left(\frac{1+\tau}{2+\tau}(2\bar{z}-1)+1+\frac{1}{\xi}\frac{\tau}{2+\tau}+\frac{2}{(1-\bar{z})\sigma^2}\right)q^D - \varepsilon^{z,D} \tag{42}$$

$$\frac{Saving-Investment}{External\ Assets} = -\frac{1}{(2+\tau)(1-\bar{z})}\left(\bar{z}-0.5+\frac{1}{\xi}\right)q^D \tag{43}$$

Now consider a drop in $\varepsilon^{z,D}$. For a given relative price q^D, net outflows scaled by external assets change by $-\varepsilon^{z,D}$. A drop in $\varepsilon^{z,D}$ implies a portfolio shift to Foreign assets, which results in net capital outflows. As illustrated in Figure 4, the upward shift in the NF schedule raises NF and lowers q^D. The shift to Foreign assets raises the relative price of Foreign assets and therefore lowers q^D. The drop in q^D in turn raises Saving-Investment, consistent with the net capital outflows. This occurs because a lower q^D lowers both relative Home consumption and investment.

The extent to which net capital flows change due to the shock depends on financial and trade globalization, which affect the slope of both schedules in Figure 4 through $\bar{z}$ and τ. First consider the role of τ. An increase in τ (less trade integration) makes the NF schedule steeper and the $Saving-Investment$ schedule less steep. Rather than show this graphically, which will not aid the intuition, consider specifically the $Saving-Investment$ schedule. This schedule is identical to net exports X. In the extreme case where $\tau \to \infty$, net trade flows go to zero. When τ drops, net trade flows become less costly and the magnitude of net trade flows in response to shocks increases. Specifically in the case of a drop in $\varepsilon^{z,D}$, which induces a drop in q^D, the decline in consumption and investment will be smaller the larger the τ. Trade costs lead to a smaller decline in consumption and investment because of the net trade flows they generate. A larger drop in q^D is then necessary for a given decline in $\varepsilon^{z,D}$ in order to equate net capital flows to saving minus investment. But a larger drop in q^D raises the relative expected return on Home assets. This leads to a reversal of capital flows to the Home country and therefore smaller net capital outflows and more so the larger τ.

Trade frictions therefore reduce the volatility of net capital flows, while trade globalization (lower τ) increases the volatility of net capital flows.

Next consider the role of financial integration. Result 2 says that financial globalization reduces the volatility of net capital flows scaled by external assets.[8] The $Saving-Investment$ schedule again provides the key insight. A lower $\bar{z}$ (higher financial globalization) implies that saving minus investment is less sensitive to q^D. Two factors play a role behind this. First, it is only to the extent that there is portfolio home bias ($\bar{z} > 0.5$) that a drop in q^D lowers relative wealth of the Home country and therefore relative consumption. A higher level of financial globalization implies that relative saving is less affected by the rise in q^D. Second, a higher value of external assets reduces the change in relative saving and investment when scaled by external assets. Net capital flows changes by $-\varepsilon^{z,D}$ for a given q^D. The smaller response of saving minus investment, scaled by external assets, to a change in q^D implies that a larger drop in q^D is needed to equate saving minus investment to net capital flows. But a larger drop in q^D implies a larger increase in the relative expected return of the Home asset, which implies a larger reversal of capital flows back towards the Home country and therefore smaller equilibrium net capital outflows.

The main result of the paper follows immediately from Results 1 and 2:

Corollary 1 *Financial globalization increases the correlation between capital inflows and outflows, while trade globalization lowers the correlation between capital inflows and outflows.*

The correlation between capital inflows and outflows depends on the volatility of gross capital flows relative to the volatility of net capital flows. Financial globalization does not affect the volatility of (scaled) gross capital flows, but lowers the volatility of (scaled) net capital flows. Trade globalization does not affect the volatility of gross capital flows, but raises the volatility of net capital flows.

[8] Graphically this is hard to see as a drop in $\bar{z}$ makes both schedules less steep and it is not clear from the graph if this increases or reduces the the size of net capital flows.

We have analyzed the capital flow moments after scaling capital flows by external assets, which are equal to $1 - \bar{z}$ in the absence of shocks. If we instead scale by GDP, we would simply need to multiply the expressions for gross and net capital flows by $1 - \bar{z}$. This does not change the relative volatility of gross and net capital flows and therefore does not affect the correlation between capital inflows and outflows. But it does affect the impact of financial globalization on the volatility of gross and net flows individually. Multiplying the expressions (39) and (40) by $1 - \bar{z}$, it is immediate that financial globalization increases the volatility of gross flows, but the effect on the volatility of net flows depends on the shocks and parameters. Net flows may either become less volatile or more volatile with financial globalization.[9] This is consistent with the Stylized Fact 2, which says that gross flows scaled by GDP will become more volatile due to financial globalization, but the effect of financial globalization on the volatility of net flows scaled by GDP is ambiguous. Scaling capital flows by external assets has facilitated the analysis as the effect of financial globalization on the volatility of gross and net flows scaled by external assets is always unambiguous.

We should finally point out that the results are also robust to an alternative way of modeling financial globalization. Instead of introducing a cost of investing abroad, in the a version of the model in the Online Appendix we introduce native and global investors. Native investors only invest in domestic assets, while global investors hold globally diversified portfolios. The fraction of wealth held by global investors is then a measure of financial globalization. It similarly implies that financial globalization raises the correlation between capital inflows and outflows.

Overall, the theory is strongly consistent with the Stylized Facts 1-3 documented in the empirics. Financial globalization accounts for the increase in the correlation between capital inflows and outflows, while the more limited trade globalization seen in the data has actually

[9] As an illustration, consider portfolio shocks. The new coefficient on portfolio shocks becomes $(1-\bar{z})a_2 < 0$. It is easy to verify that this coefficient becomes larger in absolute size when $\bar{z}$ falls and $\bar{z}$ is sufficiently close to 1. But it becomes smaller in absolute size when $\bar{z}$ falls, $\bar{z}$ is sufficiently close to 0.5 and ξ is sufficiently large.

operated in the opposite direction.

5. Conclusion

We have aimed to explain the rapidly increasing correlation between capital inflows and outflows seen in the data and the much higher correlation in more advanced countries. Both empirical evidence and theory point to a clear culprit, the increased level of financial globalization measured by external assets and liabilities as a fraction of GDP. Trade globalization has the exact opposite effect, but has been significantly dominated by financial globalization in the last several decades.

A natural direction for future work is to extend the theoretical framework developed here to a multi-country setup with countries varying in terms of their extent of financial and trade integration, their size, and the magnitude of country-specific shocks. This will allow us to consider additional stylized facts, such as the co-movement of capital flows across countries (sensitivity to global financial cycle) and the correlation between bilateral inflows and outflows.

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Table 1: Countries in the study

Advanced	Emerging Market and Developing			
Australia	Albania	Djibouti	Lebanon	Serbia
Austria	**Algeria**	**Dominican Republic**	Lesotho	Seychelles
Belgium	Angola	**Ecuador**	**Libya**	Slovakia
Canada	Antigua and Barbuda	**Egypt**	Lithuania	Slovenia
Denmark	**Argentina**	El Salvador	Macao	Solomon Islands
Finland	Armenia	Equatorial Guinea	Macedonia	**South Africa**
France	Aruba	Estonia	**Malaysia**	**Sri Lanka**
Germany	**Bangladesh**	**Fiji**	Maldives	St. Kitts and Nevis
Greece	Belarus	**Gabon**	**Mauritania**	St. Lucia
Israel	Belize	Georgia	**Mexico**	St. Vincent & Grens.
Italy	**Bolivia**	**Ghana**	Moldova	**Sudan**
Japan	Bosnia	Grenada	Mongolia	Suriname
Korea	**Botswana**	**Guatemala**	Montenegro	**Swaziland**
New Zealand	**Brazil**	**Honduras**	**Morocco**	**Syria**
Norway	Bulgaria	**Hungary**	Namibia	Tajikistan
Portugal	Cabo Verde	India	**Nicaragua**	**Thailand**
Spain	Cambodia	**Indonesia**	**Nigeria**	Timor-Leste
Sweden	**Cameroon**	Iraq	**Oman**	**Trinidad and Tobago**
Switzerland	**Chile**	**Jamaica**	**Pakistan**	**Tunisia**
United Kingdom	**China**	**Jordan**	**Papua New Guinea**	**Turkey**
United States	**Colombia**	Kazakhstan	**Paraguay**	Ukraine
	Congo	**Kenya**	**Peru**	**Uruguay**
	Costa Rica	Kosovo	**Philippines**	**Venezuela**
	Cote d'Ivoire	Kyrgyzstan	**Poland**	Vietnam
	Croatia	**Laos**	Romania	West Bank
	Czech Republic	Latvia	Russia	Yemen
			Saudi Arabia	**Zambia**

Notes: Data from all countries in the list are included in the cross-sectional regressions, using only data from 1990-2015. Countries in bold are included in the descriptive statics and the panel data regressions, both of which require data from the 1975-1989 period and the 1990-2015 period.

Table 2: Capital Flow Time-Series Moments

	Advanced			Emerging Market		
Normalize by External Assets and Liabilities						
	1975-1989	1990-2015	1990-2007	1975-1989	1990-2015	1990-2007
$Corr\,(OF, IF)$	0.46	0.83	0.77	0.25	0.53	0.54
$Std\,(NF)$	0.04	0.02	0.02	0.08	0.05	0.05
$Std\,(GF)$	0.07	0.06	0.06	0.11	0.09	0.09
$\frac{Std(GF)}{Std(NF)}$	2.56	5.73	4.64	1.48	1.98	2.14
Normalize by GDP						
	1975-1989	1990-2015	1990-2007	1975-1989	1990-2015	1990-2007
$Corr\,(OF, IF)$	0.52	0.87	0.88	0.23	0.52	0.55
$Std\,(NF)$	0.03	0.04	0.03	0.05	0.06	0.06
$Std\,(GF)$	0.07	0.19	0.17	0.08	0.12	0.12
$\frac{Std(GF)}{Std(NF)}$	3.05	5.74	6.51	1.56	2.08	2.29
(Ext. Assets+Liab.)/GDP	1.03	3.39	2.67	0.84	1.33	1.29
(Exports+Imports)/GDP	0.55	0.64	0.60	0.55	0.70	0.67
Cap. Acct. Restrictions	0.42	0.09	0.12	0.74	0.57	0.58

Note: The time-series correlations and standard deviations are calculated for each country in the sample. The table reports the simple average of the four reported capital flows moments across the advanced or emerging market group of countries.

Table 3: Impact of Financial and Trade Globalization on Capital Flow Moments

Cross Section

OLS:	Capital Flows Normalized by External A&L				Capital Flows Normalized by GDP			
	$Corr(OF, IF)$	$Std(NF)$	$Std(GF)$	$\frac{Std(GF)}{Std(NF)}$	$Corr(OF, IF)$	$Std(NF)$	$Std(GF)$	$\frac{Std(GF)}{Std(NF)}$
$\ln \frac{External\ A\&L}{GDP}$	0.215***	-0.029***	-0.027***	3.854***	0.217***	0.010	0.127***	3.698***
	(0.052)	(0.006)	(0.008)	(0.631)	(0.055)	(0.012)	(0.016)	(0.559)
$\ln \frac{Exports+Imports}{GDP}$	-0.168***	0.034***	0.045***	-1.219*	-0.153**	0.051***	0.046**	-1.218*
	(0.061)	(0.007)	(0.009)	(0.738)	(0.065)	(0.014)	(0.018)	(0.654)
$\bar{R}^2$	0.118	0.234	0.181	0.220	0.104	0.109	0.428	0.249
2SLS (using capital account openness index and gravity-based trade proxy as instruments):								
	$Corr(OF, IF)$	$Std(NF)$	$Std(GF)$	$\frac{Std(GF)}{Std(NF)}$	$Corr(OF, IF)$	$Std(NF)$	$Std(GF)$	$\frac{Std(GF)}{Std(NF)}$
$\ln \frac{External\ A\&L}{GDP}$	0.369***	-0.044***	-0.025**	5.733***	0.423***	-0.038*	0.106***	5.150***
	(0.092)	(0.009)	(0.013)	(1.106)	(0.099)	(0.021)	(0.027)	(0.970)
$\ln \frac{Exports+Imports}{GDP}$	-0.275***	0.042***	0.040***	-3.017**	-0.270**	0.084***	0.050	-2.803**
	(0.104)	(0.010)	(0.014)	(1.246)	(0.111)	(0.024)	(0.031)	(1.094)

Panel (with cross-section fixed effects)

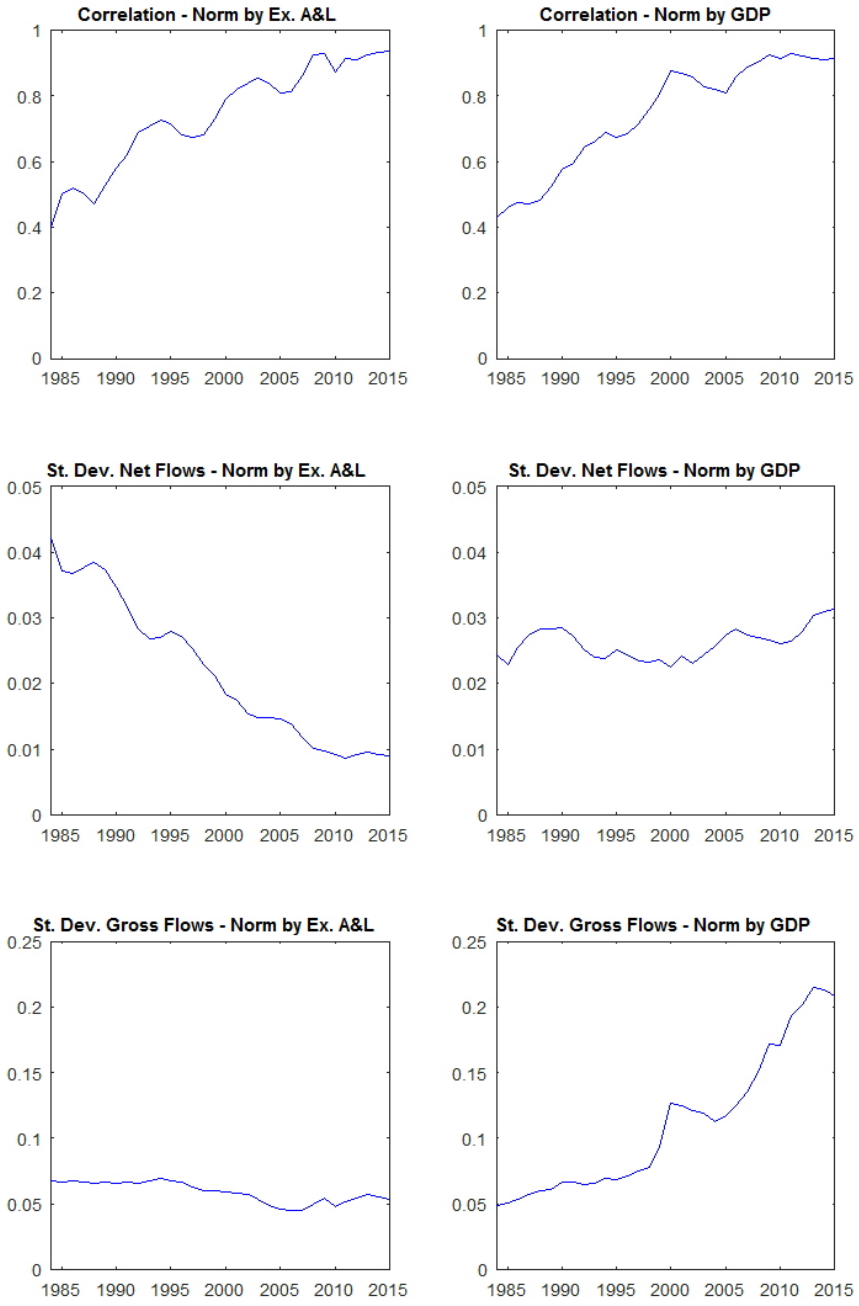
OLS:	Capital Flows Normalized by External A&L				Capital Flows Normalized by GDP			
	$Corr(OF, IF)$	$Std(NF)$	$Std(GF)$	$\frac{Std(GF)}{Std(NF)}$	$Corr(OF, IF)$	$Std(NF)$	$Std(GF)$	$\frac{Std(GF)}{Std(NF)}$
$\ln \frac{External\ A\&L}{GDP}$	0.394***	-0.029***	-0.006	2.253***	0.363***	0.016**	0.119***	2.101***
	(0.106)	(0.009)	(0.011)	(0.391)	(0.115)	(0.006)	(0.017)	(0.360)
$\ln \frac{Exports+Imports}{GDP}$	-0.048	-0.005	-0.018	-1.791**	0.053	0.003	-0.072**	-1.606**
	(0.210)	(0.018)	(0.022)	(0.776)	(0.228)	(0.013)	(0.034)	(0.714)
$\bar{R}^2$	0.243	0.438	0.226	0.646	0.212	0.741	0.609	0.671
2SLS (using capital account openness index as an instrument):								
	$Corr(OF, IF)$	$Std(NF)$	$Std(GF)$	$\frac{Std(GF)}{Std(NF)}$	$Corr(OF, IF)$	$Std(NF)$	$Std(GF)$	$\frac{Std(GF)}{Std(NF)}$
$\ln \frac{External\ A\&L}{GDP}$	0.009	0.006	-0.005	4.824***	-0.081	0.024*	0.172***	4.163***
	(0.256)	(0.022)	(0.024)	(1.108)	(0.281)	(0.014)	(0.040)	(0.941)
$\ln \frac{Exports+Imports}{GDP}$	0.482	-0.053	-0.018	-5.301***	0.663	-0.009	-0.147**	-4.367***
	(0.386)	(0.034)	(0.036)	(1.673)	(0.425)	(0.021)	(0.060)	(1.421)

Note: The table reports coefficients from multivariate regressions of capital flow moments on the log of financial and trade globalization variables. The results in the top panel are from a cross-sectional regression with the moments for each country calculated over the 1990-2015 period and the independent variables averaged over the same period. The results in the bottom panel are from a panel data regression with the moments for each country calculated in the 1975-1989 and 1990-2015 periods and the independent variables averaged over the pre-1990 and post-1990 periods. Standard errors are in parenthesis. ***/**/* denotes significance at the 1/5/10% level.

Table 4: Model Shocks

Saving Shocks	ε_H^β, ε_F^β
Investment Shocks	ε_H^I, ε_F^I
Expected Dividend Shocks	$E(\varepsilon_{H2})$, $E(\varepsilon_{F2})$
Portfolio Shocks	ε_H^z, ε_F^z

Figure 1: Capital flow moments (10-year rolling windows)



Note: The charts present the simple average of country-specific moments.

Figure 2: Financial and Trade Globalization, 1975-1989 versus 1990-2015.

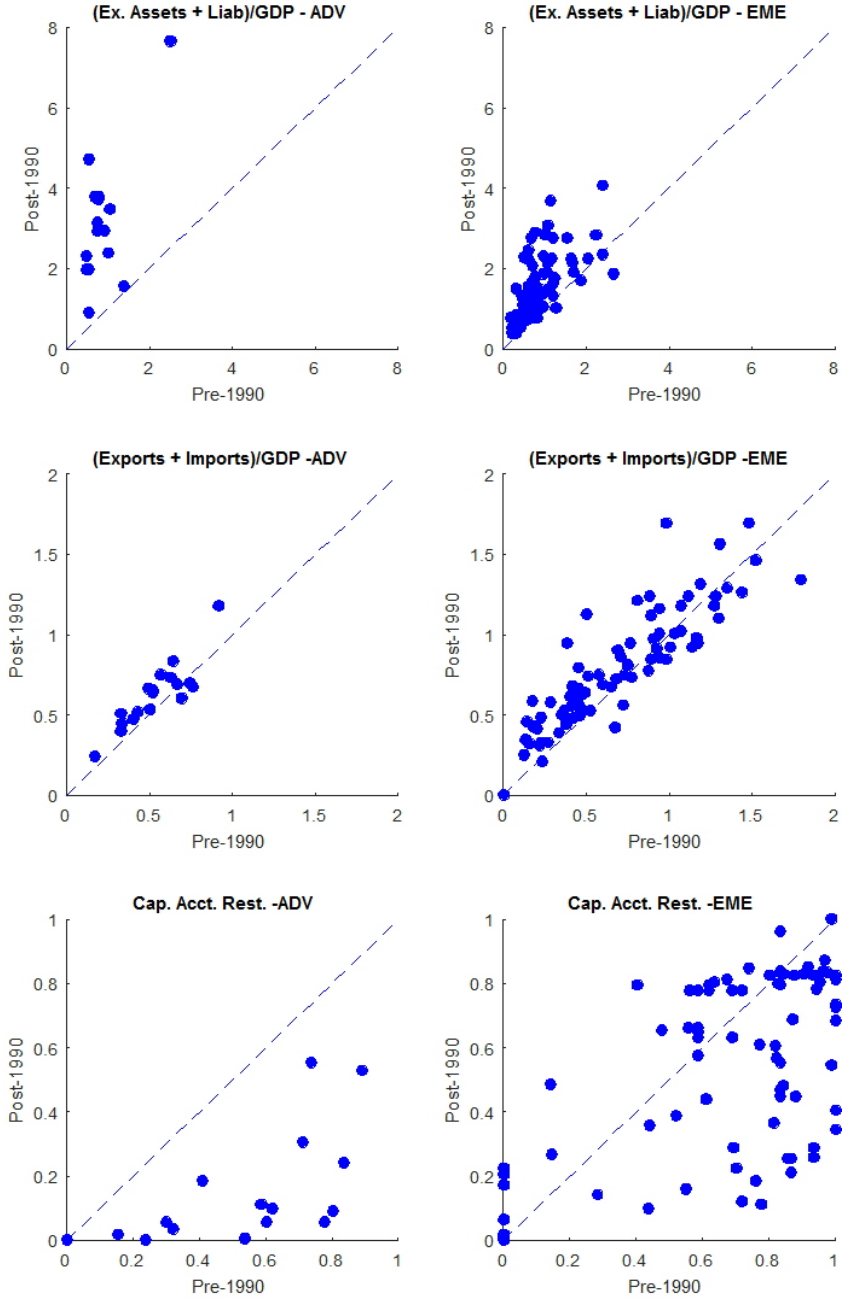
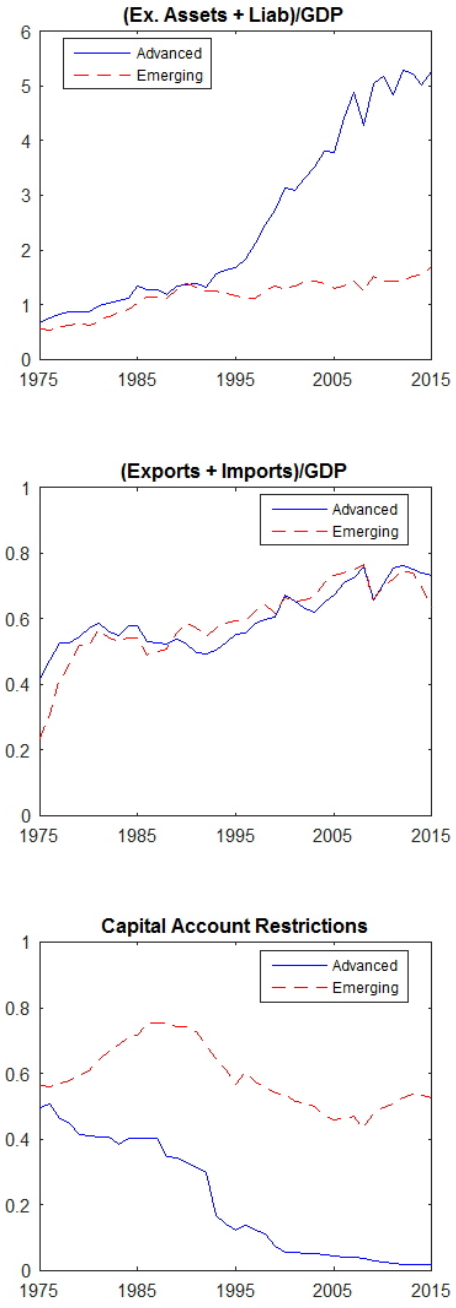


Figure 3: Financial and Trade Globalization, 1975-2015



Note: The charts present the simple average of country-specific moments.

Figure 4: Equilibrium after a portfolio shift towards Foreign assets