What Drives International Portfolio Flows?[*][†]

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Abstract

Understanding what drives international portfolio flows has important policy implications for countries wishing to exert some control on the size, direction and volatility of the flows. This paper empirically assesses the relative contribution of common (push) and country-specific (pull) factors to the variation of bond and equity flows from the US to 55 other countries. Using a Bayesian dynamic latent factor model, we find that more than 80% of the variation in bond and equity flows is due to push factors from the US to other countries. Hence global economic forces seem to prevail over domestic economic forces in explaining movements in international portfolio flows. The dynamics of push and pull factors can be partially explained by US and foreign economic fundamentals.

Keywords: International Portfolio Flows; Dynamic Factor Model; Push and Pull Factors.

JEL Classification: F21; G15.

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1 Introduction

What drives international portfolio flows? This is an important question that lies at the center of a long-standing debate in international economic policy and research. The overall level of international capital flows (that includes foreign direct investment and portfolio flows) has risen dramatically over the years, from an average of less than 5 percent of global GDP during 1980-1999 to a peak of about 20 percent by 2007 (International Monetary Fund, 2012). In the context of an increasingly globalized world with a high degree of international capital mobility, portfolio flows can have a significant effect on domestic asset prices and economic growth prospects. For example, a surge in portfolio inflows can lead to a real estate boom and inflation, whereas a sudden stop can lead to slow growth, higher interest rates and a sharp currency depreciation. It is therefore critical for recipient countries to be able to manage to some extent the size, direction and volatility of international flows. Understanding the dynamic determinants of international portfolio flows can help countries design an effective policy mix that may consist of structural reforms, targeted macroeconomic policies or capital controls.[1]

The literature typically distinguishes between two types of determinants for international capital flows: push factors and pull factors (see, e.g., Calvo, Leiderman and Reinhart, 1996; Fernandez-Arias, 1996; Taylor and Sarno, 1997; Agénor, 1998; Chuhan, Claessens and Mamingi, 1998; Forbes and Warnock, 2012; Fratzscher, 2012; Fuertes, Phylaktis and Yan, this issue).[2] Push factors reflect the global economic forces that push capital flows from the US to other

[1] For instance, countries may implement a combination of the following: structural reforms that increase the capacity of their domestic capital markets or improve the transparency of the regulatory framework; macroeconomic policies such as accumulating reserves or allowing their currency to appreciate; and different types of capital controls such as discriminating financial activity on the basis of residency, differentiating transactions on the basis of currency or imposing minimum holding periods and taxes in certain investments (International Monetary Fund, 2011).

[2] A related literature explores the role of contagion in the context of push and pull factors (e.g., Chinn and Forbes, 2004). For studies of cross-border equity flows, see Griffin, Nardari and Stulz (2004), Portes and Rey (2005), Goldstein, Razin and Tong (2008), Hau and Rey (2009), and Tong and Wei (2011).

countries, and may be related to low US interest rates, low US potential growth, low global risk aversion and international portfolio diversification. Pull factors reflect the domestic economic forces that pull capital into a country and hence capture the relative attractiveness of different destinations for investment opportunities. These factors include high domestic interest rates, low domestic inflation, high growth potential and trade openness. In other words, push factors are external to the economies receiving the flows, whereas pull factors are internal to these economies.[3]

Building on a large literature in international economics, this paper empirically assesses the relative contribution of push and pull factors to the variation of international portfolio flows. In particular, we focus on monthly bond and equity flows from the US to 55 other countries for the period of January 1988 to November 2013. The main contribution of our empirical analysis is the use of a dynamic latent factor model, which is designed to separate the common from the country-specific components of movements in international portfolio flows. This is a sophisticated and flexible model that is used for the first time in the study of international portfolio flows. More importantly, the dynamic factor model allows us to provide a comprehensive answer to the initial question of what drives international bond and equity flows. The model specifies three types of latent persistent factors, which are independent of one another: (i) a global factor that is common to all countries and all flows; (ii) two asset-specific (or flow-specific) factors, one that is common to all bond flows and one that is common to all equity flows; and (iii) a set of 55 country-specific factors. The contribution of the push factor to the variation of bond flows is captured by the global and bond factors, whereas the push factor for equity flows is captured by the global and equity factors. The pull factor is

[3] Consistent with the broad literature on capital flows, we use the terms "global" and "US" interchangeably. This is a sensible convention since our data are portfolio flows from the US to 55 other countries. Having said that, we certainly recognize that the US does not fully capture global economic forces.

simply the same as the model's country-specific factor.

The model is highly flexible as it can deal with a large cross-section of countries over a long sample period for two types of portfolio flows.[4] More importantly, it specifies latent factors that capture the different types of common and country-specific variation without having to rely on a limited number of relevant observed economic variables that may not capture the full effect of push and pull factors. The flexibility of the model comes at the cost of being high dimensional: for two types of flows and 55 countries, it requires estimation of 397 parameters. We estimate the parameters of the dynamic factor model using the Bayesian MCMC algorithm of Kose, Otrok and Whiteman (2003, 2008), which builds on the procedures developed by Otrok and Whiteman (1998). Bayesian estimation offers the advantage of dealing effectively with the high dimension of the model and making estimation feasible and efficient.

Our main finding is that for both bond and equity flows the push factor tends to contribute more than 80% to the flows' variance, whereas the pull factor contributes less than 20%. Specifically, the cross-country average of the push factor variance contribution is 83% for bond flows and 86% for equity flows. For bond flows, the push factor contribution is higher than 90% for one-third of the countries, whereas for equity flows this is the case for half of the countries. Over the past 25 years, therefore, global economic forces seem to prevail over domestic economic forces in explaining movements in international portfolio flows. It is worth noting that there is little regional variation in the relative contribution of push and pull factors among countries that belong to different continents or different groups such as the G8, the G20 and the BRICS.[5]

We also find that the push factor is significantly related to US economic variables such as

[4] Prior literature has typically dealt with few countries over shorter sample periods using less general factor specifications. See, for example, Sarno and Taylor (1999).

[5] The BRICS are five large emerging economies: Brazil, Russia, India, China and South Africa.

the US output gap, interest rates, stock market performance, and measures of market volatility and liquidity. Similarly, the pull factor can be explained by domestic economic variables such as the output gap, interest rates and the Chinn and Ito (2006) measure of capital account openness. In particular, we find that the less open a country's capital account (hence the higher the extent and intensity of capital controls), the lower the contribution of the pull factor to the variance of flows. Overall, note that the observed economic fundamentals account for about one quarter of the variation of the latent push and pull factors. This provides further justification for adopting a latent factor approach as three quarters of the variation of flows cannot be explained by observed economic variables.

The empirical analysis provides results for 55 countries and several groupings of countries based on geography or economic development. This makes it rather impractical to provide an in-depth discussion of the implications of our findings for each particular country. For this reason, we discuss in greater depth our results for three prominent emerging economies: China, India and Brazil. These countries belong to the G20 and the BRICS and, due to their fast-growing economies in recent years, have emerged as global economic powerhouses. It is interesting to note that for these three countries the contribution of global economic forces (the push factor) to the variance of international portfolio flows is higher than the world average, especially for India and Brazil.

This paper is especially related to two recent studies. First, Fratzscher (2012) provides a similar analysis by identifying the relative importance of push and pull factors in weekly portfolio flows based on a large cross-section of bond and equity funds from 50 countries. The analysis of Fratzscher (2012), however, substantially deviates from our paper in a number of ways: (i) it uses data on individual mutual funds and hedge funds rather than country-level portfolio flows; (ii) it focuses on the recent global financial crisis using a much shorter

5-year sample from 2005 to 2010; and (iii) it relies on few observed macroeconomic variables to capture the push and pull factors with particular emphasis on global risk and liquidity variables.

Second, Forbes and Warnock (2012) use 30 years of quarterly data on gross inflows and outflows to analyze waves in international capital flows. They identify episodes of "surge," "stop," "flight" and "retrenchment" as measures of sharp increases (or decreases) in gross capital inflows (or outflows). Consistent with our results, Forbes and Warnock (2012) find that global factors, and especially global risk, are the key determinants of waves in international capital flows, while domestic factors are generally insignificant.

More generally, our analysis is highly related to a recent global policy debate culminating in November 2012, when the International Monetary Fund (IMF) published its new institutional view on how to manage and control international capital flows. This view states that "[t]he IMF has developed a comprehensive, flexible, and balanced view on the management of global capital flows to help give countries clear and consistent policy advice."[6] Indeed, the new view of the IMF constitutes a historical shift, as after years of calling for the abolition of capital controls, the IMF agreed that capital controls may be a useful tool for managing flows and may be used on a case-by-case basis in appropriate circumstances.[7]

The institutional view of the IMF is consistent with two implications of our main empirical finding. First, if (as we find) global economic forces are the primary drivers of international portfolio flows, then an effective policy mix for managing these flows will likely need to include capital controls. And second, targeted domestic macroeconomic policies have a rather limited

[6] See IMF *Survey Magazine: Policy* (2012).

[7] Key features of the IMF institutional view include: (i) a recognition that capital flows can have both substantial benefits and risks for countries; (ii) capital flow liberalization is generally more beneficial for countries that have surpassed a certain threshold of financial and institutional development; (iii) liberalization needs to be well planned, timed and sequenced, especially for countries with long-standing measures to limit capital flows; and (iv) rapid capital inflow surges require appropriate policy responses both for recipient countries of capital flows and for countries from which flows originate.

role in determining international portfolio flows. Therefore, although we do not provide direct evidence on the effectiveness of capital controls, our empirical results show the predominance of the push over the pull factor, and hence support the new institutional view of the IMF that capital controls may indeed be a useful tool for managing flows.

The remainder of the paper is organized as follows. In the next section we describe the dynamic latent factor model and how it is used to capture the push and pull factors. Section 3 briefly reviews the Bayesian estimation methodology. The data and the empirical results are discussed in Section 4. Section 5 highlights the relation between the variation in the bond factor and the return to the foreign exchange carry trade, while Section 6 analyzes in more detail three country cases: China, India and Brazil. In Section 7, we relate the push and pull factors to economic variables in the US and other countries. Finally, Section 8 summarizes the key results and concludes.

2 Modeling International Portfolio Flows

2.1 The Dynamic Latent Factor Model

Prior literature on the dynamics of international portfolio flows has typically focussed on univariate latent factor models for capturing the dynamics of each flow separately (e.g., Sarno and Taylor, 1999). By design, these models do not account for the common variation of flows across countries and across assets (i.e., bonds and equities). Our empirical analysis addresses this issue by specifying a multivariate model based on dynamic latent factors. The model is designed to separate the common from the country-specific components of movements in international portfolio flows.

We implement a dynamic factor model by specifying three types of latent factors, which are independent of one another: (i) a global factor that is common to all countries and all flows; (ii) two asset-specific (or flow-specific) factors, one that is common to the bond flows of all countries and one that is common to the equity flows of all countries; and (iii) a set of country-specific factors. In this model specification, the common component of bond flows is captured by the global and bond factors, whereas the common component of equity flows is captured by the global and equity factors. The country-specific factors are the idiosyncratic (or domestic) component of bond and equity flows. All factors are specified as latent persistent processes that follow a normal distribution.[8]

Define $y_{j,n,t}$ as the international portfolio flow of type $j = 1, ..., J$, for country $n = 1..., N$ at time $t = 1, ..., T$. Our data set is for $J = 2$, where $j = 1$ denotes bond flows and $j = 2$ denotes equity flows, and all flows are from the US to $N = 55$ other countries. A positive flow is a flow from the US to another country (i.e., a US outflow), whereas a negative flow is a US inflow. The flows are in millions of US dollars. The model is specified as follows:

$$y_{j,n,t} = \beta_{0;j,n} + \beta_{1;j,n} g_t + \beta_{2;j} a_{j,t} + c_{n,t} + \varepsilon_{j,n,t}, \qquad \varepsilon_{j,n,t} \sim NID\left(0, \sigma_{\varepsilon}^2\right), \tag{1}$$

where $\beta_{0;j,n}$ is a constant, $\beta_{1;j,n}$ is the global factor loading, g_t is the global factor, $\beta_{2;j}$ is the flow-specific factor loading, $a_{j,t}$ is the flow-specific factor (i.e., $a_{1,t}$ is the bond factor and $a_{2,t}$ the equity factor), $c_{n,t}$ is the country-specific factor, and the error term $\varepsilon_{j,n,t}$ is Gaussian white noise with constant variance σ_{ε}^2. Note that $c_{n,t}$ is the country-specific regular (i.e., persistent and hence predictable) component and $\varepsilon_{j,n,t}$ is the country-specific and flow-specific irregular (i.e., random and unpredictable) component. In this model, there is one global factor, $J = 2$

[8] Note that the model does not include a regional factor because this substantially increases the dimension of the model thus making estimation more difficult, while it does not qualitatively affect our results. For a regional analysis in the context of portfolio flows, see Puy (2014). However, our empirical results below show little evidence of regional variation in the relative importance of push and pull factors.

flow-specific factors and $N = 55$ country specific factors.

The factors are persistent and follow an AR(2) process:

$$g_t = \rho_{1,g} g_{t-1} + \rho_{2,g} g_{t-2} + u_{g,t}, \tag{2}$$

$$a_{j,t} = \rho_{1,a_j} a_{j,t-1} + \rho_{2,a_j} a_{j,t-2} + u_{a_j,t}, \qquad j = 1, 2 \tag{3}$$

$$c_{n,t} = \rho_{1,c_n} c_{n,t-1} + \rho_{2,c_n} c_{n,t-2} + u_{c_n,t}, \qquad n = 1, .., N \tag{4}$$

where $u_{g,t} \sim NID(0, \sigma_g^2)$, $u_{a_j,t} \sim NID(0, \sigma_{a_j}^2)$, and $u_{c_n,t} \sim NID(0, \sigma_{c_n}^2)$. The factor error terms are independent to each other.[9]

For this model specification, it is straightforward to show that the factor variances are given as follows:

$$Var\left(g_t\right) = \frac{\sigma_g^2}{1 - \rho_{1,g}^2 - \rho_{2,g}^2}, \tag{5}$$

$$Var\left(a_{j,t}\right) = \frac{\sigma_{a_j}^2}{1 - \rho_{1,a_j}^2 - \rho_{2,a_j}^2}, \qquad j = 1, 2 \tag{6}$$

$$Var\left(c_{n,t}\right) = \frac{\sigma_{c_n}^2}{1 - \rho_{1,c_n}^2 - \rho_{2,c_n}^2}, \qquad n = 1, .., N. \tag{7}$$

The structure described so far does not uniquely identify a factor model as there is an indeterminacy on the factor rotation. This implies that the sign and the scale of each dynamic factor is not separately identified from that of its factor loading. Following Kose, Otrok and Whiteman (2003, 2008), we solve the sign problem by requiring the first element of each vector of factor loadings to be positive, and the scale problem by setting the variance of the innovations to each factor $\left\{\sigma_g^2, \sigma_{a_j}^2, \sigma_{c_n}^2\right\}$ to be constant.

[9] In estimating different versions of the model, we find that AR(2) factors work well. Adding more lags did not change our results qualitatively but made the model less parsimonious and hence more difficult to estimate.

The dynamic factor model is high-dimensional. It requires estimation of the parameters $\Theta = \{B, \rho, \sigma^2\}$:

- $B = (\beta_0, \beta_1, \beta_2)$, where $\beta_0 \in \Re^{J \times N}$, $\beta_1 \in \Re^{J \times N}$, and $\beta_2 \in \Re^{J}$;
- $\rho = \{\rho_g, \rho_{a_j}, \rho_{c_n}\}$, where $\rho_g \in \Re^2$, $\rho_{a_j} \in \Re^{J \times 2}$, and $\rho_{c_n} \in \Re^{N \times 2}$; and
- $\sigma^2 = \{\sigma^2_\varepsilon, \sigma^2_g, \sigma^2_{a_j}, \sigma^2_{c_n}\}$, where $\sigma^2_\varepsilon \in \Re$, $\sigma^2_g \in \Re$, $\sigma^2_{a_j} \in \Re^J$, and $\sigma^2_{c_n} \in \Re^N$.

For $J = 2$ and $N = 55$, as in our sample, we must estimate 222 parameters for B, 116 for ρ and 59 for σ^2, for a total of 397 parameters.

2.2 Push and Pull Factors

The dynamic factor model allows us to investigate the extent to which the bond and equity flows from the US to another country are due to: (i) a push factor captured by the global and asset-specific factors, which together reflect the global economic forces that push capital from (into) the US into (from) another country; and (ii) a pull factor captured by the country-specific factor that reflects the domestic economic forces that pull capital into or out of a country other than the US. The extent to which push or pull factors determine international portfolio flows has important policy implications. For example, if countries wish to exert some control on the size, direction and volatility of their capital flows, it is helpful to know whether their policies need to be coordinated globally or whether instead they should focus on improving their domestic institutions and macroeconomic policies.

For each type of flow j and country n, the push factor is defined simply as:

$$Push_{j,n,t} = \beta_{1;j,n} g_t + \beta_{2;j} a_{j,t}, \qquad j = 1, 2; \quad n = 1, .., N. \tag{8}$$

For each country n, the pull factor is defined as:

$$Pull_{n,t} = c_{n,t}, \qquad n = 1, .., N. \tag{9}$$

Note that for a given country n there is one pull factor that is the same for both bond and equity flows.[10]

2.3 Variance Contributions

The model implies that the variance of each flow j for each country n is equal to:

$$Var(y_{j,n,t}) = \beta^2_{1;j,n} Var(g_t) + \beta^2_{2;j} Var(a_{j,t}) + Var(c_{n,t}) + Var(\varepsilon_{j,n,t}). \tag{10}$$

Recall that by design all factors are independent of one another, and hence no covariance terms enter the equation above.

We are interested in assessing the relative contribution of each factor to the total variation of $y_{j,n,t}$ that we can explain by the model. This will allow us to evaluate the extent to which each of the global, asset-specific and country-specific factors can explain the variance of international portfolio flows. We compute the variance contribution of each factor for each flow j and country n as follows:

$$VC_{j,n}(g_t) = \frac{\beta^2_{1;j,n} Var(g_t)}{\beta^2_{1;j,n} Var(g_t) + \beta^2_{2;j} Var(a_{j,t}) + Var(c_{n,t})}, \tag{11}$$

$$VC_{j,n}(a_{j,t}) = \frac{\beta^2_{2;j} Var(a_{j,t})}{\beta^2_{1;j,n} Var(g_t) + \beta^2_{2;j} Var(a_{j,t}) + Var(c_{n,t})}, \tag{12}$$

$$VC_{j,n}(c_{n,t}) = \frac{Var(c_{n,t})}{\beta^2_{1;j,n} Var(g_t) + \beta^2_{2;j} Var(a_{j,t}) + Var(c_{n,t})}. \tag{13}$$

[10] As the asset-specific factor accounts for the separate dynamics of bond and equity flows, there is no need to have separate country factors for bonds and equities. Hence the pull (country) factor captures the domestic forces that attract all flows for bonds and equities.

In this setup, the push factor contribution to the variance of flow j for country n is given by $VC_{j,n}(g_t) + VC_{j,n}(a_{j,t})$. The pull factor contribution to the variance of flow j for country n is given by $VC_{j,n}(c_{n,t})$.

3 Estimation

We estimate the dynamic factor model using the Bayesian MCMC algorithm of Kose, Otrok and Whiteman (2003, 2008), which builds on the procedures developed by Otrok and Whiteman (1998) and Chib and Greenberg (1994). The algorithm constructs a Markov chain with data augmentation, whose limiting distribution is the target posterior density of the parameters. Bayesian estimation offers two important advantages in estimating our model specification. First, the Markov chain is a Gibbs sampler in which large blocks of parameters are drawn sequentially from their full conditional posterior distribution. This aspect of the algorithm deals effectively with the high dimension of the model and makes Bayesian estimation feasible and efficient. Second, data augmentation provides a straightforward way for sampling the latent factors conditional on the data. The sampled factors are then used as an intermediate step for sampling the model parameters conditional on these latent factors. The Gibbs sampler is iterated 10,000 times and the sampled draws, beyond a burn-in period of 1,000 iterations, are treated as variates from the target posterior distribution. In unreported results, we find that 10,000 iterations ensure convergence to the posterior and deliver low numerical standard errors.

The dynamic latent factor model involves a set of parameters $\Theta = \{B, \rho, \sigma^2\}$ and a set of latent factors $f_t = \{g_t, a_{j,t}, c_{n,t}\}$, where the latter must be estimated as an intermediate step for estimating Θ. The MCMC algorithm sets initial values for the latent factors and their parameters, and implements three steps:

1. Sample the latent factors f_t from the full conditional posterior distribution $p(f_t \mid y_{t,}\Theta)$, which can be shown to be a normal distribution, thus implementing the data augmentation method of Tanner and Wong (1987).

2. Sample all parameters Θ from the full conditional posterior distribution $p(\Theta \mid y_{t,}, f_t)$ using the method of Chib and Greenberg (1994).

3. Repeat for 10,000 iterations, beyond a burn-in period of 1,000 iterations, and use the sampled draws to compute the posterior means of the parameters.

We implement the Bayesian MCMC estimation algorithm using the following priors set out by Kose, Otrok and Whiteman (2003, 2008). For all factor loadings B we use the prior $N(0,1)$. For the factor autoregressive parameters ρ we use the prior $N(0, diag\{1, 0.5\})$, thus placing zero prior mass on ρ values which are non-stationary. Finally, the prior for the factor variances σ^2 is $IG(6, 0.001)$. All priors are diffuse.[11]

4 Empirical Results

4.1 International Portfolio Flows Data

Our empirical analysis uses data on monthly international bond and equity flows from the US to 55 other countries. The data are taken from the Treasury International Capital (TIC) database of the US Treasury Department. The bond (equity) flows are defined as the difference between gross purchases of bonds (stocks) by foreigners from US residents and gross sales of bonds (stocks) by foreigners to US residents. Therefore, a positive flow is an inflow into a

[11] We have experimented with alternative priors and our results remain qualitatively the same.

country other than the US (i.e., a US outflow), whereas a negative flow is a US inflow.[12] All flows are in millions of US dollars. Our sample includes 55 countries and ranges from January 1988 to November 2013. Table A1 of the Internet Appendix lists the 55 countries and reports descriptive statistics.

We form regional groupings of countries based on geography and economic development. In terms of the geographic regions, *Europe* includes Austria, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Netherlands, Norway, Poland, Portugal, Romania, Serbia-Montenegro, Spain, Sweden, Switzerland and United Kingdom. *North America* is Canada and Mexico. *Latin America* includes Argentina, Brazil, Chile, Colombia, Ecuador, Guatemala, Jamaica, Panama, Peru, Trinidad-Tobago, Uruguay and Venezuela. *Asia and Oceania* include Australia, China, Hong Kong, India, Indonesia, Israel, Japan, Lebanon, Malaysia, Pakistan, Philippines, Russia, Singapore, South Korea, Taiwan, Thailand and Turkey. *Africa* includes Egypt, Liberia, Morocco and South Africa.

In terms of the economic regions, we report results for the G8 vs. the non-G8 countries, for the G20 vs. the non-G20 countries, and for the large emerging economies collectively known as the BRICS (Brazil, Russia, India, China and South Africa) vs. the non-BRICS countries. World is simply the average across all 55 countries in the sample. Figure 1 displays the 12-month moving average of bond and equity flows for these geographic and economic regions. The figure shows a clear increase in the volatility of portfolio flows over the sample period.

[12] To be more precise, a positive flow is a US outflow and a foreign country inflow because it corresponds to the case when foreigners purchase more assets from US residents than they sell to US residents. The data are described in more detail in Table CM-IV-4 of the June 2012 Treasury Bulletin.

4.2 Preliminary Analysis

Before estimating the dynamic factor model, it is important to establish that portfolio flows are stationary. Otherwise, the model will not be suitable for capturing the push and pull factors in portfolio flows. To this end, we perform a series of unit root tests applied to the panel of all flows. The results for a battery of tests are reported in Table A2 of the Internet Appendix showing that the null of non-stationarity is rejected in all cases. Hence there is overwhelming evidence that international portfolio flows are stationary.[13]

We also perform principal component analysis (PCA) to have an initial indication of the number of common components required to capture the variation of bond and equity flows. We find that three principal components explain 73% of the variance of flows: the first component 45%, the second one 16%, and the third one 12%. The three principal components are plotted in Figure B1 of the Internet Appendix. Note that PCA provides a static decomposition of the variance of portfolio flows, and hence it is not directly related to our specification of the dynamic factor model. It does, however, motivate our core empirical analysis as it suggests that few common factors can capture a large part of the movements in international portfolio flows.

The main feature of the dynamic factor model is that it decomposes the time variation of flows into a push factor (captured by global and flow-specific factors) and a pull factor (captured by the country factor). The factor dynamics are captured by their serial correlation at two lags (ρ_1 and ρ_2) as specified in Equations (2)-(4). Estimates of these serial correlations are reported in Table A3 of the Internet Appendix for the common factors as well as regional groupings of the country-specific factors. To provide a visual illustration of the factor

[13] Some earlier studies find a unit root in international capital flows (e.g., Sarno and Taylor, 1999). In contrast to these studies, we use panel (as opposed to individual) unit root tests for a much longer sample period, which adds significant power to the tests and allows us to clearly reject non-stationarity. This is reassuring since it is generally difficult to explain why capital flows would be non-stationary.

dynamics, Figure 2 plots the three common factors (global, bond and equity factors) over time.

4.3 The Variance Contribution of Push and Pull Factors

The main objective of our empirical analysis is to determine the contribution of push and pull factors to the variation of international bond and equity flows. The push factor is the sum of the variance contributions of the global and bond factors for bond flows or of the global and equity factors for equity flows. The pull factor is simply the variance contribution of the country factor. We estimate the dynamic factor model and use the parameter estimates to compute the variance contribution of each factor as in Equations (11)-(13). The results for all 55 countries are reported in Table 1 for bond flows and Table 2 for equity flows.

Our main finding is that the push factor tends to contribute more than 80% to the variance of portfolio flows, whereas the pull factor tends to contribute less than 20%. For bond flows, the push factor contribution is higher than 90% for one-third of the countries, whereas for equity flows this is the case for half of the countries. For example, the pull factor can be as low as 2.3% for bonds (India) and 1.1% for equities (Serbia-Montenegro and Spain).

In addition to the country results in Tables 1 and 2, we also report regional results in Table 3. Across regions, the push factor for bonds ranges from 79.1% for Africa to 86.1% for Asia and Oceania, and for equities from 78.2% for Africa to 96.9% for North America.[14] Overall, for the World, the push factor is 82.9% for bond flows and 86.0% for equity flows. Hence, irrespective of which region we examine, our main finding remains that about 80% or more of the variation in bond and equity flows is driven by common factors.

A similar picture emerges if we group countries by their level of development. Consider,

[14]The high value of the push factor for North America is not surprising. North America includes only Canada and Mexico, which are the two economies most highly integrated with the US economy.

for example, bond flows. For the G8 countries, the push factor contributes 80.8%, whereas for the non-G8 countries 83.2%. For the G20 countries, the push factor contribution is 85.4% vs. 81.8% non-G20 countries. For the BRICS, it is 90.1% vs. 82.2% for non-BRICS countries. The results are similar for equity flows.

Recall that the sample period used in our main analysis ranges from January 1988 to November 2013. In addition to this sample period, we also report results for two subsamples each using half of the full sample period. The results remain qualitatively the same across subsamples. In particular, the full sample ranges from January 1988 to November 2013, the first subsample ranges from January 1988 to December 2000 and the second subsample ranges from January 2001 to November 2013. Table 3 reports the World results for the full sample and the two subsamples and shows that, for bond flows, the push factor contributes 82.9%, 84.0% and 81.0% across the three samples. For equity flows, the push factor contributes 86.0%, 85.1% and 84.4% across samples. The full set of results is reported in Tables A4 and A5 of the Internet Appendix. Overall, this subsample analysis suggests that our results are qualitatively identical in the first and second part of the sample, and hence are stable over time.

In Table 4, we provide further results using a subsample that captures the full extent of the recent financial crisis beginning in July 2007 and going to the end of our full sample in November 2013. This sample range includes the credit crunch, the global meltdown following the collapse of Lehman Brothers and the sovereign debt crisis. The results indicate that, over the extended crisis period, the contribution of the push factor remains similar to that of the full sample and, therefore, still overshadows the contribution of the pull factor. For example, the World push factor for bond flows is 84.2% compared to 82.9% for the full sample, whereas for equity flows it is 86.7% compared to 86.0% for the full sample.

It is interesting to note, however, that during the crisis the global factor increases its variance contribution relative to the bond/equity factor such that their sum (i.e., the push factor) remains stable over time. This implies that the financial crisis has increased the influence of global forces relating to both bonds and equities and reduced the asset-specific part of common variation. In short, we conclude that the push factor dominates the pull factor even during the recent financial crisis, but the global component of the push factor increases its contribution relative to the asset-specific component during the crisis subsample.[15]

5 Bond Flows and the Carry Trade

The carry trade is a popular currency trading strategy that invests in high-interest currencies by borrowing in low-interest currencies. This strategy is at the core of active currency management and is designed to exploit deviations from uncovered interest parity (UIP). If UIP holds, the interest rate differential is on average offset by a commensurate depreciation of the investment currency and the expected carry trade return is zero. In practice, however, it is often the case that high-interest rate currencies appreciate rather than depreciate. As a result, over the past four decades, the carry trade has delivered sizeable excess returns per unit of risk (e.g., Burnside, Eichenbaum, Kleshchelski and Rebelo, 2011; Lustig, Roussanov and Verdelhan, 2011; Menkhoff, Sarno, Schmeling and Schrimpf, 2012). It is no surprise, therefore, that the carry trade has attracted enormous attention among academics and practitioners. Indeed, by early 2007 it was estimated that about one trillion US dollars was at stake just in the yen carry trade (Economist, 2007), where investors borrow in Japanese yen at very low rates to fund investments in high-interest currencies. In short, carry trades (interest rate

[15] Using a shorter subsample for the financial crisis, ranging from August 2007 to March 2009, Fratzscher (2012) finds that the push factor (captured by observable global factors) is higher during the crisis. Using our longer sample, which also includes the ongoing sovereign debt crisis, we find that the crisis has not changed qualitatively the relative importance of push and pull factors.

differentials) are likely to be important drivers of bond flows.

One way to implement the carry trade strategy for one or more currencies is to trade international bonds. An investor may buy a foreign bond and, at the same time, sell a domestic bond. The foreign bond yields a riskless return in the foreign currency but a risky return in the domestic currency of the investor. Hence the investor who buys the foreign bond is exposed to foreign exchange risk. Then, the return to the carry trade is equal to the interest rate differential plus the exchange rate return.

In this context, it is interesting to use our empirical results to assess the extent to which the bond factor is correlated with important aspects of the carry trade by focussing on the following three correlations. First, the correlation between the bond factor and the one-month US interest rate is equal to -11.0%. Note that the bond factor captures the common variation in bond outflows, which are flows from the US to foreign countries. Hence a negative correlation implies that the lower the US short rate the higher the outflows. This is consistent with the carry trade since this is a strategy designed to exploit interest rate differentials, which are typically measured relative to the US interest rate.

Second, the correlation between the bond factor and the dollar risk factor of Lustig, Roussanov and Verdelhan (2011) is equal to 5.7%. The dollar risk factor is the average excess return on all foreign currencies since it is equal to: the average foreign one-month interest rate minus the US one-month interest rate minus the depreciation rate of the foreign currency. This is effectively the average portfolio return of a US investor who buys all foreign currencies in the forward market. The positive correlation between the bond factor and the dollar factor suggests that, other things being equal, the higher the average foreign interest rate the higher the flows into foreign countries. This is also consistent with the purpose of the carry trade to exploit interest rate differentials.

Finally, third, the correlation between the bond factor and the HML factor of Lustig, Roussanov and Verdelhan (2011) is low at 1.9%. HML is the carry trade return defined as the excess return in dollars on a zero-cost strategy that goes long in the highest interest rate currencies and short in the lowest interest rate currencies. Such low correlation between the bond factor and the HML factor suggests that the common variation in bond outflows is not correlated with the spread (high-minus-low) of foreign interest rates. Instead, as we have seen above, the common variation in bond outflows is related to low US interest rates and high *average* foreign interest rates.

6 Country Cases

In this section we analyze a subset of our results in greater depth by focusing on three of the most prominent emerging economies: China, India and Brazil. These countries belong to the G20, are members of the BRICS and, due to their fast-growing economies in recent years, have emerged as global economic powerhouses. An interesting aspect of our empirical analysis is that in terms of portfolio flows the three countries exhibit a similar pattern. The pull factor for bond and equity flows is lower than the World average for all three countries, but especially for India and Brazil. For these countries, therefore, the dominance of global forces over domestic forces in determining international portfolio flows is more pronounced than the rest of the world. Our country analysis follows with further details.

6.1 China

China is the world's second largest economy by nominal GDP after the US. It is also the world's fastest-growing major economy with an average annual growth rate of about 10%

over the past 30 years. The management of international capital flows has been a key factor in supporting China's economic miracle (see, e.g., Yu, 2010). In the 1980s and 1990s, the majority of capital flows were due to foreign direct investment, but since the early 2000s equity and bond flows have grown significantly. For example, the surge in bond flows is related to China's accumulation of large foreign exchange reserves and the dramatic increase of foreign bond purchases by Chinese financial institutions. The surge in equity flows is due to recent structural reforms in the equity market and the wave of initial public offerings of Chinese enterprises abroad, especially in the Hong Kong stock exchange.

Despite the increased prominence of China's economy in the last three decades, in terms of the relative importance of push and pull factors for portfolio flows, China is close to the world average. Specifically, the empirical results reported in Tables 1 to 3 indicate that the pull factor for China accounts for 15.5% of the variation in bond flows and 13.0% for equity flows. These are slightly lower than the World average value of the pull factor, which is 17.1% for bond flows and 14.0% for equity flows. Hence our analysis shows that China has a slightly below average pull factor.

6.2 India

India is the tenth-largest economy in the world by nominal GDP and, over the last decade, it is one of the fastest-growing economies in the world. Portfolio flows were liberalized in the early 1990s, when in the face of a balance of payments crisis, India followed an IMF structural adjustment program (see, e.g., Shah and Patnaik, 2010). This resulted in a sustained increase of equity inflows primarily by foreign institutional investors increasing their holdings of Indian companies. There has also been a large increase of bond outflows by massive purchases of US Treasury bills and other foreign assets by the Indian central bank in building its foreign exchange reserves. At the same time, however, debt inflows have been hampered as India has no sovereign debt program.

In this context, our empirical results indicate that the pull factor for India accounts only for 2.3% of the variation in bond flows and 4.9% of the variation in equity flows. This is far below the world average value of the pull factor of 17.1% for bond flows and 14.0% for equity flows. Therefore, our analysis shows that India's portfolio flows are overwhelmingly dominated by global economic forces.

6.3 Brazil

Brazil is the world's sixth largest economy by nominal GDP, the largest in Latin America and one of the fastest-growing major economies in the world. In recent years, Brazil has dominated capital inflows to Latin America due its deep capital markets, very high interest rates (11.25% in 2010) and the accumulation of large foreign exchange reserves. Our empirical results indicate that the pull factor for Brazil only accounts for 6.0% of the variation in bond flows and 4.6% of the variation in equity flows. Hence, like India, Brazil is a country where portfolio flows are overwhelmingly determined by global economic forces.

7 Latent Factors and Economic Fundamentals

Having identified the variance contribution of push and pull factors, we turn to the economic determinants of these latent factors. The first question we address is about the push factor: which observed US economic indicators can explain the push factor for portfolio flows from the US to other countries? We answer this question by regressing the monthly common (global, bond and equity) factors on the following monthly economic fundamentals: (i) the

US industrial production gap estimated using the Hodrick and Prescott (1997) filter, which is based on seasonally adjusted US industrial production data taken from the Federal Reserve Economic Data (FRED); (ii) the US 10-year nominal bond yield also taken from FRED; (iii) the ratio of the US/World MSCI stock index returns taken from Datastream; (iv) the change in the VIX index (ΔVIX) taken from Datastream, which is based on the one-month model-free implied volatility of the S&P 500 equity index and is generally regarded as a measure of global risk appetite (e.g., Brunnermeier, Nagel and Pedersen, 2009); (v) the TED spread, which is a measure of liquidity defined as the difference between the 3-month LIBOR interbank market interest rate and the 3-month risk-free T-bill rate taken from FRED;[16] and (vi) a lagged value of the factors. Conditioning on this set of variables allows us to determine whether US economic forces relating to the real economy, interest rates, stock market performance relative to the world, global risk aversion and liquidity can explain the push of flows from the US to other countries.

Note that the sign of the relation between an economic variable and a common factor does not fully determine the effect of the economic variable on flows. This is because the factor loadings β in Eq. (1) can be positive or negative. For example, it could be that a variable is negatively related to a factor but positively related to particular flow because the factor loading is negative. Hence the focus of our analysis is primarily on the statistical significance of the economic variables and less on the sign of their slopes. In other words, we wish to establish which economic variables significantly contribute to the variance of a factor and hence to the variance of flows.

Table 5 reports the results for the global factor, the bond factor and the equity factor.[17] In

[16] The LIBOR rate reflects uncollateralized lending in the interbank market that is subject to default risk, whereas the T-bill rate is generally considered riskless because it is guaranteed by the US government. When banks face liquidity problems the TED spread typically increases, and the T-bill yield often falls due to "flight-to-liquidity" or "flight-to-quality" (e.g., Brunnermeier, Nagel and Pedersen, 2009).

[17] We do not report results for the global plus bond factor and the global plus equity factor because these

what follows we will summarize our main results and then we will interpret them. First, the effect of the global factor in determining flows from the US to other countries is significantly related to low US industrial production, high US interest rates and low liquidity in the US (i.e., high TED spread). Second, the bond factor is significantly related to high US industrial production, lower US stock market performance relative to the world and decreasing global risk aversion (i.e., low ΔVIX). Finally, the equity factor is significantly related to decreasing global risk aversion and high liquidity. It is worth noting that all economic variables are significantly related to at least one of the factors and in most cases two of the factors.

In aggregate, these results tend to be consistent with what we would expect ex ante based on standard economic theory. In particular, high bond outflows (captured by the global and bond factors) are related to an underperforming US stock market and decreasing global risk aversion. The effect of real economic activity is unclear since the global factor is negatively related to it but the bond factor is positively related to it. Hence the effect of real economic activity on the push factor for bond flows will depend on the factor loadings, which will determine the relative contribution of the global and bond factor for each country. High equity outflows (captured by the global and equity factors) are related to slow economic activity in the US and decreasing global risk aversion. For equity flows, it is the effect of liquidity that is unclear and will depend on each country's factor loadings since the global factor is significantly related to low liquidity but the equity factor to high liquidity. In short, the majority of our findings seem to make economic sense.

Overall, the $\overline{R}^2$ values indicate that the economic variables can explain 22.1% of the global factor, 25.3% of the bond factor and 27.1% of the equity factor. We conclude, therefore, that observed US economic variables can explain about one quarter of the variation of the latent

summations are not equal to the push factor for bonds and equities, respectively. Recall that the latter are weighted by the relevant factor loadings so that they are specific to each flow and country (see Eq. (8)).

common factors. This further justifies our use of a latent factor model since a considerable amount of the variation of the latent factors cannot be explained by observed variables.

The second question we address is about the pull factor: which domestic economic indicators can explain the pull factor for portfolio flows for each individual country? We answer this question by estimating a panel regression of all monthly pull factors on a set of domestic monthly economic variables for each individual country. The explanatory variables for each country include: (i) the industrial production gap estimated using the Hodrick and Prescott (1997) filter, which is based on seasonally adjusted industrial production data taken from FRED; (ii) the nominal 10-year bond yield taken from FRED; (iii) the monthly MSCI national stock index return taken from Datastream; (iv) the Chinn and Ito (2006) measure of capital account openness taken from Hiroyuki Ito's website, which captures the extent and intensity of capital controls; and (v) lagged values of the pull factors. Due to lack of data availability for some countries, the panel regressions include 25 of the 55 countries for a sample that begins in January 1996 and ends in December 2011. The early end date of December 2011 is because the Chinn and Ito (2006) measure ends on that date.[18]

The results in Table 6 indicate that the pull factor in attracting portfolio flows is higher, the higher the domestic real economic activity, the higher the domestic interest rate, and the higher the openness degree of the domestic economy. The only economic variable that is not significant is the domestic stock market performance. These results are consistent with standard economic theory. The $\overline{R}^2$ in this panel regression is 24.4% indicating that the observed economic variables capture a similar portion of the variation of the pull factors compared to the push factors. In conclusion, we find that about one quarter of the push and pull latent factors can be explained by standard economic fundamentals. This allows us

[18]Note that in Table 5 on the push factor regressions we also start the sample in January 1996 so that the results in Table 5 and Table 6 are comparable.

to provide an economic interpretation to the latent factors but, given three quarters of the variation of flows remains unexplained by observed variables, it also motivates the use of the latent factor methodology to capture the dynamics of international portfolio flows.

The panel regression results in Table 6 reveal that there is a significant positive relation between the Chinn-Ito index for capital account openness and the magnitude of the pull factor. This implies that the higher the extent and intensity of capital controls for a country, the lower the openness of the capital account and hence the lower the pull factor of that country (and vice versa). Motivated by this result, as a final exercise we rank countries according to the average score on the Chin-Ito index, from the lowest to the highest, for the same sample period and the same countries used in the panel regressions of Table 6. We then report the variance contribution of the pull factor for each country. To see how the average Chinn-Ito score is related to the pull factor as we move down the list of countries, we also report the cumulative average of the variance contribution. The results are in Table 7.

As expected, we find that the countries with the lowest average Chinn-Ito score have a lower than average pull factor. For example, consider the bottom five countries, which have a negative average score: India, Brazil, Thailand, South Korea and the Philippines. Across these five countries, the pull factor is on average 5.62% for bond flows and 9.58% for equity flows. This compares to a world average (across the 25 countries in this sample) of 16.57% for bonds and 16.66% for equities. Clearly, this is not a direct test of the relation between capital controls and portfolio flows, which would be beyond the scope of this paper. However, in the context of our specific empirical framework, this is evidence that capital controls may be effective by lowering a country's pull factor.

8 Conclusion

An important challenge to policymakers across the world is the design of effective policies that deal with movements in international portfolio flows. These policies are better informed if we can empirically disentangle the relative importance of push factors that are external to the economies receiving the flows and pull factors that are internal. This paper contributes to the debate on what drives international portfolio flows by estimating a dynamic latent factor model using more than 25 years of monthly international bond and equity flows from the US to 55 other countries. The advantage of this model is that it provides a flexible way for assessing the relative importance of the contribution of push and pull factors to the variation in international bond and equity flows.

We find that the push factor dominates the pull factor by explaining more than 80% of the variance of international portfolio flows. This holds for the vast majority of countries, all geographic regions and for both bond and equity flows. It also holds for large emerging economies such as China, India and Brazil. Furthermore, about one quarter of the variation of push and pull factors can be explained by US and foreign economic fundamentals respectively. Notably, countries with less open capital accounts tend to have lower-than-average pull factors.

The empirical evidence reported in this paper essentially confirms the public perception that forces related to financial globalization are the primary determinants of international portfolio flows. Therefore, countries' exposure to global (rather than domestic) risks appear to be more important in informing the domestic policy response to international portfolio flows. This suggests that, compared to domestic macroeconomic policies, capital controls may be a more effective policy tool for managing international portfolio flows. Indeed, the new institutional view of the IMF announced in November 2012 recognizes that this may be the case. Although we do not perform a direct test on the effectiveness of capital controls, our empirical findings contribute to this debate and lend support to this new institutional view of the IMF on capital controls.

Table 1. Push and Pull Factors for Bond Flows

The table presents the percent contribution of push and pull factors to the variance of international bond flows for each country. The variance contribution of the push factor is the sum of the contributions of the global and bond factors. The pull factor is the country factor. The push and pull factor variance contributions sum up to 100%. The sample period ranges from January 1988 to November 2013.

	Global Factor (%)	+ Bond Factor (%)	= Push Factor (%)	Pull Factor (%)		Global Factor (%)	+ Bond Factor (%)	= Push Factor (%)	Pull Factor (%)
Argentina	45.8	31.9	77.7	22.3	Liberia	65.5	20.1	85.6	14.4
Australia	74.3	14.6	88.9	11.1	Malaysia	13.3	41.7	55.0	45.0
Austria	74.7	4.5	79.2	20.8	Mexico	12.6	62.4	75.0	25.0
Brazil	73.4	20.7	94.0	6.0	Morocco	29.2	26.9	56.1	43.9
Bulgaria	67.8	19.9	87.7	12.3	Netherlands	44.0	44.8	88.8	11.2
Canada	3.1	85.0	88.1	11.9	Norway	37.2	46.1	83.2	16.8
Chile	54.9	39.4	94.3	5.7	Pakistan	16.4	52.2	68.6	31.4
China	12.7	71.8	84.5	15.5	Panama	33.9	29.9	63.8	36.2
Colombia	5.9	84.1	90.0	10.0	Peru	8.0	64.1	72.1	27.9
Czech Rep.	51.6	35.7	87.3	12.7	Philippines	43.8	50.6	94.5	5.5
Denmark	25.0	48.7	73.7	26.3	Poland	3.2	93.8	97.0	3.0
Ecuador	2.6	83.7	86.4	13.6	Portugal	11.9	74.9	86.8	13.2
Egypt	31.2	50.8	82.0	18.0	Romania	23.3	53.4	76.7	23.3
Finland	40.1	31.0	71.1	28.9	Russia	61.7	20.0	81.7	18.3
France	2.0	95.3	97.3	2.7	Serbia-Montenegro	3.8	92.5	96.2	3.8
Germany	11.4	65.5	76.9	23.1	Singapore	5.2	85.6	90.7	9.3
Greece	25.0	23.2	48.1	51.9	South Africa	52.1	40.4	92.5	7.5
Guatemala	10.2	80.0	90.1	9.9	South Korea	15.9	77.0	92.9	7.1
Hong Kong	22.2	61.9	84.1	15.9	Spain	45.7	45.2	90.9	9.1
Hungary	8.2	72.6	80.9	19.1	Sweden	31.2	51.9	83.1	16.9
India	8.2	89.5	97.7	2.3	Switzerland	67.1	29.0	96.2	3.8
Indonesia	53.4	36.4	89.8	10.2	Taiwan	73.5	9.5	82.9	17.1
Israel	28.4	62.1	90.5	9.5	Thailand	35.7	57.1	92.8	7.2
Italy	15.1	22.3	37.4	62.6	Trinidad-Tobago	11.4	41.9	53.3	46.7
Jamaica	83.1	4.4	87.5	12.5	Turkey	5.6	87.5	93.1	6.9
Japan	20.8	65.9	86.9	13.2	United Kingdom	13.4	84.2	97.6	2.4
Lebanon	66.5	22.1	88.6	11.4	Uruguay	29.3	59.6	88.9	11.1
					Venezuela	56.0	28.7	84.6	15.4

Table 2. Push and Pull Factors for Equity Flows

The table presents the percent contribution of push and pull factors to the variance of international equity flows for each country. The variance contribution of the push factor is the sum of the contributions of the global and equity factors. The pull factor is the country factor. The push and pull factor variance contributions sum up to 100%. The sample period ranges from January 1988 to November 2013.

	Global Factor (%)	+	Equity Factor (%)	=	Push Factor (%)	Pull Factor (%)		Global Factor (%)	+	Equity Factor (%)	=	Push Factor (%)	Pull Factor (%)
Argentina	52.4		25.3		77.7	22.3	Liberia	32.2		12.3		44.5	55.5
Australia	36.9		24.5		61.3	38.7	Malaysia	18.5		23.9		42.3	57.7
Austria	30.0		44.5		74.5	25.5	Mexico	5.5		90.6		96.1	3.9
Brazil	6.6		88.8		95.4	4.6	Morocco	15.9		65.9		81.9	18.1
Bulgaria	44.2		33.7		77.9	22.1	Netherlands	23.3		37.6		60.9	39.1
Canada	16.3		81.3		97.7	2.3	Norway	1.5		96.7		98.2	1.8
Chile	68.9		26.3		95.2	4.8	Pakistan	15.0		69.0		84.0	16.0
China	74.2		12.8		87.0	13.0	Panama	3.7		77.3		80.9	19.1
Colombia	19.4		75.8		95.1	4.9	Peru	5.5		73.2		78.7	21.3
Czech Rep.	9.8		88.0		97.8	2.2	Philippines	26.7		53.8		80.5	19.5
Denmark	64.2		15.2		79.4	20.6	Poland	46.8		43.9		90.7	9.3
Ecuador	43.5		45.2		88.7	11.3	Portugal	9.1		80.8		90.0	10.0
Egypt	75.9		21.5		97.4	2.6	Romania	7.9		89.1		97.0	3.0
Finland	19.5		66.3		85.8	14.2	Russia	70.89		23.7		94.6	5.4
France	32.6		37.3		69.9	30.1	Serbia-Montenegro	11.6		87.3		98.9	1.1
Germany	53.8		23.0		76.9	23.1	Singapore	19.7		57.8		77.6	22.4
Greece	34.0		61.8		95.7	4.3	South Africa	3.4		85.6		89.0	11.0
Guatemala	10.5		81.8		92.3	7.7	South Korea	7.1		88.9		96.0	4.0
Hong Kong	44.3		48.6		92.9	7.1	Spain	11.8		87.1		98.9	1.1
Hungary	67.9		23.8		91.8	8.2	Sweden	16.9		34.1		51.0	49.0
India	12.8		82.4		95.1	4.9	Switzerland	25.6		71.7		97.3	2.7
Indonesia	80.8		7.1		87.9	12.1	Taiwan	4.1		86.7		90.8	9.2
Israel	8.8		86.8		95.6	4.4	Thailand	33.0		52.2		85.1	14.9
Italy	25.7		47.1		72.8	27.2	Trinidad-Tobago	25.3		70.0		95.3	4.7
Jamaica	10.1		87.3		97.4	2.6	Turkey	58.6		25.5		84.1	15.9
Japan	33.1		60.9		93.9	6.1	United Kingdom	9.9		84.1		94.0	6.0
Lebanon	26.8		60.0		86.8	13.2	Uruguay	4.0		91.6		95.6	4.4
							Venezuela	5.0		91.9		96.8	3.2

Table 3. Push and Pull Factors for Regional Flows

The table presents the percent contribution of push and pull factors to the variance of international portfolio flows for each region. The variance contribution of the push factor is the sum of the contributions of the global and bond or the global and equity factors. The pull factor is the country factor. The push and pull factor variance contributions sum up to 100%. The regional figures are averages across all countries in that region. World is the average across all 55 countries in the sample. The sample period ranges from January 1988 to November 2013.

	Bond Flows							*Equity Flows*						
	Global Factor (%)	+	Bond Factor (%)	=	Push Factor (%)	Pull Factor (%)	Global Factor (%)	+	Equity Factor (%)	=	Push Factor (%)	Pull Factor (%)
Europe	30.1		51.7		81.8	18.2	27.3		57.7		85.0	15.0
North America	7.8		73.7		81.5	18.5	10.9		86.0		96.9	3.1
Latin America	34.5		47.4		81.9	18.1	21.2		69.5		90.8	9.2
Asia and Oceania	32.8		53.3		86.1	13.9	33.6		50.9		84.4	15.6
Africa	44.5		34.6		79.1	20.9	31.9		46.3		78.2	21.8
G8 countries	18.2		62.6		80.8	19.2	34.6		51.1		85.7	14.3
non-G8 countries	34.2		49.1		83.2	16.8	26.6		59.4		86.1	13.9
G20 countries	28.3		57.1		85.4	14.6	34.1		52.3		86.4	13.6
non-G20 countries	33.8		48.0		81.8	18.2	24.8		61.1		85.8	14.2
BRICS countries	41.6		48.5		90.1	9.9	33.6		58.7		92.2	7.8
non-BRICS countries	31.2		51.0		82.2	17.8	27.1		58.3		85.4	14.6
WORLD												
Jan 1988 – Nov 2013	32.1		50.8		82.9	17.1	27.7		58.4		86.0	14.0
Jan 1988 – Dec 2000	31.5		52.5		84.0	16.0	34.9		50.2		85.1	14.9
Jan 2001 – Nov 2013	29.8		51.2		81.0	19.0	44.1		40.3		84.4	15.6

Table 4. Push and Pull Factors for Regional Flows over the Crisis Period

The table presents the percent contribution of push and pull factors to the variance of international portfolio flows for each region over the crisis period defined as July 2007 to the end of the full sample in November 2013. The variance contribution of the push factor is the sum of the contributions of the global and bond or the global and equity factors. The pull factor is the country factor. The push and pull factor variance contributions sum up to 100%. The regional figures are averages across all countries in that region. World is the average across all 55 countries in the sample.

	Bond Flows							*Equity Flows*						
	Global Factor (%)	+	Bond Factor (%)	=	Push Factor (%)		Pull Factor (%)	Global Factor (%)	+	Equity Factor (%)	=	Push Factor (%)		Pull Factor (%)
Europe	29.9		49.8		79.7		20.3	48.7		35.2		83.9		16.1
North America	37.9		37.1		75.0		25.0	18.3		64.5		82.8		17.2
Latin America	36.7		43.4		80.1		19.9	37.1		51.0		88.1		11.9
Asia and Oceania	46.5		45.8		92.2		7.8	46.4		43.7		90.2		9.8
Africa	42.1		47.9		89.9		10.1	39.5		44.4		83.9		16.1
G8 countries	41.9		39.8		81.7		18.3	42.4		36.0		78.4		21.6
non-G8 countries	37.0		47.6		84.6		15.4	43.9		44.1		87.9		12.1
G20 countries	48.0		37.1		85.1		14.9	49.8		35.7		85.5		14.5
non-G20 countries	33.0		50.8		83.8		16.2	41.0		46.3		87.2		12.8
BRICS countries	67.8		23.3		91.2		8.8	55.5		40.2		95.7		4.3
non-BRICS countries	34.7		48.9		83.5		16.5	42.5		43.3		85.8		14.2
WORLD	37.7		46.6		84.2		15.8	43.7		43.0		86.7		13.3

Table 5. The Push Factor and Economic Fundamentals

The table reports results of OLS regressions of monthly common dynamic factors on a set of US monthly economic variables. Newey and West (1987) standard errors computed using 5 lags are reported in parentheses. *** indicates statistical significance at 1% level, ** at 5% and * at 10%. The sample begins in January 1996 and ends in November 2013.

	Global Factor	Bond Factor	Equity Factor
Constant	-1.033^{***}	0.111	0.889^{***}
	(0.281)	(0.225)	(0.333)
US Industrial Production Gap	-0.065^{***}	0.115^{**}	-0.042
	(0.024)	(0.052)	(0.047)
US 10-year Bond Yield	0.181^{***}	0.026	-0.088
	(0.061)	(0.049)	(0.064)
US/World MSCI Return Ratio	0.625	-5.275^{**}	-2.456
	(0.812)	(2.537)	(2.015)
ΔVIX	0.248	-0.829^{**}	-0.717^{**}
	(0.324)	(0.374)	(0.351)
TED	0.306^{**}	-0.313	-1.014^{***}
	(0.131)	(0.197)	(0.205)
Lagged Factor	0.320^{***}	0.122^{**}	0.170^{*}
	(0.088)	(0.056)	(0.095)
$\overline{R}^2$	0.221	0.253	0.271

Table 6. The Pull Factor and Economic Fundamentals

The table reports panel regression estimates of all monthly pull (country) factors on a set of monthly economic variables for each country. The panel regressions include the following 25 countries: Australia, Austria, Brazil, Canada, Chile, Denmark, Finland, France, Germany, Greece, India, Israel, Italy, Japan, Malaysia, Netherlands, Norway, Philippines, Portugal, South Korea, Spain, Sweden, Switzerland, Thailand and United Kingdom. Newey and West (1987) standard errors computed using 5 lags are reported in parentheses. *** indicates statistical significance at 1% level, ** at 5% and * at 10%. The sample begins in January 1996 and ends in December 2011.

	Panel Regression for All Dynamic Country Factors
Constant	1.409*** (0.181)
Industrial Production Gap	1.164*** (0.147)
10-year Bond Yield	0.016** (0.007)
MSCI Stock Index Return	−0.001 (0.002)
Openness Degree	0.457*** (0.081)
Lagged Country Factors	0.271*** (0.013)
$\overline{R}^2$	0.244

Table 7. The Pull Factor and the Chinn-Ito Index

The table presents the pull factor variance contribution for 25 countries ranked by their Chinn and Ito (2008) index for capital account openness. The average score is the average Chinn-Ito index for the period of 1996 to 2011. The 25 countries are the same used for the pull factor panel regression in Table 6. VC is the per cent variance contribution and cum. average is the cumulative average of the VC for all countries up to that point.

	Chinn-Ito Index	Pull Factor – Bond Flows		Pull Factor – Equity Flows	
Country	Average Score	VC (%)	Cum. Average	VC (%)	Cum. Average
India	−1.17	2.30	2.30	4.90	4.90
Brazil	−0.43	6.00	4.15	4.60	4.75
Thailand	−0.38	7.20	5.17	14.90	8.13
S Korea	−0.21	7.10	5.65	4.00	7.10
Philippines	−0.09	5.50	5.62	19.50	9.58
Malaysia	0.00	45.00	12.18	57.70	17.60
Chile	0.85	5.70	11.26	4.80	15.77
Australia	1.29	11.10	11.24	38.70	18.64
Israel	1.43	9.50	11.04	4.40	17.06
Greece	1.88	51.90	15.13	4.30	15.78
Norway	2.34	16.80	15.28	1.80	14.51
Japan	2.37	13.20	15.11	6.10	13.81
Spain	2.39	9.10	14.65	1.10	12.83
Portugal	2.42	13.20	14.54	10.00	12.63
Sweden	2.42	16.90	14.70	49.00	15.05
Austria	2.44	20.80	15.08	25.50	15.71
Canada	2.44	11.90	14.89	2.30	14.92
Denmark	2.44	26.30	15.53	20.60	15.23
Finland	2.44	28.90	16.23	14.20	15.18
France	2.44	2.70	15.56	30.10	15.93
Germany	2.44	23.10	15.91	23.10	16.27
Italy	2.44	62.60	18.04	27.20	16.76
Netherlands	2.44	11.20	17.74	39.10	17.73
Switzerland	2.44	3.80	17.16	2.70	17.11
UK	2.44	2.40	16.57	6.00	16.66

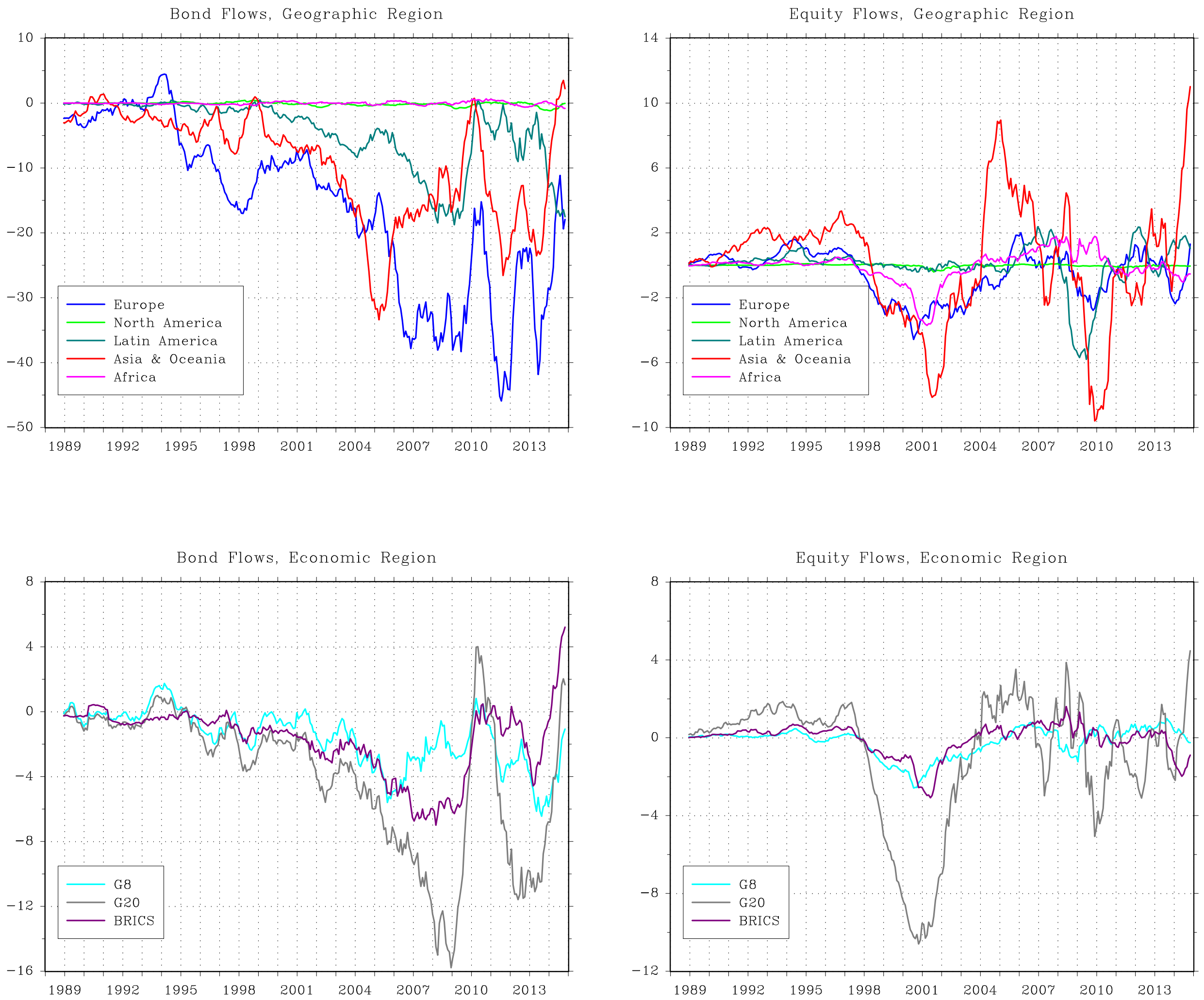

Figure 1. International Portfolio Flows

The figure shows the 12-month moving average of bond and equity flows for a set of geographic and economic regions. These are based on portfolio flows from the US to 55 other countries and are measured in billions of US dollars. The sample period ranges from January 1988 to November 2013.

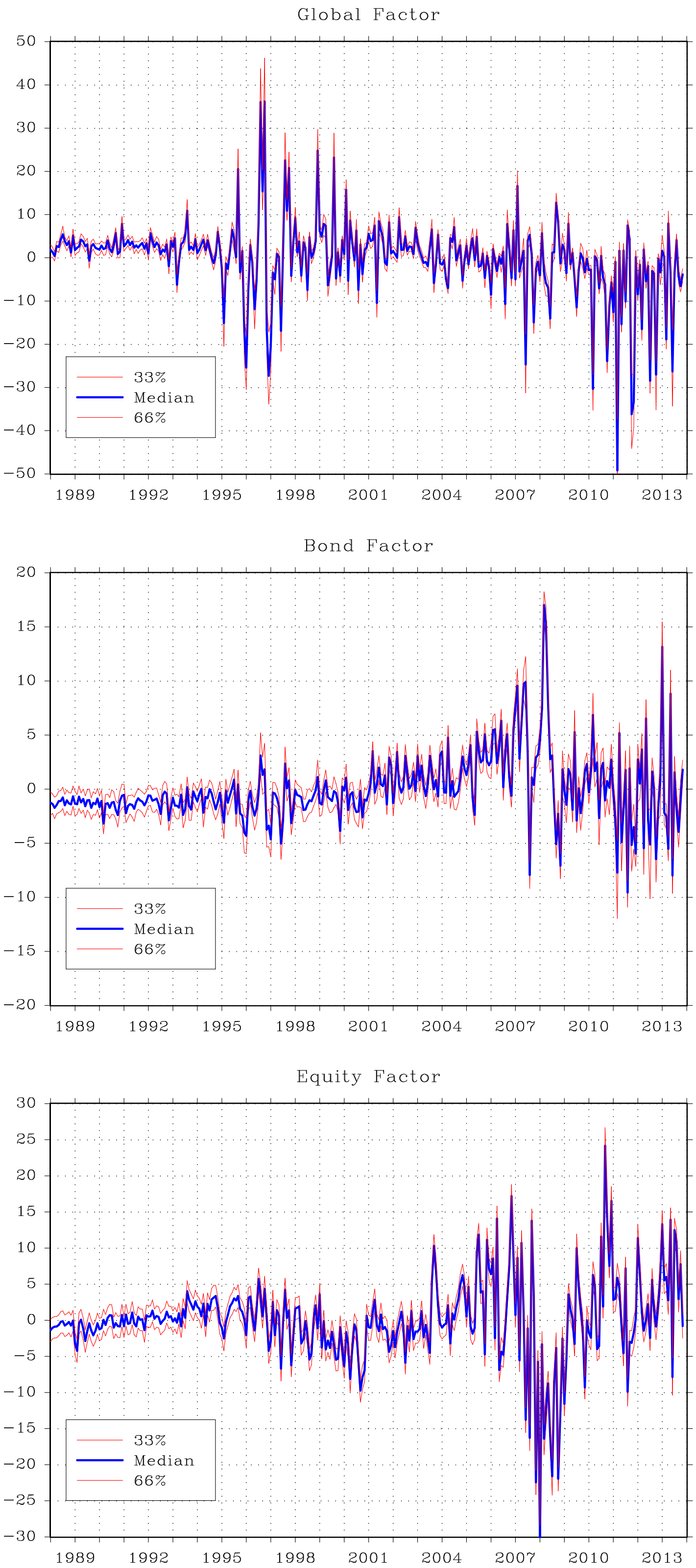

Figure 2. Dynamic Push Factors

The figure shows the three dynamic push factors that explain the common variation in monthly international portfolio flows from the US to 55 other countries. The top panel shows the global factor, the middle panel the bond factor and the bottom panel the equity factor. The dashed lines display the 33% and 66% quantile bands of the factors' posterior distribution. The sample period ranges from January 1988 to November 2013.

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