Factors influencing international portfolio flows

The free movement of capital is a core element of open economies. It allows for efficiency gains and can help to mitigate country-specific risks internationally. Being closely interconnected with other countries can also be a source of risk, however, especially if it leads to unilateral dependencies.

Cross-border portfolio investment – transactions in equities, mutual fund shares and debt securities between residents and non-residents – accounts for a significant proportion of international capital flows. The comparatively high volatility of these transactions presents challenges in terms of economic policy, particularly for emerging market economies, but also for advanced economies, too. For this reason, there is great interest in gaining a better understanding of the factors that drive portfolio flows.

The economic literature makes a distinction between international "push" factors and country-specific "pull" factors. Domestic and foreign economic developments play a prominent role in this regard, while movements in equity markets, uncertainty, commodity prices, and the international interest rate environment are also significant drivers.

The international interest rate environment is shaped to a large extent by US monetary policy. Analysis reveals that the US Federal Reserve exerts an influence on international portfolio flows not only via "pure policy" responses, but also by means of the information that it provides on the US economy as a key driver of global economic activity. Bundesbank estimates find that monetary policy responses by the US Federal Reserve have a stronger impact on flows into bond funds investing in emerging market economies than on funds investing in advanced economies.

Another Bundesbank study shows that there is variation over time in the degree to which the drivers of cross-border capital flows affect fund flows into individual countries. In this context, there is variation across regions (advanced economies versus emerging market economies) and also across asset classes (equities versus bonds), with the international drivers of portfolio flows gaining in significance in various advanced economies, especially Member States of the European Union, over the 15 years under review. As regards portfolio flows into emerging market economies, the results are found to vary widely across countries.

Introduction

Cross-border capital flows have positive impact on economic developments, but also involve risks

The increasing interconnectedness of the global economy is directly linked to cross-border capital flows. The ability to invest capital around the world or raise capital abroad broadens the spectrum of investment opportunities. This can foster and entrench economic growth in the economies involved. However, a high degree of capital mobility is also a source of risk. Under the right conditions, it can promote abrupt swings in financial flows, destabilising the real economy.

Portfolio flows are particularly volatile

This holds particularly true for assets that are highly liquid and thereby exposed to constant influence from foreign and domestic factors. These mainly include securities that are traded globally. In the balance of payments, these cross-border securities transactions are consolidated under the item "portfolio investment". They include trading in equities, mutual fund shares and debt securities with non-residents.[1] The comparatively high volatility of these transactions presents challenges for emerging market economies in particular, but also for advanced economies, too. From an economic perspective, there is particular interest in understanding the factors that drive portfolio flows. The analyses presented in this article investigate the determinants and their significance for portfolio flows.[2] Particular attention is paid to the role played by US monetary policy as well as how the importance of international and country-specific factors varies over time.

This article begins by discussing the economic significance of cross-border capital flows, making a distinction between characteristics that support economic activity and those that inhibit it. It then explains how portfolio flows fit into the bigger picture of cross-border capital flows and the wider balance of payments, distinguishing between the various analytical methods that can be used to investigate portfolio flows. It is important to make this distinction because, in some cases, different research approaches in the economic literature come to different conclusions regarding the significance of individual factors. As there is such a wide range of factors that influence portfolio flows, this article focuses on some of the main drivers – such as economic developments, movements in equity markets, and risk aversion. Two analyses are presented in this context to highlight the effects of US monetary policy on portfolio flows as well as how the significance of drivers varies over time.

Economic significance of cross-border capital flows

Characteristics that support and stabilise the economy

Free movement of capital promises efficiency gains …

The free movement of capital, which opens up the possibility of employing funds worldwide, fosters the efficient allocation of capital around the world. As a result, consistent with the economic rationale of maximising profits and utility, financial resources are allocated where – for a given level of risk – they generate the highest return.

… and facilitates the sharing of risk …

Cross-border portfolio investment in particular offers investors a way of reducing their risk by adding a broadly diversified basket of different securities from different countries to their portfolio rather than a single paper.

… as well as a smoothing of consumption

Besides offering benefits in terms of efficiency, international capital flows are a means of offsetting temporary country-specific fluctuations in income and thus smoothing consumption.[3] Expected lifetime income and consumption projected on that basis are often disrupted by

1 The balance of payments statistics differentiate between portfolio investment and direct investment by categorising the former as holdings of less than 10% of an enterprise's shares.
2 See Deutsche Bundesbank (2020a).
3 The lifetime income theory posits that households prefer a smooth path of consumption to large fluctuations in their standard of living. See, for example, Obstfeld and Rogoff (1996).

unexpected events.[4] If, for example, a natural disaster depresses a country's economic output and thus also household incomes, international capital flows can help to sustain consumption through the crisis by borrowing from abroad.[5] In such a case, the households or general government affected by the natural disaster stabilise their consumption by means of an "intertemporal trade" – they borrow to bring some of their future consumption forward to the present.[6]

Characteristics that inhibit and destabilise the economy

Sudden stops, especially in emerging market economies

Having large stocks of assets or extensive liabilities abroad also entails being exposed to particular risks, however. Expectations that an economy will develop favourably typically generate strong capital imports and thus drive up that country's external liabilities. If these forecasts turn out to have been overly optimistic, financial flows can suddenly stop or, in unfavourable circumstances, even reverse. Sudden stops like this often lead to severe economic crises. One such event was the Asian crisis triggered in 1997: in the early 1990s, many South-East Asian economies were attracting strong flows from abroad. Investors seemed to have been expecting a high return on their capital in these countries. However, when the assessments of these countries' economic prospects changed, they pulled their capital out again. This process triggered severe recessions and currency crises in many South-East Asian countries. These then rippled to other parts of the world and caused crises there, too, such as in Mexico and Russia.

Advanced economies at risk of contagion as well

However, this does not mean that advanced economies are immune to financial distress and contagion, as proved in 2008 during the global financial crisis and shortly afterwards during the European sovereign debt crisis. Even countries with high net capital exports and corresponding levels of net external assets can be affected, especially if those assets are insufficiently diversified.

Portfolio flows as part of the balance of payments

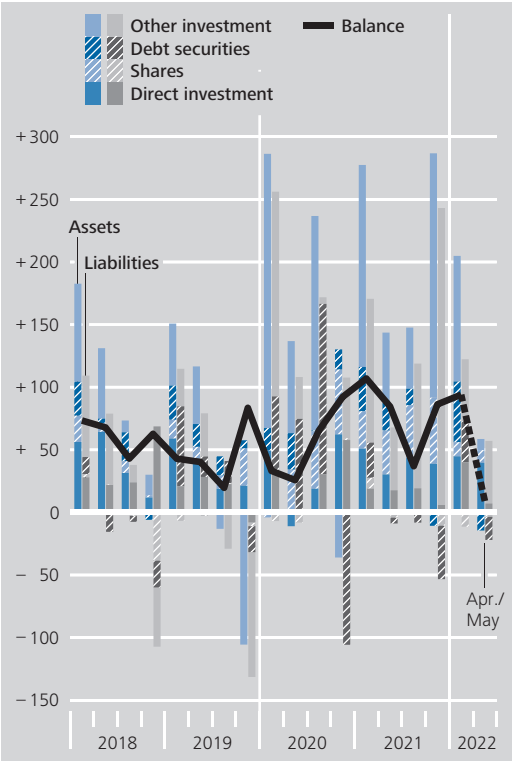
Importance of capital flows for an economy can be derived from balance of payments

The importance of cross-border capital flows, and thus also of portfolio flows, for an economy differs from one country to the next and can be derived from the balance of payments. The balance of payments records all economic transactions between residents and non-residents within a given period (month, quarter or year).[7] As these transactions can differ in character, they are broken down into sub-accounts: the current account, capital account and financial account.[8] Of these, the current and financial accounts are generally considered the most important. The current account records cross-border trade in goods, services as well as primary and secondary income. If this account is in surplus, this implies that a country's receipts from current transactions with non-residents are higher than the corresponding expenditure paid to non-residents. The payments associated with current transactions are recorded in the financial account.

4 A positive event would be an unexpected discovery of natural resources, for example, while a negative one would be an unforeseen natural disaster. For this model, the key aspect is that the event comes as a surprise. This is because a foreseeable decline in income, such as due to retirement, is, according to the lifetime income theory, generally always factored into consumption decisions, while only an unexpected change leads to an immediate shift in households' consumption and saving behaviour.
5 See Obstfeld and Rogoff (1996). The intertemporal approach to the current account is based on (net) capital flows in general. Many of the transactions belonging to this category would, in practice, be categorised as "other investment".
6 Enterprises and government, too, would generally borrow more in this kind of situation, albeit with different intentions in mind. These agents do not play any role in the intertemporal approach to the current account, however.
7 A detailed account of Germany's balance of payments for 2021 was presented in Deutsche Bundesbank (2022).
8 The current (sixth) edition of the International Monetary Fund's Balance of Payments and International Investment Position Manual states how individual transactions should be recorded.

Financial account

€ billion



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However, the financial account records not only payments related to current transactions, but also cross-border transactions involving financial instruments of all kinds. These also include the portfolio investment mentioned above. In addition, the financial account makes a further distinction between direct investment, financial derivatives, reserve assets, and other investment. Other investment comprises loans and trade credits (where these do not constitute direct investment) as well as bank deposits and other capital.

Flows also particularly important in relation to GDP

The analysis presented in this article centres on portfolio investment, as this is influenced in a unique way by the short-term investment decisions of international investors. The significance of this asset category for a national economy becomes clear when the individual flows are expressed in relation to gross domestic product (GDP). For example, since the introduction of the euro, German investors have purchased foreign securities for an amount averaging 4.7% of German GDP each year. Non-residents, meanwhile, have added German securities to their portfolios for an average of 2.7% of German GDP. Added up over a little more than 20 years, the figures show that portfolio flows in Germany are highly important for the national economy and that there is significance in both their stabilising and destabilising characteristics. The same holds true for other countries.

Different analytical options for portfolio flows

Broad body of literature on portfolio flows, but findings are heterogeneous

The body of literature on the drivers of portfolio flows has grown rapidly over the past few years.[9] However, different investigations do not always produce the same findings. This is partly because, on closer inspection, the studies differ fairly substantially in some cases.

Not all studies on international capital flows focus on portfolio flows

First, not all studies focus exclusively on portfolio flows. Some examine international capital flows as a whole. Second, some studies break these flows down into direct investment, portfolio investment and other investment.[10] Within these categories, flows can also be subdivided further still – into equities, bonds and mutual fund shares in the portfolio investment category, for example. Equities and bonds are subject to different levels of demand, depending on the macroeconomic environment for individual investors. As a result, different study findings are possible in this regard, too, along different dimensions. It is therefore essential to define the capital and portfolio flows precisely in order to make the findings comparable.

Most studies examine only one side of the balance of payments

However, even investigations that focus explicitly on portfolio investment, and perhaps make a distinction between equities and debt securities as well, will not necessarily be based on the same data. While some authors take an

9 See Koepke (2019).
10 See, inter alia, Barrot and Serven (2018) and Cerutti et al. (2019).

interest in the evolution of net flows, the majority of cross-country analyses use gross flows. These studies typically investigate which factors drive increased demand for or sales of a particular country's equities and debt securities in international capital markets. Applied on a global scale, this approach explains cross-border portfolio investment in its entirety.

Fund flows can be a useful proxy

Another way to investigate rising or falling demand for securities using volume data (rather than price data) is to analyse flows into funds that invest in certain countries. Investment funds pool together the financial resources of international investors and are obliged to allocate them in line with their investment strategy. The data obtained in this manner differ from balance of payments statistics in two ways. First, the funds in question also receive flows from residents, for example from German savers who acquire stakes in German enterprises in this way. Second, the data capture only securities that are traded indirectly via investment companies, but not investors' direct transactions in individual equities or debt securities. One benefit of fund data, however, is that, unlike balance of payments statistics, they are available for many countries in near real-time and at a high frequency.

Financial flows often normalised

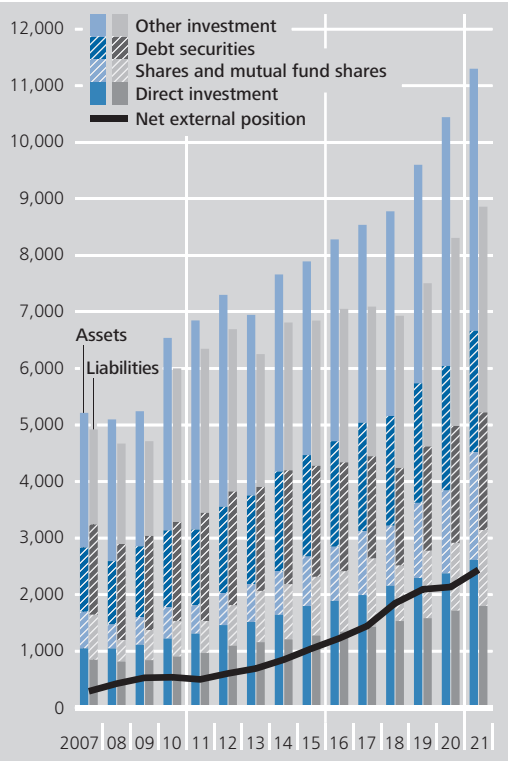
Ultimately, cross-country studies need to make the capital flows of differently sized countries comparable with one another, which is why the original data from the balance of payments are often expressed in relation to a country's GDP. Where fund flows are used as the dataset, it makes sense to use the existing total fund volume at the start of given a period as a point of reference. This also has the advantage of largely eliminating the influence of valuation changes. Lastly, it is also possible to logarithmise the original data as a way of visualising percentage changes rather than absolute variables.

Study samples differ, too

One final point is that studies often differ in terms of frequency, observation period, or the group of countries under review. All of these aspects mean that the empirical evidence regarding the significance of individual drivers of portfolio flows is inconsistent across studies.[11]

Germany's external position

€ billion



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Selected determinants of international portfolio flows

Drivers can be broken down into international "push" factors and country-specific "pull" factors

For the most part, the economic literature already divides the drivers of portfolio flows into separate categories at a higher level, breaking them down into international "push" factors and country-specific "pull" factors.[12] According

11 See, inter alia, Bettendorf and Karadimitropoulou (2022), Fratzscher (2012) and Lo Duca (2012).

12 This categorisation goes back in particular to the work of Calvo et al. (1993). The authors found empirical evidence that international variables were especially significant as drivers of Latin American fund flows. Since then, the categorisation of drivers into push and pull factors has been used in many studies. This approach is not above criticism, however. This strict differentiation means that certain causes of portfolio flows, such as spillover effects between two countries, are not captured (see Koepke (2019) and Deutsche Bundesbank (2020a)).

to this approach, push factors lead to simultaneous and unidirectional changes in fund flows into different countries, while pull factors relate solely to fund flows into the country in question.[13]

Differentiation challenging in practice

However, in some ways, push and pull factors have a very close economic relationship with one another. It is therefore possible for one and the same variable to act as a push factor from a global perspective and as a pull factor from a country-specific perspective. An example of this is economic activity. While global economic activity is clearly a push factor, national economic activity represents a pull factor. The two factors are related, however: economic developments in large countries such as China or the United States have a significant impact on global economic activity as well. Conversely, economic activity in small open economies is crucially dependent on global economic activity. Analytically, it is thus all but impossible to draw a clear line between these two factors.

Push and pull factors can affect portfolio flows simultaneously and unidirectionally

Certain push and pull factors may indeed influence portfolio flows in the same direction. This is because domestic and foreign investments are not necessarily in competition with each other. Instead, investors first decide whether they want to invest at all and then have the opportunity to diversify their investments across borders depending on their strategy and the economic environment. As a result, unidirectional movements in push and pull factors can lead to unidirectional changes in fund flows domestically and abroad.

Economic developments an important determinant

Both global and country-specific economic developments influence fund flows into individual countries. From a macroeconomic perspective, strong economic growth increases expected returns and reduces investment risks; it therefore also leads to higher investment activity. The contribution of global economic growth increases with the strength of international trade and financial market linkages. Various empirical studies provide indications that growth in the global economy acts as a push factor.[14] However, the evidence on this matter is mixed. The relationship between the development of the global economy and capital flows appears to depend on how the respective model is specified and the region under consideration. Other studies find no statistically significant correlation whatsoever.[15] What is clearer is the significance of country-specific economic developments as a pull factor – it is clearly positive, so it supports capital flows into a country.[16] Nevertheless, the correlation is less significant in studies with high frequency data on portfolio flows.[17]

Developments in equity markets reflect expectations of future profits

In addition to current economic developments, expectations regarding the future path of the economy also play an important role in portfolio flows. Equity markets are a good proxy for these expectations because firms' equity prices are influenced by their discounted expected earnings. Accordingly, rising equity prices can be interpreted as an indication that market participants have positive expectations, while falling equity prices are typically associated with negative expectations. Economically speaking, this means that capital flows into individual countries should be positively correlated with how prices evolve in the local equity market (pull factor). However, global sentiment in equity markets is also likely to generally increase the propensity to invest in this form of investment and thus push up demand for equi-

13 On this point, Koepke (2019) also identifies a link to portfolio theory according to Markowitz (1952).
14 Some studies refer only to economic growth in advanced economies. This accounts for the bulk of global economic growth in statistical terms, however.
15 See, for example, Baek (2006), Bettendorf and Karadimitropoulou (2022) and De Vita and Kyaw (2008).
16 International trade and financial market linkages mean that, in practice, global and country-specific economic growth are often strongly correlated. In order to determine the significance of country-specific economic growth for fund flows, this first needs to be adjusted for the global economic component using statistical methods. In doing so, different estimation approaches may yield different results.
17 See, for example, Bettendorf and Karadimitropoulou (2022) and Koepke (2018).

ties in all countries (push factor).[18] Empirical studies find statistically significant evidence of correlations between equity market movements and fund flows, though it is mainly studies based on relatively high frequency data that are able to demonstrate the existence of strong correlations here.[19] This is plausible insofar as equity market movements, unlike economic data, can be mapped at a very high frequency, which gives them potentially greater short-term significance for investors.

There are risk indicators …

An increased perception of risk can, for example, be caused by economic and financial crises or political disputes. Here, a distinction should be made between global risks and country-specific risks. Given the particular importance of the United States for global financial conditions, US risk indicators are often used as a proxy for global risk assessment in the financial markets.[20]

… for global risks …

Uncertainty in the financial markets is typically reflected in increased volatility of equity returns. The degree of uncertainty can, for example, be derived from option prices and depicted using volatility indices such as the CBOE Volatility Index (VIX) for the S&P 500 stock index.[21] Furthermore, yield spreads have become established in the literature as a measure of risk. Well-known indicators of global risk include the TED spread (spread between the three-month LIBOR and three-month Treasury bills) and Moody's Baa-Aaa spread (spread between US corporate bonds with the corresponding ratings). While the TED spread serves as an indicator of risks in the interbank market, the Baa-Aaa spread represents risks across the entire corporate sector.

… and country-specific risks

Country-specific risks can be derived in an analogous manner, for example from national measures of volatility. In periods of heightened uncertainty, investors tend to sell off the affected portfolio investments. Accordingly, portfolio investment outflows are to be expected if the perception of risk increases. Where securitised credit default swaps (CDS) are available, their prices may also provide an indication of specific risks.

Uncertainty triggers shifts to comparatively safe investments

The empirical evidence lends weight to this hypothesis. A rise in the global risk assessment – expressed as changes in the VIX – is negatively correlated with the global flows to investment funds and is therefore a significant push factor. At the same time, such a rise is typically accompanied by increased demand for securities from the United States or other countries that are deemed to be comparatively safe (safe haven flows). As the VIX is derived from the US equity market, it is not surprising that its effects appear to play a particular role in equity transactions in advanced economies. In addition, evidence for alternative risk measures such as the TED spread and the Baa-Aaa spread can be found in studies analysing portfolio flows around the time of the global financial crisis. These studies show that increased demand for US securities can be observed even in cases where a global crisis originated in the United States.[22]

Portfolio flows are also influenced by country-specific measures of risk. Empirical studies show that external debt, the quality of political and financial institutions, and the assessments of rating agencies play a significant role as pull factors.[23] An increase in country-specific risk thus impedes further capital inflows while boosting capital outflows.

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18 In the case of investment funds, this would be immediately evident from an increase in flows into equity funds. For balance of payments statistics, this would translate into an increase in cross-border purchases by non-banks, possibly supported by an increase in issuance.
19 See Bettendorf and Karadimitropoulou (2022), Chuhan et al. (1998), Fratzscher (2012), Froot et al. (2001) or Lo Duca (2012).
20 This relationship is discussed in the literature under the concept of the "global financial cycle". See Rey (2013).
21 The term "risk" is also used below as a synonym for "uncertainty". Here it does not mean risk in terms of the specific probability of losing capital (value at risk), but rather the intensity of price fluctuations in the equity markets.
22 See, inter alia, Bettendorf and Karadimitropoulou (2022), Fratzscher (2012) and Lo Duca (2012).
23 See Fratzscher (2012), Kim and Wu (2008) and World Bank (1997).

Rising commodity prices are a significant cost factor …

Another significant driver of portfolio flows are commodity prices.[24] They are a key cost factor, especially in the production of goods. While enterprises' dependence on commodity prices varies considerably across countries and sectors, increases in commodity prices nevertheless lead to higher costs and thus reduce enterprises' competitiveness and profits – except in the case of commodity exporters. As a result, it becomes less lucrative to finance production projects of the affected enterprises or to invest in these firms. In such an economic environment, it is to be expected that investors would offload portfolio investments, especially ones involving commodity-intensive production.

… but benefit commodity exporters

Empirical studies show that this relationship can be demonstrated across different estimation approaches. However, this driver does not act in the same direction for all countries. This is because commodity exporters tend to benefit from rising commodity prices, as price increases have a positive impact on earnings. Here, results indicate that the relationship has a greater impact on advanced economies.[25] This effect can be seen especially in relation to commodity cycles and has, for example, also been discussed in the economic policy debate on global imbalances.[26]

Impact of US monetary policy on international portfolio flows

International interest rate environment impacts portfolio flows

Portfolio flows in advanced economies and emerging market economies are strongly influenced by the international interest rate environment. As interest rates are an important monetary policy instrument, the role of monetary policy will be examined in more detail here. The focus is on monetary policy in the United States, as it significantly impacts financial conditions around the world.[27]

One possible transmission channel is through investors' search for yield and appetite for risk. A tightening of monetary policy in the United States leads directly to higher yields on US debt securities. Moreover, it typically reduces investors' risk appetite, as a given yield target can then be achieved with a less risky investment instrument (e.g. government bonds versus equities or US equities versus emerging market equities).[28] Owing to higher interest rates, on the one hand, and investors' lower risk appetite, on the other, investments in US securities therefore become more attractive, leading to portfolio shifts at the global level.

Interest rate environment shaped by monetary policy in the United States

Empirical analyses show the impact of US monetary policy on portfolio flows

Empirical analyses confirm the effects of monetary policy on portfolio flows. They indicate that the Federal Reserve's monetary policy affects fund flows both in advanced economies and emerging market economies.[29] In this context, even the mere expectations of a monetary policy measure have a significant impact.[30]

Monetary policy influences portfolio flows via two channels

In addition to the pure monetary policy impulse itself, the central bank can also send an information signal in press releases or press conferences by disclosing assessments of economic developments that represent new, surprising information for investors.[31] While a positive outlook would also lead to higher yields in the United States, it would also increase investors' risk appetite and simultaneously raise the expectation of positive spillover effects from the United States to the rest of the world. This would then result in rising gross inflows of funds to other countries as well. The positive information impulse thus leads to market reactions that are very similar to the effects of an increase in aggregate demand.

An analysis by the Bundesbank on the functioning of these two channels shows that the

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24 See, inter alia, Davis et al. (2021).
25 See Barrot and Serven, Bettendorf and Karadimitropoulou (2022) and Sarno et al. (2016).
26 See Bernanke (2005) as well as Reinhart et al. (2016).
27 In view of this relationship, the global financial cycle is considered to play an important role. See, inter alia, Miranda-Agrippino and Rey (2020).
28 See, inter alia, Bruno and Shin (2015).
29 See Kalemli-Özcan (2019).
30 See Koepke (2018) and Dahlhaus and Vasishtha (2020).
31 See Kerssenfischer (2019).

Impact of US monetary policy on international portfolio flows

International portfolio flows are influenced by different drivers, which the literature usually breaks down into international "push" factors and country-specific "pull" factors. One key structural driver is monetary policy in the United States, which ranks as a global determinant, or push factor, owing to the special role the United States plays in shaping financial conditions worldwide.

Empirical evidence indicates that a tightening of monetary policy in the United States leads to outflows of funds in the rest of the world, especially in emerging market economies.[1] This box takes a closer look at how exactly US monetary policy influences portfolio investment around the world, given that central banks influence capital markets not only by means of monetary policy measures themselves, but also via what are known as central bank information shocks. When central banks present their decisions and explain them in press releases or at press conferences, they also explicitly or implicitly share their own assessment of the economic outlook, which for investors might contain a new and surprising piece of information.

The effects of both these shocks – "pure policy" shocks and central bank information shocks – on portfolio flows can be estimated using proxy VAR models.[2] These models use instrument variables to identify the two shocks. Kerssenfischer (2019) shows how these instrument variables can be generated from high frequency data, using the scenario of a Eurosystem monetary policy shock. Applied to a monetary policy shock in the United States, the approach is based on changes in the two-year US government bond yield and percentage changes in the S&P 500 index within a relatively narrow window around announcements by the Federal Open Market Committee (FOMC). For the purposes of this analysis, the window is the day of the announcement: closing prices on the day of the announcement are compared with closing prices on the day before the announcement.[3] Thus, the investigation is based on the assumption that movements in equity prices and bond yields on the day of the FOMC announcement are driven primarily by the announcement itself. A (pure) policy shock can be expected to send equity prices and bond yields in different directions: taken in isolation, a contractionary monetary policy shock is likely to push up interest rates and dampen economic activity, probably causing bond yields to rise and equity prices to fall. A central bank information shock, by contrast, generally moves both variables in the same direction. Hence, a positive information shock – that is, an unexpectedly upbeat outlook for investors – can be expected not only to lead to rising interest rate expectations and bond yields, as with a pure policy shock, but also to have a positive effect on equity prices at the same time.

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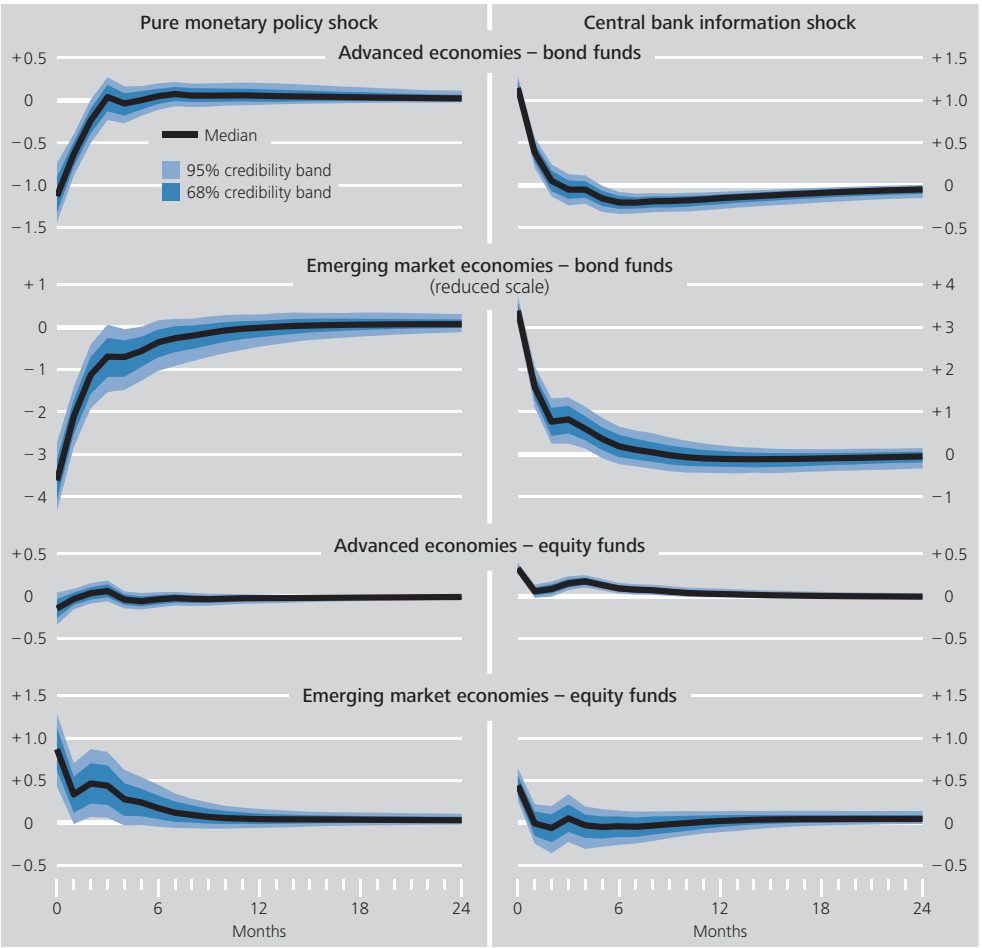
1 See, inter alia, Anaya et al. (2017), Ciminelli (2022), Kalemli-Özcan (2019) and Koepke (2018).
2 See also Deutsche Bundesbank (2020b).
3 Kerssenfischer (2019) uses a window of just a few minutes around announcements. This approach tends to improve the identification of shocks because it also means the effect can be disentangled from information that becomes known on the same day as the monetary policy decisions but at different times. However, this makes it more difficult for researchers without access to such data to replicate the results. Comparisons between shocks from high frequency data and daily data have shown that, in the present case, daily data provide tools that are good enough to clearly identify the shocks.

Monetary policy effects on selected fund flows*

Percentage points



* Impulse response functions of fund flows following various monetary policy shocks. Shocks are normalised such that they increase the yield on US government bonds with a two-year residual maturity by 25 basis points. Fund flows are shown as the monthly change relative to total net assets at the start of the respective period. The respective percentage point change relates to this ratio.

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Proxy VAR models are estimated using monthly data for the period from August 2005 to December 2021. These models are fed with variables that capture key elements of the US capital market: the S&P 500 composite index, the US dollar's nominal effective exchange rate (NEER), the VIX volatility index and the yields of US government bonds with a residual maturity of two years. In addition, a variable is added to each model to represent fund flows of investment funds investing in a given region and asset class.[4] Fund flow data are sourced from EPFR Global and serve as a proxy for balance of payments statistics on international portfolio investment, which are available at only a relatively low frequency in many countries.[5] The models are estimated using Bayesian methods.

The estimation results produced by the VAR models are presented in the form of im-

4 The regions analysed here are advanced economies and emerging market economies. Economies are categorised according to their EPFR Global classification. The asset classes analysed here are equity funds and bond funds.

5 EPFR data and balance of payments statistics are not exactly the same in conceptual terms. One reason for discrepancies between the data is that the EPFR data also capture transactions by residents, which are omitted from the balance of payments statistics.

pulse response functions of the fund flows in each case. The shocks are scaled such that the median of the posterior distribution of two-year yields increases by 25 basis points. This way, the effects of a contractionary monetary policy shock can be compared with those of a positive central bank information shock. Fund flow responses are summarised in the chart on p. 48, which shows the respective estimated changes in fund flows compared with total net assets at the start of the period in percentage points.[6]

The monetary policy shock triggers immediate and significant declines in the fund flows into bond funds investing in advanced economies (1.1 percentage points; median) and emerging market economies (3.6 percentage points). Hence, the effects in emerging market economies are significantly stronger.[7] The picture is mixed for equity funds, however, for two reasons. First, the evidence of a decline in fund flows into advanced economies is not significant. Second, the results indicate a significant increase in fund flows into emerging market economies. One possible reason for this observation could be reallocations into funds with higher risk premia in emerging market economies.

A much more uniform picture is presented by the estimation results for fund flows following a positive central bank information shock. A positive shock of this kind causes fund flows to increase significantly, irrespective of region (advanced economies versus emerging market economies) and asset class (equities versus bonds). Here again, fund flows into bond funds investing in emerging market economies show a much stronger response than those focused on advanced economies: the information shock causes fund flows into emerging market economies to increase by 3.4 percentage points, while those into advanced economies rise by 1.1 percentage points. As regards equity funds, the responses are significantly smaller and smoother, with fund flows into advanced and emerging market economies increasing by 0.3 and 0.4 percentage point, respectively.

The results show the importance of specifying a monetary policy shock as precisely as possible, because a pure policy shock can affect capital flows differently than a central bank information shock, even though both shocks induce an interest rate rise in the specification shown. If, for example, the role of monetary policy were identified only via an exogenous rise in interest rates, the estimation results could be distorted and result in incorrect economic policy conclusions being drawn.

6 Total net assets at the start of a period will not necessarily match those at the end of the previous one because new funds may have been added to the sample.
7 See, inter alia, Kalemli-Özcan (2019) and Koepke (2018).

Bundesbank study: US monetary policy influences portfolio flows via monetary policy impulses and information impulses

effects, approximated by flows to investment funds, can vary considerably (see the box on p. 47).[32] The impulses in the study lead to an assumed increase in interest rates of 25 basis points in each case. However, a contractionary monetary policy impulse causes investors to reduce their investments in bond funds, while a positive information impulse leads to increased inflows of funds. It makes no difference here whether the funds invest in advanced or emerging market economies.

Impact greater in emerging market economies than in advanced economies

In emerging market economies, the effects are much greater still:[33] a pure monetary policy impulse in the United States leads to a simultaneous decline in flows to bond funds in emerging market economies, equivalent to 3.6% of holdings. In advanced economies, this decrease amounts to 1.1% of holdings. New information results in a similar pattern among these two groups of economies, albeit with an inverted sign. In this case, flows to bond funds in emerging market economies increase by around 3.4% and in advanced economies by 1.1% of their holdings. As a result, this means that models that do not distinguish between the two channels only partially capture the impact of monetary policy on cross-border purchases of debt securities, or even provide a distorted picture.

Mixed findings for equity funds

With regard to equity funds, the results are less consistent. While new, positively received information does lead to an increase in fund flows in both groups of economies, monetary policy impulses trigger a decline in fund flows only in advanced economies. In emerging market economies, fund flows are seen to increase, which may be attributable to shifts toward funds with higher risk premia in emerging market economies.

Time variation in the importance of drivers of international portfolio flows

Various causes of time variation in the importance of drivers of portfolio flows

In the above considerations, it was implicitly assumed that the importance of the various drivers of portfolio flows remained constant over time, and any variation in their specific influence over time was not taken into consideration. However, this assumption may be too restrictive, for example due to information asymmetries, heterogeneity amongst investors, budget constraints, and reappraisals of risks. Moreover, in the case of individual variables, certain thresholds also play an important role.[34]

Information asymmetries

Information asymmetries: If the supply and demand sides possess different information about the intrinsic value of a security, it is not possible for the market to clear completely. The drivers of portfolio flows would shift depending on whether there is excess supply or demand.[35]

Heterogeneous investors

Heterogeneous investors: Domestic and foreign investors may have different investment motives. A change in the importance of individual drivers may therefore reflect the activity of different groups of investors.[36]

Budget constraints

Budget constraints: Investors are, to some extent, tied to the specific risk profiles of managed portfolios. If the relevant specifications are violated, for example, due to financial market stress, this can lead to assets being sold off in the financial markets, which in turn can trigger further selling. As a result, the importance of risk measures may grow over time.[37]

Reappraisal of risks

Reappraisal of risks: Investors and economists learn from economic changes. For example,

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32 Flows to investment funds are generally used as a proxy for portfolio flows. The advantage of these data is that they are available at a relatively high frequency and earlier than the official balance of payments statistics.
33 This result is also consistent with other studies, such as Kalemli-Özcan (2019).
34 See Lo Duca (2012).
35 See Mody and Taylor (2012).
36 See Forbes and Warnock (2012).
37 See Adrian and Shin (2010).

Variation in the importance of push and pull factors for portfolio flows over time

The extent to which portfolio flows are influenced by international (push) and country-specific (pull) factors has already been subject to both comprehensive and controversial discussion in the economic literature. A discussion paper recently published by the Bundesbank investigates the question of how the importance of these factors changes over time.[1] To this end, a Bayesian dynamic factor model with time-varying coefficients and time-varying stochastic volatility is estimated.[2] This model can be used to explain not only when certain factors were important for individual countries in the past, but also which factors are important at present. The approach is based on the idea that capital flows to individual countries can be broken down into a common component and a country-specific component. In this context, the model accounts for the fact that the weights of these components can shift over time. The common component is interpreted as a push factor and the country-specific component is interpreted as a pull factor.

For the analysis, portfolio flows are approximated using flows to investment funds, as these data are available earlier and at a higher frequency than balance of payments data. Monthly data on 26 emerging market economies and 21 advanced economies from EPFR Global are used for this purpose.[3] The observation period extends from August 2005 to September 2020. The investigation distinguishes between capital flows to advanced economies and those to emerging market economies. In addition, the data allow a distinction to be made between equity funds and bond funds. This results in four different variations, for each of which a factor model is estimated.

The objective of the factor model is to break down each individual time series under observation $(y_{i,t})$ into a common component, factor (f_t), and a country-specific component, residual $(\epsilon_{i,t})$:

$$y_{i,t} = a_i + b_{i,t} f_t + \epsilon_{i,t}\,.$$

The indices i and t represent the country and period under observation, respectively. The constant (a_i) refers to the specific country in question and is not time-dependent. By contrast, the factor can have a different impact on the respective fund flows for each country and at each point in time. The sensitivity of the fund flows to the factor is determined by the time-varying parameter $b_{i,t}$, which is assumed to follow a random walk:

$$b_{i,t} = b_{i,t-1} + \sigma_{\eta i}\eta_{i,t}\,.$$

The intensity of the time variation is defined by the term $\sigma_{\eta i}\eta_{i,t}$, where $\sigma_{\eta i}$ describes the variance and $\eta_{i,t} \sim N(0,1)$ is true.

Both the factor and the country-specific component follow autoregressive processes of order $p = 2$ and $q = 3$:[4]

$$f_t = \phi_{0,1} f_{t-1} + \ldots + \phi_{0,q} f_{t-q} + e^{h_{0,t}} u_{0,t}$$
$$\epsilon_{i,t} = \phi_{i,1}\epsilon_{i,t-1} + \ldots + \phi_{i,p}\epsilon_{i,t-p} + \sigma_i e^{h_{i,t}} u_{i,t}.$$

Here, $u_{0,t}$ and $u_{i,t}$ are the respective error terms. The autoregressive dynamics of the factor and the country-specific components are described using the parameters ϕ. In addition, the model also accounts for vari-

1 See Bettendorf and Karadimitropoulou (2022).
2 See Del Negro and Otrok (2008).
3 These fund data differ from balance of payments data in that they cover only a subset of the total portfolio flows and, at the same time, depict the total flows to funds that invest in a given country. This means that they also cover funds invested by residents.
4 The number of time lags corresponds to the specification in Del Negro and Otrok (2008). The lags account for the assumption that both the common and country-specific components represent macroeconomic variables as drivers of portfolio flows.

Breakdown of variance in flows into contributions of push and pull factors*

Percentage contributions

Region	Country	Factor	Aug. 2005	Aug. 2008	Aug. 2011	Aug. 2014	Aug. 2017	Sep. 2020
Advanced economies (bond funds)	Canada	Push factor	45	46	60	64	73	77
		Pull factor	55	54	40	36	27	23
	France	Push factor	53	90	97	99	99	99
		Pull factor	47	10	31	1	1	1
	Germany	Push factor	51	70	81	88	91	92
		Pull factor	49	30	19	12	9	8
	Italy	Push factor	54	88	96	98	99	99
		Pull factor	46	12	4	2	1	1
	Japan	Push factor	34	59	85	91	94	95
		Pull factor	66	41	15	9	6	5
	United Kingdom	Push factor	40	64	79	85	91	93
		Pull factor	60	36	21	15	9	7
	United States	Push factor	7	26	51	65	82	88
		Pull factor	93	74	49	35	18	12
Advanced economies (equity funds)	Canada	Push factor	20	24	14	5	11	12
		Pull factor	80	76	86	95	89	88
	France	Push factor	50	81	93	97	98	98
		Pull factor	50	19	7	3	2	2
	Germany	Push factor	39	39	17	39	48	47
		Pull factor	61	61	83	61	52	53
	Italy	Push factor	43	68	85	89	90	91
		Pull factor	57	32	18	11	10	9
	Japan	Push factor	35	39	33	24	15	10
		Pull factor	65	61	67	76	85	90
	United Kingdom	Push factor	58	75	81	85	87	87
		Pull factor	42	25	19	15	13	13
	United States	Push factor	20	26	35	15	12	14
		Pull factor	80	74	65	85	88	86
Emerging market economies (bond funds)	Brazil	Push factor	55	57	57	54	56	57
		Pull factor	45	43	43	46	44	43
	China	Push factor	54	33	21	15	11	10
		Pull factor	46	67	79	85	89	90
	India	Push factor	53	26	12	5	3	4
		Pull factor	47	74	88	95	97	96
	Indonesia	Push factor	49	67	74	74	67	65
		Pull factor	51	33	26	26	33	35
	Russia	Push factor	51	71	77	75	73	72
		Pull factor	49	29	23	25	27	28
	South Africa	Push factor	56	73	79	80	77	71
		Pull factor	44	27	21	20	23	29
	Turkey	Push factor	58	70	74	71	63	48
		Pull factor	42	30	26	29	37	52
Emerging market economies (equity funds)	Brazil	Push factor	43	52	49	47	42	40
		Pull factor	57	48	51	53	58	60
	China	Push factor	42	35	20	13	7	5
		Pull factor	58	65	80	87	93	95
	India	Push factor	36	46	40	33	23	22
		Pull factor	64	54	60	67	77	78
	Indonesia	Push factor	36	55	61	64	66	65
		Pull factor	64	45	39	36	34	35
	Russia	Push factor	51	51	49	45	44	45
		Pull factor	49	49	51	55	56	55
	South Africa	Push factor	39	63	76	82	84	84
		Pull factor	61	37	24	18	16	16
	Turkey	Push factor	53	58	59	52	45	44
		Pull factor	47	42	41	48	55	56

* The table shows the contributions of the respective push and pull factors to the variance in flows to investment funds that invest in particular countries.

Deutsche Bundesbank

ation in the volatility ($h_{i,t}$) of the components over time, which follows a random walk:

$$h_{i,t} = h_{i,t-1} + \sigma_{\zeta i}\zeta_{i,t},$$

where $\sigma_{\zeta i}$ describes the variance and $\zeta_{i,t} \sim N(0,1)$ is true.

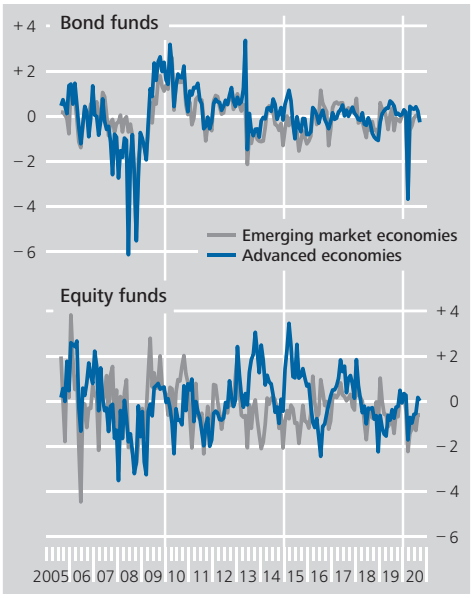
The estimated factors (f_t) in the four models are shown in the adjacent chart. Both the global financial crisis in 2008 and the financial market turmoil at the start of the COVID-19 pandemic in March 2020 are captured by all of the models in the common push factors. This suggests that the model correctly recognises global events and allocates them to the appropriate factor.

However, the key question of this analysis is: "To what extent does each factor influence the flow of funds to each country?". In order to answer this question, the variance in fund flows is broken down into the contributions of each factor. The table on p. 52 shows the relative contribution of each factor to the variance in flows to equity and bond funds in selected countries. In this case, this approach reveals a high degree of heterogeneity with regard to the relative importance of factors within different regions and asset classes. The table shows the shares of the variance in each fund flow that can be explained by push and pull factors at various points in time for selected countries. For example, the relative importance of push factors for portfolio flows to advanced economies has increased over time – this holds especially true for EU Member States. With regard to portfolio flows in emerging market economies, the results vary significantly by region (advanced versus emerging market economies) and asset class (equities versus bonds).

One advantage of this approach is that it is agnostic when determining the international and country-specific drivers. Commonalities are interpreted as push factors, whilst all other aspects are considered to be pull factors. This means that the factors are calculated in a purely statistical manner, which implicitly also takes account of variables that are unknown in the literature. For this reason, the results may differ from studies that focus on the importance of individual drivers.[5]

The model class presented here provides deep insight into the portfolio flows under observation not only with regard to their cross-section, but also into how they change over time. However, this comprehensive picture comes at a cost. Due to the considerable number of different parameters, the estimates are subject to a comparatively high level of uncertainty. This should be taken into consideration when interpreting the results.

Estimated factors for flows to investment funds*



Source: Bundesbank calculations based on data from EPFR Global. * Development over time of estimated factors derived from Bayesian dynamic factor models with time-varying coefficients for various samples. At each point in time, the respective medians of the posterior distributions are depicted.
Deutsche Bundesbank

5 See, inter alia, Fratzscher (2012) and Lo Duca (2012).

the global financial crisis also led to changes in modelling. Since the crisis, much more attention has been given to the real estate markets and the banking sector than had been before.

Thresholds

Thresholds: Certain variables may gain or lose importance for international capital flows if they exceed or fall short of specific thresholds. For example, foreign currency reserves contribute to the external stability of an economy, but, if holdings exceed a certain threshold, they may become less relevant as a variable for investors.

Estimating time variation is computationally intensive

It should therefore come as no surprise to find empirical evidence of shifts in the importance of drivers of portfolio flows. Nevertheless, the estimation methods for such matters are much more complex and have only recently gained in popularity.

Empirical studies sometimes resort to a temporal separation of samples

Before time variation was explicitly mapped in models, studies simply looked at individual time periods separately. For example, Fratzscher (2012) found that portfolio flows were heavily influenced by international drivers such as the TED spread at the time of the global financial crisis, while individual country-specific drivers gained in importance later on. In addition, the study also points to differences in the importance of drivers amongst individual countries. The fact that countries react to individual drivers to differing degrees can, for example, be attributed to the quality of institutions, country-specific risk, or macroeconomic fundamentals.

Major change in the importance of drivers following global financial crisis

Lo Duca (2012) published one of the first studies on portfolio flows to explicitly model time variation and found evidence of a change in the importance of individual drivers. In this context, the study established connections between flows and specific variables including confidence, credit risk in the interbank market, and regional developments in emerging market economies. The results of the study point to significant changes in the importance of individual drivers. Prior to the global financial crisis, the regional macroeconomic environment played an important role in portfolio equity flows to emerging market economies. However, following the collapse of the US investment bank Lehman Brothers in 2008, there was a significant withdrawal of equity portfolio investment from these countries. According to Lo Duca's model, a loss of confidence among market participants set in at this time, leading to a change in the importance of individual drivers of portfolio flows.

Increased significance of push factors as a whole for EU Member States

A study recently published by the Bundesbank analyses the relative importance of push and pull factors for portfolio flows.[38] The study does not examine individual drivers, however, but instead statistically determines pull factors and push factors from the flows and views each set of factors collectively (see the box on p. 51). This approach is agnostic as far as the specific factors are concerned. The advantage of this is that no material determinants are overlooked. The results suggest that time variation is of particular significance, with a high degree of heterogeneity in the importance of the factors within different regions (advanced economies versus emerging market economies) and asset classes (equities versus bonds). For example, the importance of push factors for portfolio flows in many advanced economies has increased significantly over time – especially in EU Member States. By contrast, with respect to flows into emerging market economies, the picture is very heterogeneous.

Conclusion

Portfolio flows are a key factor in the external interconnectedness of economies as well as in their economic development. This is because they contribute, amongst other things, to an efficient allocation of capital, enable investors to diversify their risk, and allow risk to be shared in the event of unforeseen events. However, notwithstanding the positive aspects,

38 See Bettendorf and Karadimitropoulou (2022).

close interconnectedness can also lead to external dependencies and help economic crises to spread more quickly. From an economic policy perspective, a sound understanding of the main drivers of capital flows is therefore essential.

Which variables have the greatest impact on portfolio flows depends on a number of criteria. The level of development (advanced economies versus emerging market economies) and the asset class (equities versus bonds) play key roles here. At the superordinate level, the respective drivers can be divided into global factors (push factors) and country-specific factors (pull factors). However, individual drivers affect portfolio flows both from a global economic perspective and from a country-specific perspective. In addition to other factors, such as economic developments, monetary policy also plays an important role, as it has a significant impact on the international interest rate environment and the risk assessment in the financial markets.

The results presented here suggest that the US Federal Reserve, in particular, has a significant impact on international portfolio flows (measured in terms of fund flows) through both pure monetary policy impulses as well as information impulses. A tightening of monetary policy that leads to an increase in the interest rate level in the United States can therefore influence investors' investment behaviour in different ways. While the monetary policy impulse, and the more challenging financing conditions for enterprises associated with this impulse, mean that there will tend to be a decline in flows to bond funds, the information impulse acts in the opposite direction. This is because the interest rate hike can be interpreted as a signal from the central bank that it expects an economic upturn. The impact of both impulses is stronger in emerging market economies than in advanced economies. For equity funds, the results are inconsistent.

Moreover, the importance of push and pull factors appears to be subject to significant time variation. For example, estimation results indicate a high degree of heterogeneity with regard to the importance of factors in different regions (advanced versus emerging market economies) and asset classes (equities versus bonds). The importance of push factors for portfolio flows in many advanced economies has increased over time – especially in EU Member States. With respect to portfolio flows to emerging market economies, the results are highly heterogeneous between individual countries. This is in line with the academic literature, which indicates that investors are increasingly differentiating between individual emerging market economies.

List of references

Adrian, T. and Y. S. Shin (2010), The Changing Nature of Financial Intermediation and the Financial Crisis of 2007-2009, Annual Review of Economics, Vol. 2, pp. 603-618.

Aguilar, C. P., R. O. Soares and R. Adalid (2020), Revisiting the monetary presentation of the euro area balance of payments, ECB Occasional Paper No 238.

Anaya, P., M. Hachula and C. J. Offermanns (2017), Spillovers of U. S. unconventional monetary policy to emerging markets: The role of capital flows, Journal of International Money and Finance, Vol. 73 (part B), pp. 275-295.

Baek, I.-M. (2006), Portfolio investment flows to Asia and Latin America: pull, push or market sentiment?, Journal of Asian Economics, Vol. 17(2), pp. 363-373.

Barrot, L.-D. and L. Serven (2018), Gross Capital Flows, Common Factors, and the Global Financial Cycle, World Bank Group, Policy Research Working Paper No 8354.

Bernanke, B. (2005), The Global Saving Glut and the U. S. Current Account Deficit, Remarks at the Sandridge Lecture, Virginia Association of Economics, Richmond, VA, 10 March 2005.

Bettendorf, T. and A. Karadimitropoulou (2022), Time-variation in the effects of push and pull factors on international portfolio flows, Deutsche Bundesbank Discussion Paper No 05/2022, March 2022.

Bruno, V. and H. S. Shin (2015), Cross-Border Banking and Global Liquidity, Review of Economic Studies, Vol. 82(2), pp. 535-564.

Calvo G., L Leiderman and C. Reinhart (1993), Capital Inflows and Real Exchange Rate Appreciation in Latin America: The Role of External Factors, IMF Staff Papers Vol. 40(1), pp. 108-151.

Cerutti, E., S. Claessens, and A. K. Rose (2019), How Important is the Global Financial Cycle? Evidence from Capital Flows, IMF Economic Review, Vol. 67, pp. 24-60.

Chuhan, P., S. Claessens, and N. Mamingi (1998), Equity and bond flows to Latin America and Asia: the role of global and country factors, Journal of Development Economics, Vol. 55(2), pp. 439-463.

Ciminelli, G., J. Rogers and W. Wu (2022), The Effects of U. S. Monetary Policy on International Mutual Fund Investment, mimeo.

Dahlhaus, T. and G. Vasishtha (2020), Monetary policy news in the US: Effects on emerging market capital flows, Journal of International Money and Finance, Vol. 109(C), pp. 1-17.

Davis, J. S., G. Valente and E. v. Wincoop (2021), Global drivers of gross and net capital flows, Journal of International Economics, Vol. 128, pp. 1-21.

De Vita, G. and K. S. Kyaw (2008), Determinants of capital flows to developing countries: a structural VAR analysis, Journal of Economic Studies, Vol. 36(4), pp. 304-322.

Del Negro, M. and C. Otrok (2008), Dynamic factor models with time-varying parameters: measuring changes in international business cycles, Staff Reports, No 326, Federal Reserve Bank of New York.

Deutsche Bundesbank (2022), German balance of payments in 2021, Monthly Report, March 2022, pp. 37-57.

Deutsche Bundesbank (2020a), Global financial interconnectedness and spillovers between the G20 countries, Monthly Report, September 2020, pp. 53-73.

Deutsche Bundesbank (2020b), The impact of monetary policy on the euro's exchange rate, Monthly Report, September 2020, pp. 19-51.

Dornbusch, R. (1976), Expectations and Exchange Rate Dynamics, Journal of Political Economy, Vol. 84(6), pp. 1161-1176.

Forbes, K. J. and F. Warnock, Capital flow waves: Surges, stops, flight, and retrenchment, Journal of International Economics, Vol. 88(2), pp. 235-251.

Fratzscher, M. (2012), Capital flows, push versus pull factors and the global financial crisis, Journal of International Economics, Vol. 88(2), pp. 341-356.

Froot, K. A., P. G. J. O'Connell and M. S. Seasholes (2001), The portfolio flows of international investors, Journal of Financial Economics, Vol. 59(2), pp. 151-193.

Kalemli-Özcan, S. (2019), U. S. Monetary Policy and International Risk Spillovers, NBER Working Paper No 26297, National Bureau of Economic Research.

Kerssenfischer, M. (2019), Information effects of euro area monetary policy: New evidence from high-frequency futures data, Deutsche Bundesbank Discussion Paper No 07/2019, February 2019.

Kim, S.-J. and E. Wu (2008), Sovereign credit ratings, capital flows and financial sector development in emerging markets, Emerging Markets Review, Vol. 9(1), pp. 17-39.

Koepke, R. (2019), What drives capital flows to emerging markets? A survey of the empirical literature, Journal of Economic Surveys, Vol. 33(2), pp. 516-540.

Koepke, R. (2018), Fed policy expectations and portfolio flows to emerging markets, Journal of International Financial Markets, Institutions and Money, Vol. 55(C), pp. 170-194.

Lo Duca, M. (2012), Modelling the time varying determinants of portfolio flows to emerging markets, ECB Working Paper Series, No 1468.

Markowitz, H. (1952), Portfolio Selection, The Journal of Finance, Vol. 7(1), pp. 77-91.

Miranda-Agrippino, S. and H. Rey (2020), U. S. Monetary Policy and the Global Financial Cycle, The Review of Economic Studies, Vol. 87(6), pp. 2754-2776.

Mody, A. and M. P. Taylor (2013), International capital crunches: the time-varying role of informational asymmetries, Applied Economics, Vol. 45(20), pp. 2961-2973.

Obstfeld, M. and K. Rogoff (1996), Foundations of International Macroeconomics, MIT Press.

Reinhart, C., V. Reinhart and C. Trebesch (2016), Global Cycles: Capital Flows, Commodities, and Sovereign Defaults, 1815-2015, American Economic Review, Vol. 106(5), pp. 574-580.

Rey, H. (2013), Dilemma not trilemma: the global financial cycle and monetary policy independence, Technical report, Proceedings, Economic Policy Symposium, Jackson Hole, WY.

Sarno, L., I. Tsiakas, and B. Ulloa (2016), What drives international portfolio flows?, Journal of International Money and Finance, Vol. 60, pp. 53-72.

World Bank (1997), Private capital flows to developing countries: the road to financial integration, World Bank Policy Research Report, Oxford University Press, Oxford.