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Article

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Aussenwirtschaft

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Suggested Citation: Schmidt, Richard; Yesin, Pinar (2022) : The growing importance of investment funds in capital flows, Aussenwirtschaft, ISSN 0004-8216, Universität St.Gallen, Schweizerisches Institut für Aussenwirtschaft und Angewandte Wirtschaftsforschung (SIAW-HSG), St.Gallen, Vol. 72, Iss. 1, pp. 1-39

This Version is available at:
https://hdl.handle.net/10419/290115

The growing importance of investment funds in capital flows

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In this paper, we first document the growing importance of foreign-domiciled investment funds in countries' portfolio liabilities over time and then show empirical evidence that cross-border fund flows are coincident with asset price movements. To measure the external liabilities of countries to foreign-domiciled funds, we complement conventional balance-of-payments and international investment position data with granular and real-time data on fund flows. We find that the external exposure of countries to investment funds has been steadily increasing both for advanced and emerging market economies. Furthermore, we find that this increased external exposure is coincident with higher exchange rate fluctuations, lower bond yields and higher stock returns. Because sustainability-themed investment funds are growing faster than conventional investment funds, we also focus on Environmental, Social and Governance (ESG) funds and construct an index of sustainable finance that can distinguish between its domestic and cross-border components. Our index reveals that ESG funds domiciled in European countries tend to invest predominantly in domestic markets, whereas ESG investment in emerging market economies to a large extent originates from foreign-domiciled investment funds.

JEL codes: investment funds, portfolio investment, fund flows, ESG funds, financial markets
Key words: F32, G15, G23

1 Introduction

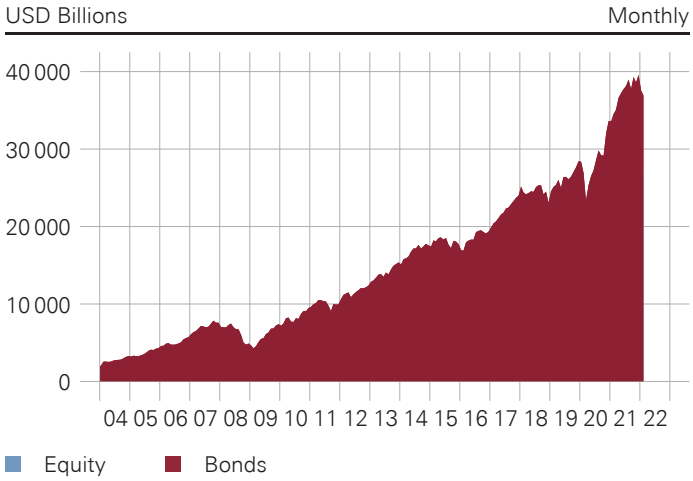
Financial markets are dynamic and continuously adapt to changing regulations, macroeconomic developments and technology. In recent years, numerous regulatory reforms in the banking sector triggered by the global financial crisis have contributed to a remarkable rise in nonbank financial intermediation. The FSB (2021) estimates that the balance sheets of nonbank financial intermediaries[2] (NBFIs) increased from USD 103 trillion in 2008 to USD 226 trillion in 2020.

1 Corresponding author: Pınar Yeşin (pinar.yesin@snb.ch). Richard Schmidt was affiliated with the SNB while working on this paper. We thank Iñaki Aldasoro for discussing our paper and giving us constructive comments at the 2022 *Aussenwirtschaft* workshop in Zurich. We also thank an anonymous referee, Martin Brown, Nathaniel Burkhalter, Cathérine Casanova, Anusha Chari, Andreas M. Fischer, Alain Gabler, Marie Hoerova, Fabio Natalucci, Richard Senner, Lukas Voellmy, Laurence Wicht and participants at the SNB brownbag seminar and the 2022 Aussenwirtschaft workshop for useful suggestions. We thank Simon Tièche and Christoph Kappeler for helpful discussions regarding the details of the data we use in this paper. Andrea Riccucci provided excellent research assistance. Any remaining errors are our own. The views, opinions, findings, and conclusions or recommendations expressed in this paper are strictly those of the author(s). They do not necessarily reflect the views of the Swiss National Bank (SNB) or StepStone Group (SSG). The SNB takes no responsibility for any errors or omissions in, or for the correctness of, the information contained in this paper..

2 Nonbank financial intermediaries include insurance corporations, pension funds, investment funds, central counterparties, broker-dealers, finance companies and structured finance vehicles, among others.

In particular, investment funds[3] other than money market funds and hedge funds exhibited striking growth after the global financial crisis. Figure 1 shows that between 2009 and 2022, assets under management (AUM) of equity and bond investment funds increased by a factor of six, to almost USD 40 trillion. During the last five years, they doubled.

Figure 1: AUM of investment funds globally



Notes: The figure shows total assets under management (AUM) of investment funds in equity and in bonds.
Source: EPFR.

As an example, Switzerland, with its large financial sector, also experienced the switch from bank finance to nonbank finance. Since the global financial crisis, its investment fund sector has boomed, while the growth of its banking sector has been subdued. Table 1 compares the total assets of investment funds domiciled in Switzerland to those of banks domiciled in Switzerland. Between 2005 and 2021, that is, during the last 16 years, the total assets of investment funds increased by almost 350% to more than CHF 1.2 trillion. This corresponds to an average annual increase of 22%. In contrast, banks' total assets increased by only 22% in total since 2005. Similarly, the number of investment funds increased by 127%, from fewer than 800 in 2005 to more than 1,800[4] in 2021, while the number of banks decreased by almost 30%, from 337 in 2005 to fewer than 240 in 2021.

3 An investment fund, also known as collective investment scheme or mutual fund, is a financial vehicle that pools money contributed by a group of investors to invest in securities and other financial instruments.

4 There were approximately 1,400 open-ended equity funds, bond funds and mixed funds domiciled in Switzerland in 2021. Their total assets amounted to 75% of the whole fund industry.

These trends indicate the growing importance of investment funds versus the declining importance of banks in the Swiss financial sector.[5]

Table 1: Investment funds versus banks domiciled in Switzerland

		2021	2005	Change
Investment funds[i]	Total assets (CHF billion)	1,230	275	347%
	Number of entities	1,803	796	127%
Banks[ii]	Total assets (CHF billion)	3,587	2,846	26%
	Number of entities	239	337	-29%

Notes: [i] Open-ended active collective investment schemes domiciled in Switzerland. [ii] Parent company perspective.
Source: SNB.

This evolving landscape of the global financial sector and the surge of investment funds have profound implications for international capital flows,[6] yet not all fund flows are capital flows. Importantly, not all investment funds have a mandate to invest cross-border and there is a significant degree of domestic investment by funds. But the commonly used data sources for capital flows cannot separately identify flows originating from investment funds. Consequently, the ongoing policy debate and research have sometimes used the terms "capital flows" and "fund flows" interchangeably. This paper fills this gap in the available data and literature by combining different data sources and properly measuring the external exposure of countries to foreign-domiciled investment funds over time.

In particular, we measure the growing importance of investment funds in international capital flows and cross-border exposures for a large group of countries by complementing the traditional lower-frequency and aggregate perspective balance of payments (BOP) and international investment position (IIP) data with the higher frequency and real-time fund flows data. In particular, we quantify the share of portfolio liabilities of each country to foreign-domiciled investment funds. This is an important step towards building a sectoral breakdown of the holders of countries' equity and debt liabilities. Although the IMF Coordinated Portfolio Investment Statistics (CPIS) provide information on "from where to where" regarding portfolio investment, they cannot answer the "from whom to whom" question. In particular, a sectoral breakdown of the holders of portfolio

5 Globally, NBFI assets' share in total financial assets increased significantly, while banks assets' share declined. At the same time, banks' links with NBFIs grew also strongly; see Aldasoro et al. (2020).

6 After the global financial crisis, international bank lending has decreased driven by the deleveraging of banks in advanced economies while market-based capital flows increased (CGFS, 2021).

liabilities of countries is not available in the conventional BOP and IIP data.[7] However, the answer to the question of which foreign sectors are financing the domestic economy may have important policy implications, depending on the investment horizon, existing exposures, externalities and regulation faced by the nonresident investor. We can partially fill this data gap by estimating the share of portfolio equity and bond liabilities to foreign-domiciled investment funds.[8]

Furthermore, we make use of the higher frequency and real-time fund flows data to nowcast countries' portfolio investment liabilities that are normally published at a lower frequency and with a longer lag. Such a nowcast can be useful for policy-makers in their external sector assessment, in estimating the external demand for domestic-currency denominated assets or in their monetary policy decisions, among others. Then, we conduct a simple empirical exercise to estimate the impact of growing external exposure on financial markets. In the second half of the paper, we focus on sustainability-themed funds – that is, Socially Responsible Investment (SRI) funds and Environmental, Social and Governance (ESG) funds (henceforth "ESG funds", for simplicity) – because they have boomed even more than conventional investment funds in recent years. We construct measures of sustainable finance that distinguish between the domestic and external components.

Our country sample consists of 20 advanced economies (AEs) and 13 emerging market economies (EMEs). Our main data sources are the EPFR and IMF Balance of Payment Statistics (BOPS) for fund flows and IIP, respectively. We focus on the period 2011–2021 and use monthly and quarterly data. We make use of either stocks data or flows data depending on the objective of the exercise we tackle.

In particular, we undertake four exercises. First, we estimate the share of investment funds in countries' portfolio equity and debt liabilities. We show that the external exposure of countries to foreign-domiciled investment funds has been increasing both for AEs and EMEs. This result is not surprising, because investment funds offer diversification, liquidity and professional management in a way that makes cross-border investment less cumbersome and less expensive for all investors across the globe. Second, we make use of the higher frequency of fund flow data to nowcast portfolio equity and bond liabilities. We find that our nowcast of portfolio equity liabilities outperforms a random walk in the vast majority of countries in our sample, while it is more difficult to nowcast portfolio

7 Although issuers of securities may know who initially acquires them in primary markets, subsequent purchases and sales cannot be traced back. In particular, the residency or the sector of the holder cannot be determined. Therefore, BOP and IIP statistics rely on data coming from banks regarding the custody accounts. Most of the time, banks aggregate these data based on residency but not on sector.

8 While this paper only analyzes countries' exposures to investment funds, the analysis can easily be repeated for other types of NBFIs, such as pension funds, if suitable data sources are available.

debt liabilities accurately using our methodology. This may be driven by the greater importance of financial institutions other than investment funds in bond markets. Third, we conduct a few empirical analyses to gauge the impact of fund flows on exchange rates and asset prices. We find that larger exposure to funds is coincident with higher exchange rate volatility and that larger fund flows are coincident with asset price increases. The latter result becomes stronger for fund flows arising from foreign-domiciled funds. Fourth, we focus on sustainability-themed funds by constructing a measure of sustainable finance and showing that sustainable finance has also impacted capital flows, though to a varying degree in different countries. In fact, we show that ESG flows to EMEs have a considerable cross-border nature, whereas ESG flows to AEs tend to be domestic investment.

Our paper adds to three strands of literature. First, it adds to the vast literature on capital flows and sheds light on the growing importance of investment funds for external exposures. Previous studies document the evolution of capital flows, external exposures and capital flow volatility and identify capital flow waves – see, for example, Calvo (1998), Lane and Milesi-Ferretti (2007), Forbes and Warnock (2012, 2021), Gelos et al. (2019), CGFS (2021) and Eguren-Martin et al. (2021), among others.[9] Due to sectoral data unavailability, however, these studies have focused on aggregate flows and did not consider sectoral capital flows. In this paper, we document that the switch from bank finance to market finance in recent years has affected how countries' exposures to foreign financial sectors have changed and provide a partial answer to the "from whom to whom" question concerning portfolio equity and debt liabilities.

Second, our paper is related to the literature on macro challenges and financial stability risks that NBFIs pose to the global economy. In particular, Claessens and Lewrick (2021) and FSB (2021) study the liquidity risks of investment funds, while Converse et al. (2020) show that the growing role of exchange-traded funds (ETFs) has amplified the exposure of EMEs to the global financial cycle. While capital flows are desirable, as they can bring significant benefits to countries, they can also be volatile and pose macro challenges and financial stability risks. This paper adds to this literature by quantifying countries' exposures to foreign-domiciled investment funds and presents evidence that countries' external exposure to investment funds has become an important channel for shocks to propagate across national borders. Thus, we show how volatile capital flows can become in response to large redemptions of investment fund shares in other countries, as observed in the March 2020 turmoil.

9 Yeşin (2015) and Yeşin (2017) focus on Switzerland and study capital flow waves and the empirical link between exchange rates and capital flows, respectively.

Third, our paper adds to the growing literature on sustainable finance. Since the United Nations' adoption of an ambitious agenda for sustainable development in 2015, the literature on sustainable finance has been growing at a rapid speed. It covers a wide set of questions from the prevalence and performance of sustainability-themed products to the impact of such products on achieving a sustainable economy to greenwashing (see, for example, Pastor et al., 2021; UNCTAD, 2021; Schoenmaker, 2018). We contribute to this literature by documenting the cross-border aspect of sustainability-themed investment funds.

Our analysis yields four important findings with policy implications. First, the external exposure of countries to investment funds is on the rise for both bonds and equity. Second, higher external exposure to bond funds is coincident with higher depreciations during the March 2020 turmoil. Third, our methodology to nowcast equity liabilities using the index of external exposure to investment funds performs better than using a random walk. Fourth, sustainable finance is on the rise for all countries, albeit at different level and with varying cross-border exposure.

2 Not all fund flows are capital flows

In this section, we explain the relationship between capital flows and fund flows, as well as the relationship between external liabilities and AUM. Although in the literature and in the media fund flow data are sometimes used as a proxy for capital flows, they in fact measure different concepts. Similarly, the AUM of investment funds in a given country should not be treated as external liabilities of that country. In this paper, we exploit the granularity of the fund flows data to identify capital flows channeled by foreign-domiciled investment funds.

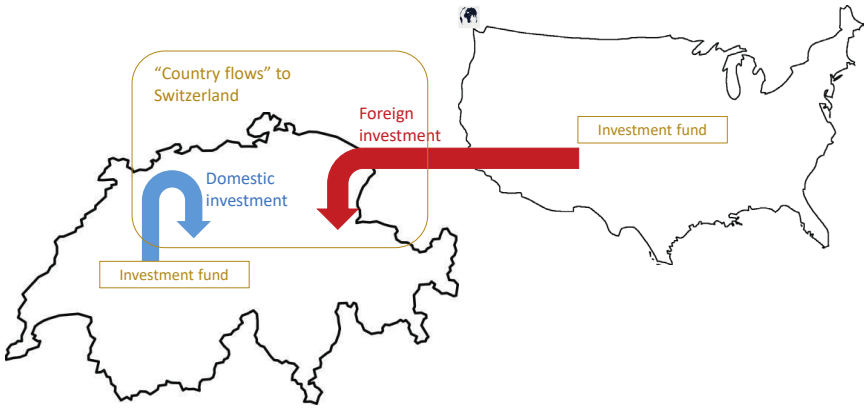
Capital flows occur through the transfer of ownership of a financial asset between residents and nonresidents of a country. Thus, a country's financial account records only the cross-border transactions as capital flows, while its IIP records cross-border asset and liability stocks. These data are compiled by national statistical authorities and follow the BOP accounting standards as described in the IMF Balance of Payments and International Investment Manual (BPM6). Countries report their data to the IMF on a regular basis. These data are available in the IMF's Balance of Payments Statistics (BOPS) database with a quarterly frequency and usually come with a long lag.[10]

10 Few countries compile and publish flows and stocks data at a monthly frequency. For a very small number of emerging market economies, IIF publishes daily or weekly data of capital inflows into portfolio investment, but the corresponding IIP data are not available at this high frequency.

In contrast, fund flows measure purchases and redemptions of fund shares by all investors independent of their residency. EPFR's flow and allocation data record investor demand for equity and bond funds as well as how funds allocate their investment to different countries.[11] Because not all investment fund transactions are between residents and nonresidents, fund flows data compiled by EPFR differ from capital flows data taken from the IMF BOPS. In fact, fund flows data mainly capture shifts in investor sentiment and momentum and in real time (Koepke and Paetzold, 2020; Ben-Rephael et al., 2012). These data are available on a daily frequency and have a short lag.

To illustrate how capital flows and fund flows are related to each other, Figure 2 depicts two countries – Switzerland and the United States – where two investment funds are domiciled. We assume, for simplicity, that there are no other countries and no other investment funds. In addition, we assume that both funds have a mandate to invest in Switzerland. Thus, they both invest in assets issued by Swiss-domiciled entities. In this case, fund flows to Switzerland will be the sum of the investments by these two funds into Swiss equity and bond markets. In contrast, only the flows of the investment fund domiciled in the United States and investing in Switzerland will be recorded as capital inflows to Switzerland. Similarly, the AUM of the United States investment fund vis-à-vis Switzerland will be recorded as external liabilities of Switzerland to the United States. Further information on how the EPFR and IMF BOPS data are related to each other can be found in Appendix A.

Figure 2: Fund flows versus capital flows



Notes: The figure shows investment into Switzerland by two investment funds. Fund flows to Switzerland (country flows) is the sum of all investment into Switzerland. However, only the claims of the investment funds that are domiciled in the United States are cross-border, therefore, fund flows will not be equal to capital flows.

Source: Authors' illustration.

11 Note also that funds generally maintain a cash buffer so that flows in and out of funds do not necessarily result in immediate corresponding transactions of the underlying asset.

3 Data used in our analysis

In this paper, we rely on two main sources of data: EPFR for fund flows and AUM data; and IMF BOPS for capital flows and IIP data. These data sources provide both end-of-period stocks data as well as during-the-period flows data, both of which we make use of.

Specifically, from EPFR, we use *country flows* data. Country flows measure total investment into each country from all fund types across the globe. They are a derived dataset by EPFR in which each fund's flow data are combined with its portfolio allocation information. Country flows data are available for equity and bonds separately. These data are actual flows and are not estimates based on changes in stocks and changes in asset prices or exchange rates. Therefore, country flows data reliably measure actual investment decisions. Furthermore, data on AUM are available for each country. In our analysis, we use monthly and quarterly data from EPFR.[12]

We use IMF BOPS data to select our sample of countries based on their global importance as destination countries for portfolio investment. We select the 30 countries with the largest portfolio investment liabilities in 2019 and the 30 countries with the largest portfolio investment inflows during 2015–2019.[13] Then, we merge these samples, as there is a significant overlap. Our final sample has 20 AEs and 13 EMEs with available EPFR and IMF data, covered approximately 88% of the world's portfolio investment liabilities in 2019, and was behind 87% of world GDP in 2019. Further information on our sample can be found in Appendix B.

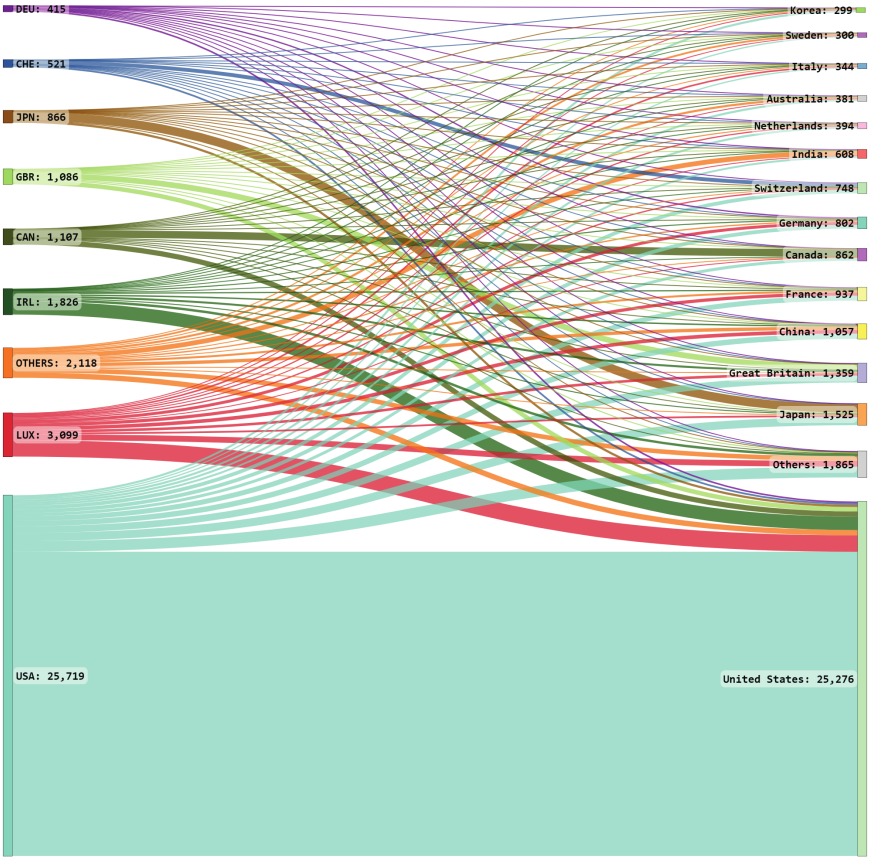
Figure 3 gives a quick look into the data we use in this paper. The figure illustrates the asset and liability positions of domicile and destination countries based on investment funds' AUM in our sample as of February 2022. Fund domicile countries are shown on the left-hand side, while the destination countries are shown on the right-hand side. The figure shows that investment funds are clustered in relatively few countries, such as the United States, Luxembourg, Ireland and Canada. The group "*Others*" on the left-hand side includes, in order of decreasing AUM, India, France, Australia, Sweden, China, Spain and the Netherlands, among others. The destination countries are far more diverse, ranging from the United States to Korea. Furthermore, there is significant inbound investment for

12 The EPFR also provides daily and weekly data that we do not use in this paper as the higher-frequency fund flows data do not add much benefit for our purposes.

13 We select our sample of countries based on their importance in global financial integration. There may be other countries not included in our sample that may be affected by the developments in global financial markets. However, those countries outside of the scope of our paper are less likely to be the source of a macrofinancial shock and/or policy changes that may be propagated internationally via portfolio investment exposures.

the United States, while less so for other countries such as Japan and Switzerland. The figure shows that it is important not to use fund flows and capital flows terms and data interchangeably, as inbound investment may blur the picture.

Figure 3: Domicile and destination countries of investment funds



Notes: The figure shows the AUM of equity and bond funds in our sample of countries as of February 2022. The countries on the left-hand side are those where investment funds are domiciled. The countries on the right-hand side are the recipients of fund flows.

Source: EPFR.

4 Measuring external exposure to investment funds

In this section, we construct an index to measure the external exposure of countries to foreign-domiciled investment funds. In particular, for each country in our sample, we calculate the share of portfolio liabilities channeled via foreign-domiciled investment funds to total portfolio liabilities. We calculate three versions of this index: portfolio equity, portfolio debt and total portfolio.

Specifically, for each country i at time t,

$$External\ exposure\ to\ funds_{i,t} = \frac{AUM\ Investment\ Funds_{i,t}^{Foreign\ domic}}{Portfolio\ investment\ liabilities_{i,t}} \quad (1),$$

where the denominator represents the portfolio investment liabilities of country i at time t, and the numerator is the value of AUM of foreign-domiciled investment funds investing in country i at time t.[14] In other words, the index measures the share of portfolio liabilities to nonresident investment funds in all portfolio liabilities of a country. The index takes a value between 0 and 1 when there are no data gaps in the IIP data. The index can be calculated for bonds and equity separately, as well as for total portfolio investment.

The index in Equation (1) has several advantages. It is a simple index to calculate and interpret. Higher values of the index indicate higher external exposure to investment funds; that is, the index tells us how exposed a country is to foreign-domiciled investment funds. Another advantage of the index is that it relies on existing financial data from two different sources; thus, any potential data gaps in these different sources will be unrelated to each other. A potential shortcoming of the index is that it only gives a lower bound for external exposure because currently the EPFR has an impressive but not full coverage of all funds globally.[15] Thus, in reality, the external exposure of countries to funds may be slightly higher than our estimates.

Note that the denominator is usually available only at a quarterly frequency because IIP data are compiled less frequently. In contrast, the numerator is available at daily, weekly and monthly frequencies because EPFR collects data from investment funds at these higher frequencies. Therefore, the index can be calculated at a quarterly frequency with exact precision, and at daily, weekly, or monthly frequencies with some imprecision, keeping the denominator fixed

14 There are alternative ways to measure exposure to investment funds. Since the focus of this paper is on capital flows, our index only measures the prevalence of foreign investment channeled via investment funds. Another way to measure exposure to investment funds would be to consider all stock market capitalization or total outstanding debt and AUM of all equity or bond funds in the respective country.

15 Our main assumption in this assessment is that the IIP data are compiled correctly, which may not be true.

during the quarter. For the scope of this paper, we calculate the index at monthly and quarterly frequencies as higher frequencies introduce a level of imprecision that would compromise the reliability of our results.

Tables 2 and 3 give a quick overview of the external exposure index to equity and bond funds in each country at the start and end of our sample period, respectively.[16] For the vast majority of countries in the sample, external exposure to both bond and equity funds is higher at the end of the sample period compared to at the start. For example, the external exposure of Switzerland to equity funds almost doubled from 0.15 in 2011 Q1 to 0.29 in 2021 Q4, while the exposure to bond funds increased by a factor of six from 0.02 in 2011 Q1 to 0.12 in 2021 Q4. Remarkably, there is large cross-country heterogeneity in the level and trend of the exposure index.

For the whole sample, external exposure to equity funds increased from 0.19 in 2011 Q1 to 0.26 in 2021 Q4. During the same period, external exposure to bond funds more than quadrupled from 0.02 to 0.09. Note also that, in general, the index has larger values for equities than for bonds. Consequently, foreign investment in bonds does not necessarily come via investment funds, whereas foreign-domiciled equity funds hold a substantial share of equity liabilities.

As mentioned earlier, the index may be inaccurate if the underlying data have measurement issues or gaps. For example, if the fund coverage is too low, the index may be underestimated. In contrast, if the IIP has any data gaps, then the index may be overestimated and, in extreme cases, may even exceed the value of 1. Potential gaps in our sample are easily visible in the cases of Argentina, Egypt and India, as seen in Table 2. In all three countries, the external exposure index to equity funds exceeds the value of 1 either at the beginning or at the end of the sample period, or both. This is because these countries' portfolio investment liabilities in the IIP are lower than the claims of foreign-domiciled funds in these countries, as reported by EPFR. Either or both of these data sources may potentially have data gaps, which are difficult to determine. However, for these countries, stock market capitalization is significantly higher than the reported AUM of investment funds; thus, we conclude that AUM is not overestimated. Instead, portfolio equity liabilities in official IIP statistics seem to be too low.[17] Regardless of what the source of the data gap is, we exclude these countries from our EME sample when using the external exposure index to equity funds in the remaining parts of our paper.

16 The total external exposure index will be a weighted average of these two indices, which we do not report separately here.

17 If these countries' portfolio liabilities are held in custody accounts at banks outside of the jurisdiction, an accurate data compilation may be difficult to achieve and data gaps may be significant.

Table 2: External exposure to equity funds

Country	2021 Q4	2011 Q1	Change (pp)
Egypt[i]	6.66	1.72	494
Argentina[i]	4.20	1.07	313
India	1.64	0.74	90
Indonesia[i]	0.63	0.27	36
Chile	0.61	0.39	22
China	0.60	0.54	6
Czech Rep.	0.59	0.38	21
France	0.51	0.21	30
South Africa[i]	0.49	0.37	12
Italy	0.44	0.18	26
Russia[i]	0.44	0.44	0
Norway[i]	0.43	0.36	7
Japan	0.41	0.28	13
Korea	0.40	0.39	-1
Denmark	0.39	0.20	19
Spain	0.38	0.14	24
Canada	0.37	0.11	26
Sweden	0.36	0.18	18
Brazil	0.35	0.35	0
Germany	0.35	0.19	16
United Kingdom	0.35	0.21	14
Mexico	0.35	0.25	10
Australia	0.33	0.16	17
Hong Kong	0.31	0.19	12
Singapore[i]	0.31	0.25	6
Thailand	0.31	0.37	-6
Finland	0.30	0.17	13
Switzerland	0.29	0.15	14
Austria	0.28	0.14	14
Netherlands	0.23	0.13	10
United States	0.19	0.08	11
Belgium	0.18	0.17	1
Ireland	0.01	0.01	0
Total	*0.26*	*0.19*	*7*

Notes: [i] The exposure index cannot be calculated in 2011 Q1 due to missing portfolio liabilities data in IMF BOPS. Instead, the first available data are shown under 2011 Q1. Countries are sorted in decreasing order by the value of the index in 2021 Q4.

Sources: EPFR; IMF BOPS; authors' own calculations.

Table 3: External exposure index to bond funds

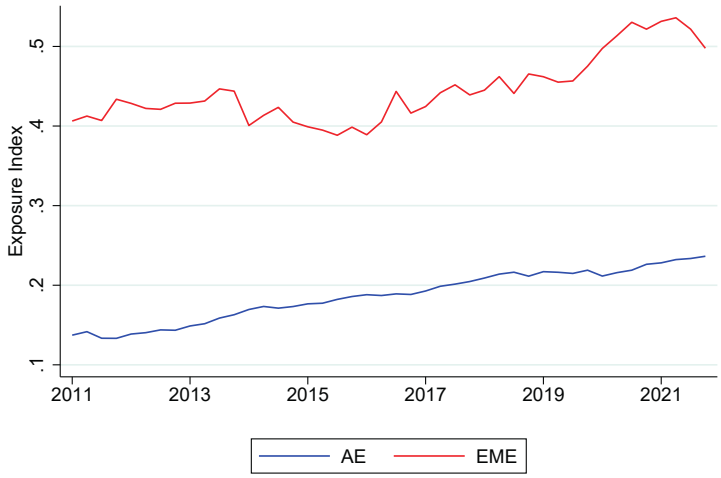
Country	2021 Q4	2011 Q1	Change (pp)
Russia[i]	0.33	0.73	-40
South Africa[i]	0.33	0.26	7
Thailand[i]	0.30	0.18	12
Indonesia[i]	0.28	0.24	4
Brazil	0.24	0.11	13
India	0.24	0.07	17
Egypt[i]	0.23	0.03	20
China	0.18	0.20	-2
Italy	0.17	0.02	15
Mexico	0.17	0.19	-2
Chile	0.15	0.12	3
Singapore[i]	0.14	0.23	-9
Czech Rep.	0.13	0.02	11
Spain	0.13	0.01	12
Hong Kong	0.13	0.08	5
Argentina[i]	0.12	0.10	2
Switzerland	0.12	0.02	10
Germany	0.10	0.02	8
Sweden	0.10	0.03	7
Belgium	0.08	0.01	7
Denmark	0.08	0.03	5
France	0.08	0.01	7
Korea	0.08	0.08	0
United States	0.08	0.01	7
Austria	0.07	0.01	6
United Kingdom	0.07	0.02	5
Norway[i]	0.07	0.04	3
Netherlands	0.06	0.01	5
Australia	0.05	0.03	2
Finland	0.05	0.01	4
Canada	0.04	0.02	2
Japan	0.04	0.03	1
Ireland	0.03	0.00	3
Total	*0.09*	*0.02*	*7*

Notes: [i] The index cannot be calculated in 2011 Q1 due to missing portfolio liabilities data in IMF BOPS. Instead, the first available data are shown under 2011 Q1. Countries are sorted in decreasing order by the value of the index in 2021 Q4.

Sources: EPFR; IMF BOPS; authors' own calculations.

Next, we calculate the exposure index for two subsamples separately – namely, for AEs and EMEs – to provide an aggregate overview of the evolution of the exposure index.[18] Figures 4 and 5 illustrate the exposure index to equity and bond funds over time in those two subsamples, respectively. The figures show that the indices have been steadily increasing in recent years in both subsamples. In other words, portfolio investment channeled by investment funds has been steadily growing over time both in AEs and in EMEs. Remarkably, both indices are at significantly higher levels in EMEs than in AEs. This may be driven by various factors, such as the risk aversion of retail investors and barriers to investing in EMEs for retail investors. . In other words, it may be easier, cheaper and less risky for an AE investor to invest in EMEs via investment funds. Note also that some of the volatility in the exposure index in earlier years is probably due to EPFR increasing its coverage of investment funds over time.

Figure 4: External exposure index to equity funds in AEs and EMEs over time

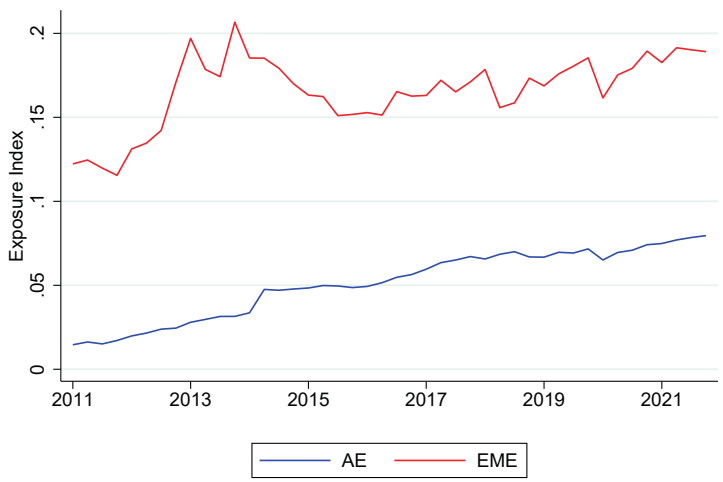


Notes: The figure shows the external exposure index to equity funds in AEs and in EMEs in aggregate, following Equation (1). We exclude Argentina, Egypt and India from the EME sample due to potential data gaps.

Sources: EPFR; IMF BOPS; authors' own calculations.

18 EMEs are Argentina, Brazil, Chile, China, Czech Republic, Egypt, India, Indonesia, Korea, Mexico, Russia, South Africa and Thailand. Argentina, Egypt and India are excluded from the calculations of the equity exposure index due to their apparent data gaps in IIP statistics.

Figure 5: External exposure index to bond funds in AEs and EMEs over time



Notes: The figure shows the external exposure index to equity funds in AEs and in EMEs in aggregate, following Equation (1).

Sources: EPFR; IMF BOPS; authors' own calculations.

5 Nowcasting portfolio investment liabilities

This section presents a methodology to nowcast portfolio equity and bond liabilities of each country using their external exposure index at a monthly frequency. A nowcast of portfolio liabilities is useful because IIP data are normally available with a long lag and at a low frequency, and therefore cannot be effectively used for policy-making in real time. We make use of the increasing importance of foreign-domiciled investment funds in portfolio investment and the higher frequency of EPFR data in our nowcast.

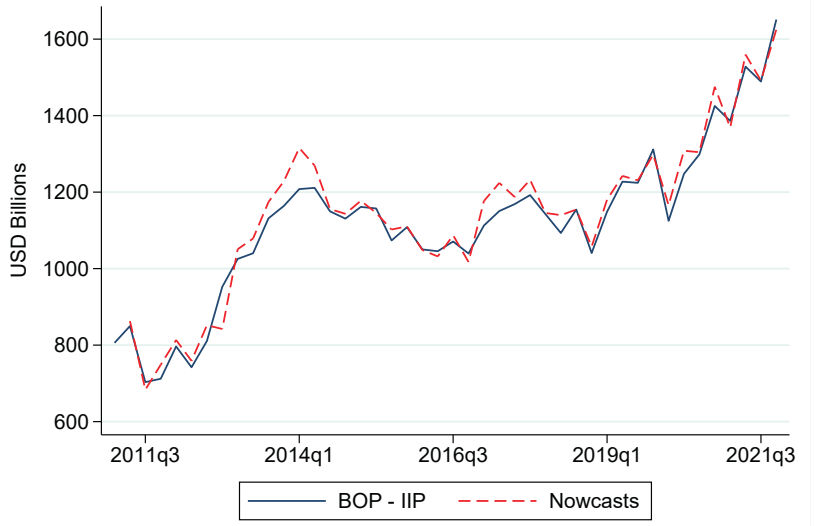
Following Equation (1), our nowcast of portfolio investment liabilities relies on the external exposure index value in the previous period and the AUM of investment funds in this period. Namely,

$$Portfolio\ investment\ liabilities\ nowcast_{i,t} = \frac{AUM\ Investment\ Funds_{i,t}^{Foreign\ domiciled}}{External\ exposure\ index_{i,t-1}} \quad (2),$$

Note that we implicitly assume that the exposure index remains relatively stable over time so that we can make accurate nowcasts.

We nowcast both equity liabilities and bond liabilities for each country in our sample over time following Equation (2). Figure 6 shows the official data juxtaposed with our nowcast for Switzerland at quarterly frequency. The figure shows that our nowcast is a fairly good indicator of official data that will be compiled and released with some lag. Note that the nowcast is almost spot on in some quarters, although there are also some apparent divergences in other quarters. In general, when the nowcast diverges from official data, it tends to overestimate. This overestimation may be driven by the increasing coverage of funds in EPFR data over time.

Figure 6: Nowcast and actual data for portfolio equity liabilities of Switzerland

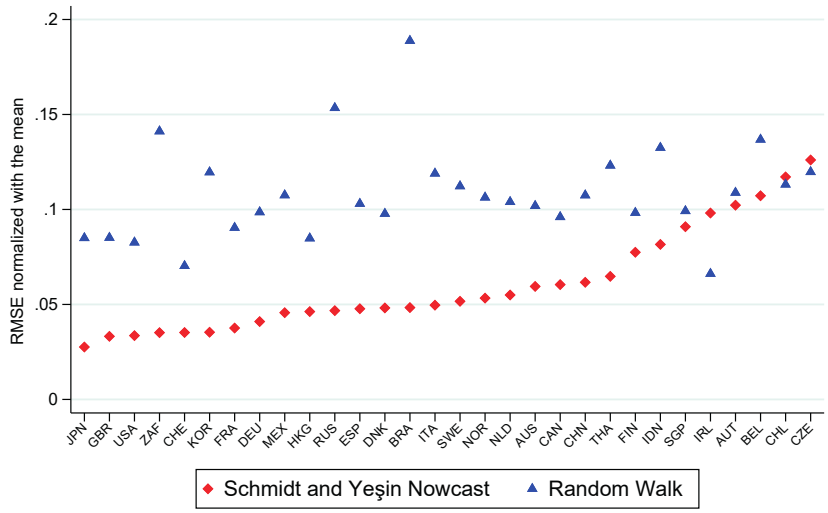


Notes: The figure shows official data for portfolio equity liabilities of Switzerland as published by the Swiss National Bank and its nowcast based on Equation (2).
Sources: EPFR; SNB; IMF BOPS; authors' own calculations.

We test the predictive power of our nowcasts for each country by comparing them to that of a random walk. We calculate the prediction errors at a quarterly frequency for each country using our method as well as for a random walk. Lower values of prediction errors indicate a higher prediction accuracy. We normalize by dividing the root mean square error by the mean of the variable in question to perform a cross-country comparison. Figure 7 illustrates that our equity liabilities nowcast is fairly successful in predicting portfolio equity liabilities in the vast majority of countries in our sample. Indeed, in all countries except Ireland, Chile and the Czech Republic, our nowcast of portfolio equity liabilities outperforms a

random walk. The outperformance of a random walk is largest for Ireland, while for Chile and the Czech Republic, the outperformance is negligible.

Figure 7: Predictive power of nowcast for portfolio equity liabilities



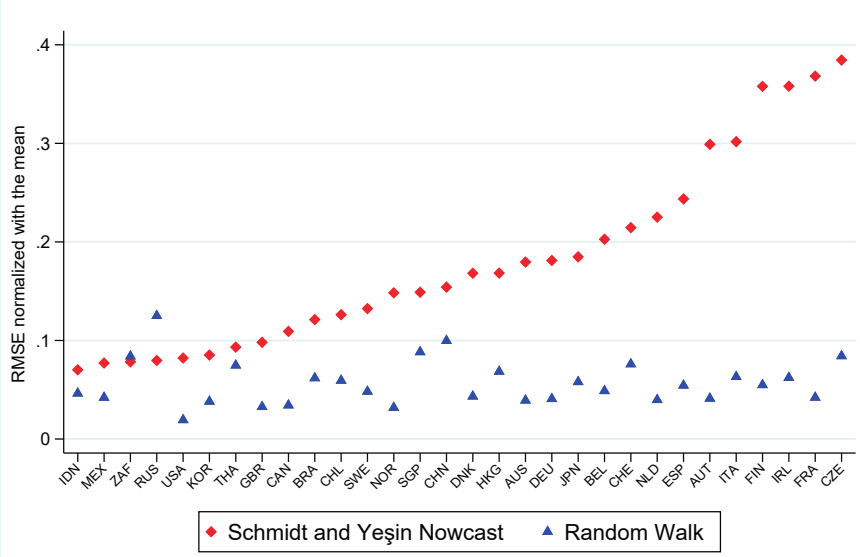
Notes: The figure shows the root mean square errors (RMSE) from the nowcast exercise and from a random walk normalized with the mean of the underlying variable.

Sources: EPFR; IMF BOPS; authors' own calculations.

In contrast, the predictive power of our nowcast for portfolio debt liabilities is very small. Figure 8 shows the root mean square errors (RMSE) for our nowcast and for a random walk.[19] Except for South Africa and Russia, a random walk outperforms our nowcast. There may be various reasons for the inaccuracy of our nowcast of bonds. Of the many potential reasons, the following three are the most likely. First, we note that the values of the external exposure index for bonds are rather low. That is, investment funds play a lesser role in bond liabilities; thus, the evolution of the bond funds' AUM is not very informative for the actual developments of the portfolio debt liabilities. Second, the coverage of bond funds in EPFR may be lower than that of equity funds, and/or its coverage may increase steeply over time, making the exposure index and the nowcast subject to errors. In other words, our assumption regarding the stability of the index over time may be violated. Third, countries' portfolio debt liabilities data may be imprecise or may include some data gaps.

19 We compare our nowcast to a random walk because a random walk is a simple and important model to forecast any time-series variable.

Figure 8: Predictive power of nowcast for portfolio debt liabilities



Notes: The figure shows the root mean square errors (RMSE) from the nowcast exercise and from a random walk normalized with the mean of the underlying variable.

Sources: EPFR; IMF BOPS; authors' own calculations.

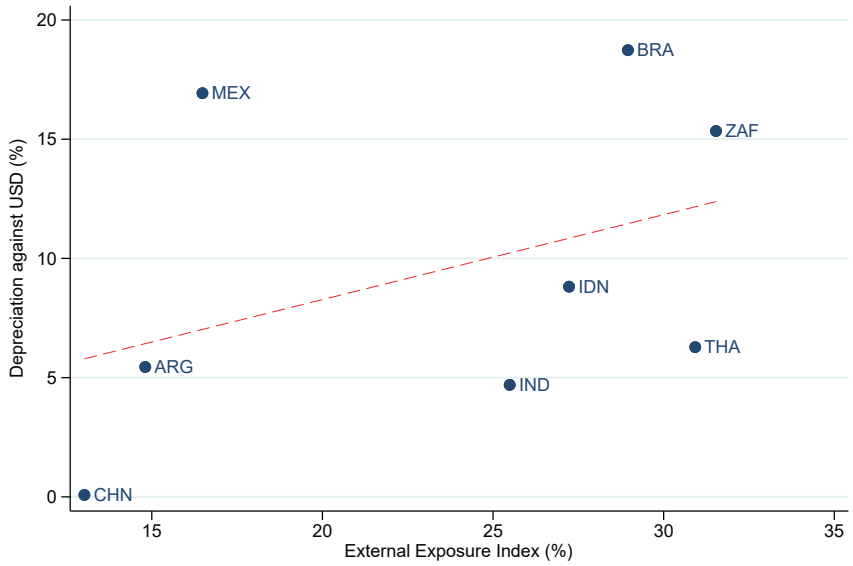
6 Relationship between fund flows and asset prices

In this section, we provide some empirical evidence for the relationship between fund flows, external exposure and movements of asset prices and exchange rates. Our analysis is inspired by the financial market developments during the March 2020 market turmoil with sudden capital outflows from EMEs and sharp asset price movements. In fact, FSB (2020), CGFS (2021) and FSB (2022) document that investment funds' transactions in March 2020 amplified capital outflows from EMEs. IMF (2020) finds that investment funds accounted for more than half of all portfolio outflows from EMEs in March 2020, although they were only one-third of the liabilities. The findings in Chari et al. (2020) imply that the actual conduits that facilitate investor flows matter in the transmission of shocks to investor risk appetite and to flows and returns.[20]

20 For example, the authors show that passive fund redemptions are more responsive to shocks than active fund redemptions.

Motivated by these findings, we first study the link between the external exposure index to bond funds and exchange rate movements in EMEs during the March 2020 turmoil. Figure 9 illustrates a positive correlation between the external exposure index to bond funds at the end of 2019 and exchange rate depreciations during the March 2020 turmoil in eight EMEs with available data. In particular, the figure shows that EMEs with higher external exposure to bond funds before the March 2020 turmoil experienced larger depreciations of their currencies against the US dollar during the turmoil. In other words, EMEs' external exposure to bond funds were coincident with their currencies' depreciation.

Figure 9: External exposure index to bond funds and the March 2020 turmoil



Notes: The vertical axis shows the nominal depreciation of the domestic currency vis-à-vis the USD from 1 January 2020 to 31 March 2020. The horizontal axis shows the external exposure to bond funds at the end of Q4 2019.

Sources: EPFR; IMF BOPS; BIS; authors' own calculations.

Motivated by Figure 9, we undertake a simple empirical exercise. Table 4 shows the results of the cross-sectional regression of exchange rate volatility on the external exposure index. In the first three columns, the dependent variable is the standard deviation of the exchange rate between 2011 and 2021, whereas, in the last three columns, we scale the standard deviation of the exchange rate by its mean. The table illustrates that countries with higher exposure indices tended to experience higher exchange rate volatility during the last 11 years. This exercise

formalizes the positive correlation observed in Figure 9 to a longer time period and covers all countries in our sample. In fact, higher exposure index values are associated with higher exchange rate volatility in our sample of countries. All estimated coefficients are statistically significant and economically relevant. In particular, exposure to bond funds is coincident with higher exchange rate volatility.

Table 4: Foreign exchange volatility and external exposure to funds

	FX volatility					
	Standard deviation of the nominal exchange rate with respect to the US dollar			**Standard deviation of the nominal exchange rate with respect to the US dollar divided by its mean**		
Equity Exposure Index	5.787*** (1.455)		3.658** (1.456)	0.0655*** (0.0231)		0.0359* (0.0198)
Bond Exposure Index		11.252*** (2.805)	10.161*** (2.942)		0.1516*** (0.0410)	0.1408*** (0.0433)
Observations	30	30	30	30	30	30
R-squared	0.312	0.117	0.355	0.317	0.084	0.340

Notes: The table shows the coefficient estimates from cross-sectional regressions of exchange rate volatility on the exposure index and a constant. Each country is a data point, with an average bond exposure index, an average equity exposure index, the standard deviation of the exchange rate and the normalized standard deviation of the exchange rate from January 2011 to December 2021 at a monthly frequency. Argentina, Egypt and India are excluded from the original sample. Standard errors are given in parentheses, with statistical significance indicated by * p<0.10, ** p<0.05, *** p<0.01.

Next, we run a panel regression with country and time fixed effects of asset returns on fund flows using monthly data from 2015 to 2021. Table 5 shows the estimated coefficients when we use total fund flows, while Table 6 shows the results when we use external fund flows as the explanatory variable. External fund flows are fund flows coming from foreign-domiciled investment funds. We have three main findings. First, higher equity fund flows are coincident with increases in stock market indices. Second, higher bond fund flows are coincident with lower bond yields. Interestingly, the results get stronger when we use external fund flows as independent variable. Third, exchange rate movements are coincident with total equity flows, but not with external equity flows.

Table 5: Fund flows and asset prices

	(1) Index prices	**(2) Bond yields**	**(3) Exchange rates**		
Equity flows	20.59*** (4.479)		0.0286* (0.0172)		0.0277 (0.0173)
Bond flows		-0.0540*** (0.0142)		0.0137 (0.0213)	0.0091 (0.0214)
Observations	2,616	2,616	2,532	2,532	2,532
R-squared	0.970	0.885	0.909	0.909	0.909

Notes: The table shows the coefficient estimates from panel regressions of asset prices on fund flows with time and country fixed effects. The data cover the whole sample at a monthly frequency from January 2015 to December 2021 subject to availability. Standard errors are given in parentheses, with statistical significance indicated by * p<0.10, ** p<0.05, *** p<0.01.

Table 6: External fund flows and asset prices

	(1) Index prices	(2) Bond yields	(3) Exchange rates		
External equity flows	26.24*** (5.433)		0.0265 (0.0205)		0.0228 (0.0205)
External bond flows		-0.0591*** (0.0166)		0.0361 (0.0246)	0.0320 (0.0245)
Observations	2,616	2,616	2,532	2,532	2,532
R-squared	0.970	0.646	0.909	0.909	0.909

Notes: The table shows the coefficient estimates from panel regressions of asset prices on external fund flows with time and country fixed effects. The data cover the whole sample at a monthly frequency from January 2015 to December 2021 subject to availability. Standard errors are given in parentheses, with statistical significance indicated by * p<0.10, ** p<0.05, *** p<0.01.

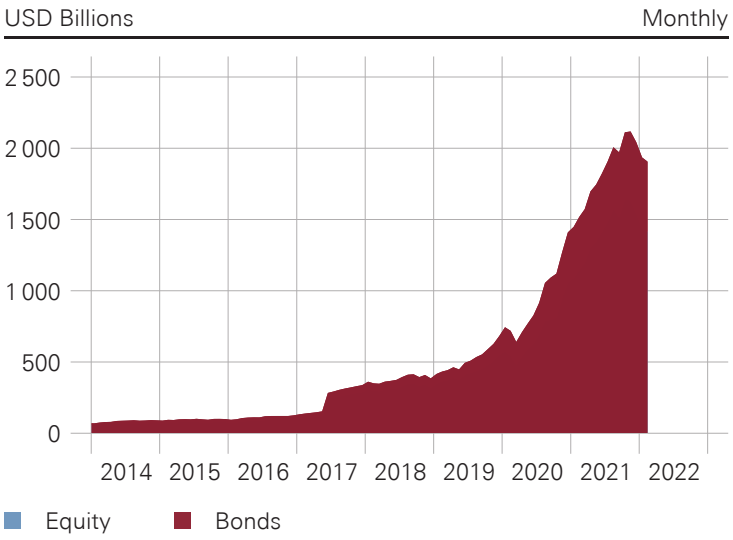
7 ESG funds warrant a closer look

This section gives a brief overview of sustainability-themed investment funds, including trends in the data, current policy discussions on sustainable finance and findings in the literature. It shows that in recent years, the urgency of transforming the world economy toward growth that is also sustainable has shaped financial markets that led to a surge in ESG funds. We elaborate on the factors that drive the supply and demand of sustainability-themed products and how the landscape may evolve with changing regulations and disclosure requirements. We argue that there soon may be a massive issuance of green, social and sustainable bonds, which may lead to a subsequent boom of ESG bond funds. Consequently, we

argue that ESG funds warrant a closer look and separate analysis for external linkages, as they have a different nature than conventional funds and are growing at a rapid pace.

Rising public awareness of climate change and other environmental problems in recent years has led to changes in investor preferences regarding ESG issues. Financial instruments that are labeled "sustainable" have become an increasingly attractive option to investors. At the same time, the increased demand for such products has spurred their supply. UNCTAD (2021) estimates that the value of sustainability-themed investment products increased from less than USD 0.5 trillion in 2015 to USD 3.2 trillion in 2020. These investment products include ESG funds, SRI funds, green bonds and social bonds. The soaring popularity of sustainability-themed investment funds can be seen in Figure 10. During the last five years, the AUM of ESG equity and bond funds has grown an impressive tenfold. As of February 2022, 5% of all funds' AUM was managed by an ESG fund.

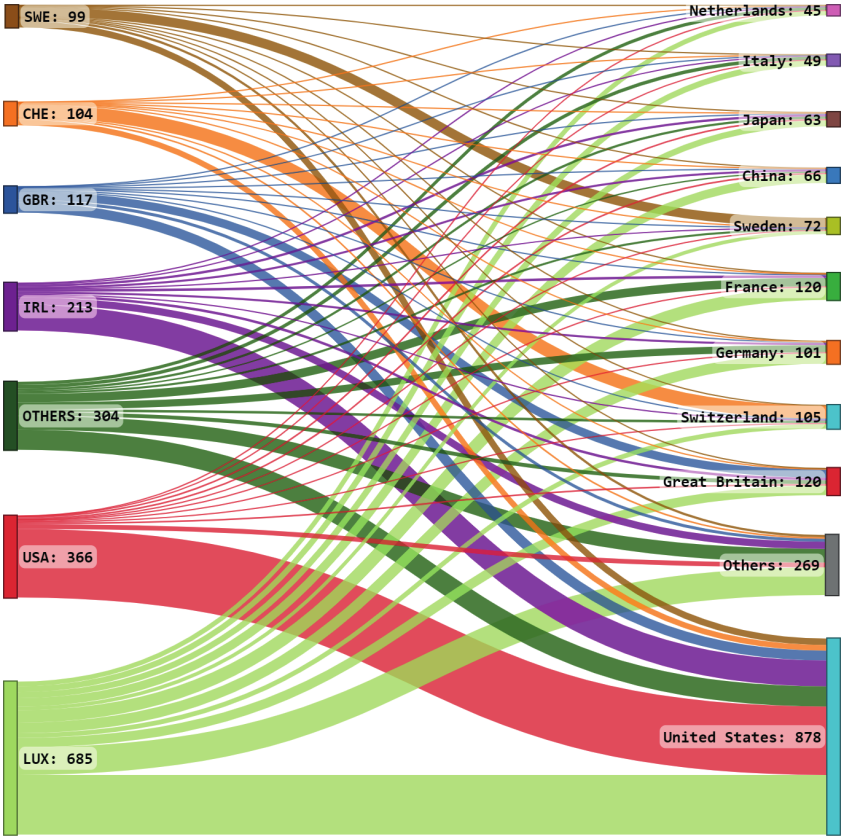
Figure 10: AUM of ESG funds globally



Notes: The figure shows total AUM of ESG- and SRI-labeled investment funds in equity and in bonds.
Source: EPFR.

ESG funds exhibit different domicile and destination patterns from conventional funds, as illustrated in Figure 11. Interestingly, the United States, the country with the largest fund sector, does not dominate as a domicile country of ESG funds. Instead, Luxembourg is the most prominent domicile country for ESG funds, followed by the United States and Ireland. Yet, the United States still receives the largest share of ESG fund flows, followed by the United Kingdom and Switzerland. Remarkably, several EU countries are major destinations for ESG investment.

Figure 11: Domicile and destination countries of ESG funds

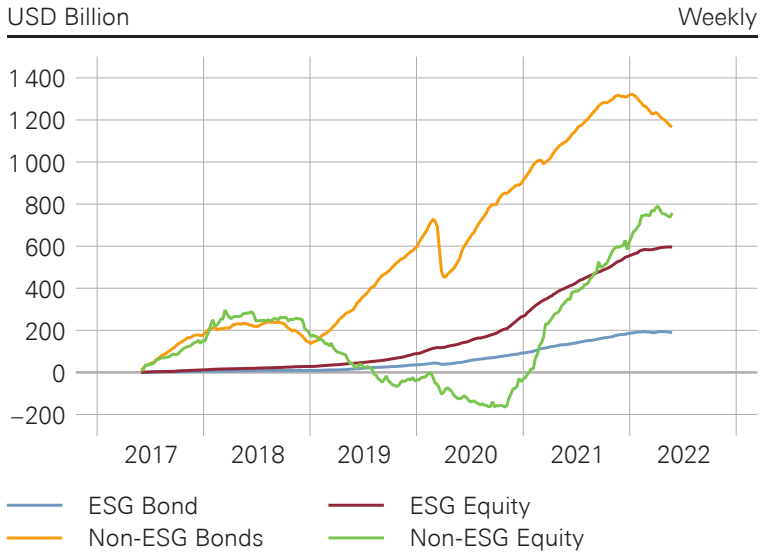


Notes: The figure shows the AUM of investment funds with ESG and SRI labels as of February 2022. The countries on the left-hand side are those where investment funds are domiciled. The countries on the right-hand side are the recipients of fund flows.

Source: EPFR.

The impressive growth of the AUM of ESG funds in recent years is not only a result of asset price changes but also of increased investment in these products by investors. This is particularly the case for ESG equity funds. Figure 12 shows that since 2017, ESG equity funds have attracted almost as much new investment as non-ESG equity funds have. In other words, half of the new investment in equity funds during the last five years went toward ESG funds, although the market share of these funds is still very small. It is also striking that from mid-2018 until approximately mid-2020, investors redeemed their shares of non-ESG funds while they continued to purchase shares of ESG funds at a nearly unchanged pace, as the figure shows. The reasons behind this unintuitive investor behavior may be manifold. The most compelling argument rests on the stark difference in the investor base of each asset class. While non-ESG investors would solely target higher returns, ESG investors may not only aim at increasing financial value now but probably also at lowering their societal and environmental impact or having a longer horizon for their investment, making them less likely to redeem their shares in downturns. In contrast, the cumulated investment in ESG bond funds continues to be small relative to the cumulated investment in non-ESG bonds. The figure shows that the cumulative investment in non-ESG bonds during the last five years is approximately six times larger than the cumulative investment in ESG bonds.

Figure 12: ESG and non-ESG fund flows



Notes: Cumulative flows for the last five years. ESG includes all ESG- and SRI-labeled investment funds.

Source: EPFR.

Previous studies, such as Pástor et al. (2020), confirm this observation that the strong and stable demand for sustainability-themed funds persisted even during the March 2020 turmoil. The authors find that more sustainable funds – particularly those that are more environmentally sustainable and those that employ exclusion criteria in their investment process – received relatively more net flows than less sustainable funds within the same style group during the March turmoil. Furthermore, the increased demand for ESG funds has been supported by their economic performance in 2019 and 2020 compared to their non-ESG peers (ESMA, 2021). In fact, the recent outperformance of ESG funds and of companies with high ESG ratings has been used by asset managers to attract new funding.[21] Pástor et al. (2020) argue that the high returns of sustainable funds suggest that market participant tastes continued to shift toward green assets and green products even during the March 2020 turmoil. Furthermore, the empirical results in Capotă et al. (2022) support the view that ESG investors may have longer-term investment horizons and may expect a higher level of performance from ESG funds in the future. In addition, Pástor et al. (2021) find that ESG preferences move asset prices and that green bonds can outperform brown bonds over a certain period when investors' ESG concerns have grown unexpectedly.

Although the outstanding volume of sustainable bond funds is still small relative to that of sustainable equity funds, this may change significantly in the near future. Government policy shifts and changes in business strategies by the private sector may lead to the massive issuance of green, social and sustainable bonds, which may spur a boom in ESG bond funds. Fiscal planning by the governments of major economies to incorporate climate change and sustainability issues is already evident. Some recent examples of such policy shifts are NextGenerationEU by the European Union, which aims to assist the green transition, and the Build Back Better Act in the United States, which includes provisions related to climate change and social policy. Overall, governments are expected to turn their commitments to sustainable growth into actions, with implications for sustainability-themed investment products Recent data support this view. Cheng et al. (2022) show that sovereign issuance of green, social and sustainable bonds has increased significantly since August 2020, reaching a monthly issuance of USD 88 billion on average compared with less than USD 30 billion during the previous three years. Sustainable bond issuance is, in fact, not limited to governments or AEs. Goel et al. (2022) show that the financial and nonfinancial sectors have also been issuing green bonds extensively in EMEs recently.[22]

21 Previous studies do not always agree if and to what extent a risk premium on green or social bonds exist. Despite the differences in their conclusions, they have developed a common terminology: the *greenium* (or *socium*) measures the amount by which the yield on a green (or social) bond is lower than that on a conventional bond (see, for example, Scatigna et al., 2021).

22 Green bonds of EMEs follow the landscape of regular EME bonds. They are issued not only in the local currency but also in USD and other foreign currencies. They also have higher coupons and shorter maturities.

The surge of sustainable finance also brings some regulatory challenges to financial markets. Here, we elaborate on two of these – namely, disclosure requirements of investment funds and financial stability risks arising from price developments in a rapidly growing asset class.[23] First, greenwashing remains a major concern. In particular, any investment fund could use the label ESG or SRI in its prospectus, signaling to investors that it invests in sustainable companies. However, there are no international disclosure standards or external certification by a third party to assess this label yet. Lack of transparency, greenwashing allegations and a regulatory vacuum remain major concerns in financial markets, although various institutions have recently started discussing how to strengthen the comparability and reliability of sustainability-related disclosures for companies, financial institutions and investment funds.[24] Second, while both the supply of and the demand for sustainability-themed products have been soaring and are expected to grow further, the surrounding financial stability risks related to sustainability-themed risks are also growing. For example, Aramonte and Zabai (2021) point out that the surge of the private label mortgage-based securities (MBS) market before the global financial crisis is comparable to that seen in ESG mutual funds and exchange-traded funds (ETFs), warning of a financial bubble. In this paper, we do not take any stance regarding these two challenges and assume that all ESG and SRI funds are sustainability-themed finance products that are priced correctly by financial markets.

8 Measuring sustainable finance and external exposure

In this section, we focus on ESG funds and construct three indices to measure the prevalence of sustainability-themed finance products in our sample over time. In particular, we reveal that the share of assets of sustainability-themed funds to total assets of all countries has been increasing sharply during the last two years.

We define the overall sustainability index of country *i* in period *t* as follows:

$$Overall\ sustainability\ index_{i,t} = \frac{AUM_{i,t}^{ESG}}{AUM_{i,t}} \quad (3),$$

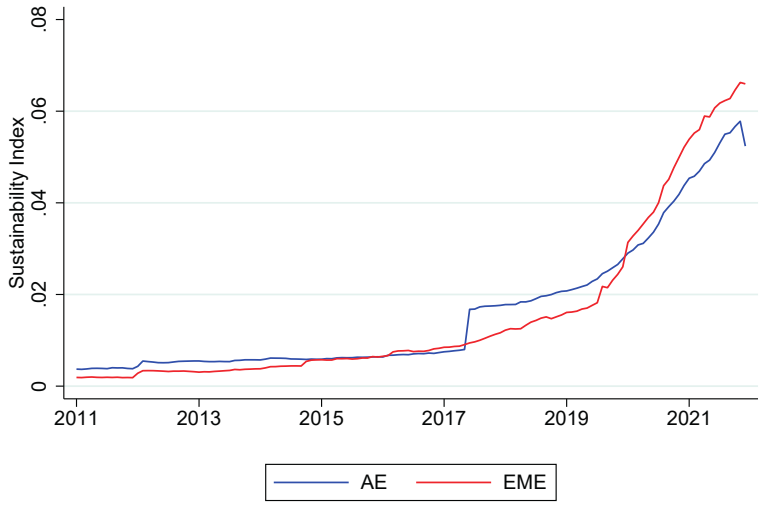
23 For a broader policy discussion concerning sustainable funds, see IMF (2021).

24 For example, in March 2021, the U.S. Securities and Exchange Commission (SEC) created a Climate and ESG Task Force that proactively identifies ESG-related misconduct and presses charges against companies and funds suspected of greenwashing. In the meantime, the SEC is designing regulation to standardize disclosures by funds about their ESG investment. Similarly, the European Securities and Markets Authority (ESMA) aims to ensure that financial markets support and promote the transition toward a greener and more sustainable economy and is providing technical expertise along with other European supervisory authorities such as the European Financial Reporting Advisory Group (EFRAG), European Banking Authority (EBA) and European Insurance and Occupational Pensions Authority (EIOPA) to set the European Sustainability Reporting Standards (ESRS).

where the denominator is the AUM of all investment funds investing in country i at time t, and the numerator is the value of the AUM of all ESG investment funds investing in country i at time t. In other words, the index measures the overall share of ESG funds in all funds. The index takes values between 0 and 1. The index can be calculated for bonds and equity separately, as well as for total portfolio investment.

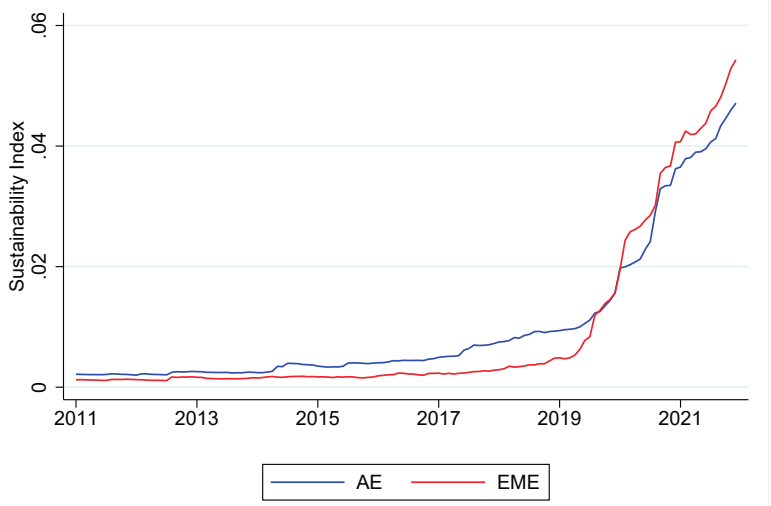
We calculate the sustainability index for each country in our sample as well as for EMEs and AEs in aggregate over time following Equation (3). Figures 13 and 14 illustrate the sustainability index in AEs and EMEs for equity and bond funds, respectively. Both figures show a sharp rise after 2019. Remarkably, the index has similar values for both AEs and EMEs. Despite the sharp rise of the index, it is still at levels below 10% at the end of our sample period in both country groups and for both asset classes.

Figure 13: Sustainability index of equity funds



Notes: The figure shows the share of ESG and SRI equity funds' AUM to those of all funds, following Equation (5) in aggregate.
Sources: EPFR; authors' own calculations.

Figure 14: Sustainability index of bond funds



Notes: The figure shows the share of ESG and SRI bond funds' AUM to those of all funds, following Equation (5) in aggregate.

Sources: EPFR; authors' own calculations.

Next, we disentangle the sustainability index into two parts by separating domestically domiciled and foreign-domiciled investment funds. In other words, we calculate two versions of the sustainability index for each country, taking into account whether the investment fund is domiciled abroad or not. Equations (4) and (5) give the formulae for these indices.

$$Domestic\ sustainability\ index_{i,t} = \frac{AUM_{i,t}^{ESG-domestically\ domiciled}}{AUM_{i,t}^{domestically\ domiciled}} \tag{4}$$

$$Foreign\ sustainability\ index_{i,t} = \frac{AUM_{i,t}^{ESG-foreign\ domiciled}}{AUM_{i,t}^{foreign\ domiciled}} \tag{5}.$$

Again, these indices can be calculated for equity and bond funds separately and take values between 0 and 1. Note that the sum of domestic sustainability and foreign sustainability indices will not add up to the sustainability index, as the denominators of these indices are all different from one another. We choose not to have the AUM of all funds in the denominator because of the high concentration of investment funds in a handful of countries. We attempt to separate the overall surge of investment by funds in each country from the surge in ESG funds, as these developments are driven by different factors. Therefore, Equations 4

and 5 measure the share of AUM that is labeled ESG by domestic and foreign-domiciled investment funds investing in that country, respectively. Depending on investor preferences and the extent of domestic investment, we expect domestic and foreign sustainability indices to show wide variation both within and across countries.

Tables 7 and 8 show the domestic, foreign and overall sustainability indices for each country at the beginning and end of the sample period for equity and bond funds, respectively. Note that in 2021 Q4, the total sustainability index is highest in Sweden for both equity and bonds, at 0.19 and 0.38, respectively. In contrast, the United States exhibits very low values in 2021 Q4 both for equity and bonds, at 0.04 and 0.022, respectively. Note that in 2011 Q1, the domestic sustainability index is zero in many countries in our sample, while it has some positive values in 2021 Q4. This is driven by the fact that more and more investment funds are domiciled in those countries with an ESG label. It is also remarkable that the foreign sustainability index is significantly higher for countries that are not among the main fund domicile countries. In fact, for countries that do not host any ESG funds, all ESG flows come from foreign-domiciled investment funds and have a cross-border nature. In contrast, European countries such as Sweden, Switzerland and Austria exhibit higher values in the domestic sustainability index than they do in the foreign sustainability index. Note also that countries in which no investment fund is domiciled have a domestic sustainability index equal to zero by definition. Overall, we observe that ESG flows to EMEs have a cross-border nature, whereas ESG flows to AEs tend to be domestic investment.

Table 7: Sustainability index of equity funds

Country	Total		Domestic		Foreign	
	2021 Q4	2011 Q1	2021 Q4	2011 Q1	2021 Q4	2011 Q1
Sweden	0.190	0.005	0.356	0.000	0.102	0.005
Czech Rep.	0.132	0.001	0.000	0.000	0.132	0.001
Switzerland	0.124	0.005	0.201	0.000	0.093	0.005
Finland	0.112	0.005	0.401	0.000	0.099	0.005
Austria	0.111	0.006	0.128	0.000	0.107	0.006
Norway	0.111	0.004	0.201	0.000	0.097	0.004
France	0.110	0.005	0.270	0.006	0.095	0.005
Netherlands	0.107	0.005	0.237	0.000	0.105	0.005
Germany	0.106	0.004	0.076	0.001	0.112	0.005
Denmark	0.106	0.004	0.014	0.000	0.108	0.004
Ireland	0.106	0.005	0.167	0.003	0.101	0.005
Belgium	0.097	0.005	0.112	0.003	0.097	0.005
Spain	0.097	0.005	0.004	0.000	0.100	0.005
Italy	0.097	0.005	0.021	0.000	0.098	0.005
Mexico	0.095	0.001	0.301	0.000	0.075	0.001
Egypt	0.091	0.001	0.000	0.000	0.091	0.001
Russia	0.091	0.002	0.008	0.000	0.093	0.002
Chile	0.085	0.001	0.000	0.000	0.085	0.001
UK	0.081	0.006	0.082	0.009	0.081	0.004
Indonesia	0.075	0.002	0.058	0.000	0.075	0.002
South Africa	0.073	0.002	0.032	0.000	0.083	0.002
Brazil	0.072	0.001	0.006	0.000	0.076	0.001
China	0.071	0.002	0.030	0.000	0.079	0.002
Korea	0.071	0.003	0.024	0.000	0.078	0.003
Singapore	0.067	0.004	0.000	0.000	0.067	0.004
Argentina	0.064	0.003	0.000	0.000	0.064	0.003
Hong Kong	0.061	0.004	0.000	0.000	0.061	0.004
Australia	0.049	0.007	0.028	0.019	0.060	0.004
Canada	0.048	0.007	0.013	0.008	0.083	0.005
Thailand	0.045	0.003	0.001	0.000	0.072	0.003
India	0.044	0.001	0.007	0.000	0.073	0.001
Japan	0.042	0.004	0.004	0.000	0.069	0.004
USA	0.040	0.003	0.017	0.002	0.178	0.013
AE	0.052	0.004	0.022	0.003	0.120	0.006
EME	0.066	0.002	0.020	0.000	0.078	0.002
Total	*0.053*	*0.003*	*0.022*	*0.003*	*0.112*	*0.005*

Notes: The table shows the values of the three sustainability indices as defined in Equations (3), (4) and (5). The overall sustainability index is not equal to the sum of domestic and foreign indices.

Sources: EPFR; authors' own calculations.

Table 8: Sustainability index of bond funds

Country	Total		Domestic		Foreign	
	2021 Q4	2011 Q1	2021 Q4	2011 Q1	2021 Q4	2011 Q1
Sweden	0.379	0.001	0.493	0.000	0.308	0.001
Switzerland	0.212	0.000	0.229	0.000	0.146	0.001
Norway	0.203	0.001	0.179	0.000	0.225	0.001
Austria	0.194	0.001	0.274	0.000	0.187	0.001
Belgium	0.178	0.001	0.338	0.000	0.177	0.001
France	0.173	0.001	0.373	0.000	0.158	0.001
Finland	0.171	0.002	0.640	0.000	0.166	0.002
Italy	0.170	0.001	0.140	0.000	0.171	0.001
Spain	0.165	0.001	0.017	0.000	0.189	0.001
Germany	0.161	0.001	0.034	0.000	0.166	0.001
Denmark	0.154	0.001	0.001	0.000	0.168	0.001
Ireland	0.154	0.001	0.075	0.000	0.169	0.001
Netherlands	0.137	0.001	0.070	0.000	0.162	0.001
UK	0.105	0.001	0.108	0.000	0.103	0.001
Czech Rep.	0.082	0.001	0.000	0.000	0.082	0.001
Egypt	0.071	0.001	0.000	0.000	0.071	0.001
South Africa	0.070	0.001	0.000	0.000	0.070	0.001
Chile	0.069	0.001	0.000	0.000	0.069	0.001
Mexico	0.067	0.001	0.000	0.000	0.067	0.001
Russia	0.067	0.001	0.000	0.000	0.067	0.001
Brazil	0.063	0.001	0.000	0.000	0.063	0.001
Argentina	0.059	0.001	0.000	0.000	0.059	0.001
Indonesia	0.054	0.001	0.000	0.000	0.054	0.001
Hong Kong	0.053	0.000	0.000	0.000	0.053	0.000
Korea	0.052	0.001	0.000	0.000	0.052	0.001
Thailand	0.050	0.001	0.000	0.000	0.050	0.001
Japan	0.049	0.001	0.000	0.000	0.066	0.001
Australia	0.045	0.001	0.001	0.000	0.080	0.001
India	0.045	0.001	0.000	0.000	0.045	0.001
Singapore	0.040	0.001	0.000	0.000	0.040	0.001
China	0.039	0.001	0.000	0.000	0.039	0.001
USA	0.022	0.002	0.008	0.002	0.107	0.001
Canada	0.018	0.001	0.006	0.000	0.075	0.001
AE	0.047	0.002	0.016	0.002	0.132	0.001
EME	0.054	0.001	0.000	0.000	0.054	0.001
Total	*0.047*	*0.002*	*0.016*	*0.002*	*0.121*	*0.001*

Notes: The table shows the values of the three sustainability indices as defined in Equations (3), (4) and (5). The overall sustainability index is not equal to the sum of domestic and foreign indices.

Sources: EPFR; authors' own calculations.

9 Conclusion and policy implications

The external financial linkages of countries shape the cross-border propagation mechanism of macrofinancial shocks and changes in macroprudential regulation. The significance of NBFIs, in particular investment funds, in this cross-border propagation mechanism became evident during the market turmoil in March 2020. A health crisis brought about by the COVID-19 shock evolved into a debt and equity crisis and led to sudden capital outflows from EMEs, sharp asset price movements and a deterioration of US dollar funding conditions globally. Redemptions of investment fund shares amplified capital outflows from EMEs during the turmoil. Thus, the importance of investment funds for capital flows and asset prices across the globe became palpable in March 2020. Central banks had to respond to market developments quickly by participating in the standing swap arrangement with the U.S. Federal Reserve and by conducting US dollar repos with banks to enhance the provision of dollar liquidity, thereby lessening the strain on the global US dollar funding markets. The IMF provided liquidity to a very large number of countries. Overall, the turmoil showed that investment funds – a sector with little regulation and without access to lender-of-last-resort facilities – could pose a substantial threat to financial stability.

In this paper, we measure the growing importance of investment funds in international capital flows and for global financial stability. Motivated by the developments in global financial markets during the March 2020 turmoil, we undertake two main exercises. In the first exercise, we measure countries' external exposure to investment funds over time. We show that countries have been receiving portfolio investment inflows that are increasingly channeled by foreign-domiciled investment funds. In some countries, particularly in EMEs, the external exposure to investment funds is very high. We argue that those countries with high exposures may be subject to sudden capital outflows again if global investment funds face large redemptions. We also make use of this external exposure measure to nowcast countries' portfolio liabilities over time. As the official portfolio liabilities data come with a long lag, our nowcast can be useful for policy-makers in their decision making concerning external sector assessment or monetary policy. In the second exercise, we estimate the empirical relationship between fund flows and asset prices. We have three main findings. First, countries with higher external exposure to investment funds experience higher exchange rate volatility. Second, larger fund flows are coincident with higher equity prices and lower bond yields and the results are stronger when we focus only on fund flows originating from foreign-domiciled funds. Third, the empirical link between fund flows and exchange rate movements is not robust.

This paper also adds to the growing policy discussion on sustainability-themed investment funds. In particular, we develop sustainability indicators for each country over time that measure the share of ESG funds in total funds. While their levels are still relatively small, these sustainability indices are currently growing at a rapid pace. We also show that sustainable investment via investment funds has mostly a domestic investment nature in AEs, while for EMEs it mainly comes from foreign-domiciled funds. EMEs' cross-border exposure to ESG funds may be both beneficial and detrimental. In general, it may act as a buffer against external shocks because ESG investors seem to hold these assets for a longer period of time and with different investment purposes. However, it may also have a detrimental effect on capital flows and financial markets when disclosure requirements change for corporates and investment funds across the globe.

This paper's findings should be considered within the context of policy discussion concerning two issues. These are changes in NBFI regulation and disclosure requirements on climate-related issues.

First, our findings illustrate the potential importance of investment funds as a cross-border propagation mechanism if NBFI regulation changes in some countries. In particular, the boom of NBFIs, including that of investment funds after the global financial crisis, has been on the radar of international organizations for a while, yet the market turmoil in March 2020 made NBFIs a prominent work priority of the Financial Stability Board (FSB). The FSB's current work program in collaboration with standard-setting bodies and other international organizations aims to enhance the resilience of NBFIs and covers a wide range of issues, from margin calls in derivatives and securities markets, to liquidity risk in open-ended funds, to dealer behavior in core bond markets. Among the many and multifaceted topics concerning NBFIs, liquidity risk and its management in open-ended investment funds remains a challenging one. Yet the optimal regulation to mitigate systemic risk may have non-negligible spillovers and spillbacks according to our findings in this paper. In particular, if investment funds are regulated with macroprudential tools, as suggested by Claessens and Lewrick (2021), there may initially be non-negligible spillovers to destination countries' financial markets because funds are domiciled in handful of countries and many EMEs have substantial and growing exposure to foreign-domiciled funds, as we show in this paper. In other words, changes in regulation can lead to portfolio rebalancing of investment funds that in turn may spill over to financial markets elsewhere via external exposures. Although such a policy may ultimately strengthen the resilience of financial markets, its immediate adverse impact may be significant.

Second, the findings of our paper concerning ESG funds are subject to change with the upcoming changes in disclosure requirements on climate-related issues. In particular, our indicators for sustainable finance may need to be re-examined when the ESG fund landscape adjusts to new disclosure requirements. Indeed, there is currently a significant momentum towards developing internationally accepted disclosure standards for sustainability-themed finance products. In particular, the International Sustainability Standards Board (ISSB) is currently working on developing two standards – one on climate and one on general sustainability-related disclosures.[25] With the upcoming changes in regulation and disclosure requirements across the globe, it is possible that some ESG funds may lose their ESG label or may have to rebalance their portfolios. In addition, some currently non-ESG funds may suddenly earn an ESG label. Also, it may become possible to undertake a focused analysis of investment funds with a pure "E" or, better yet, climate focus, instead of the broad ESG concept that currently puts three very different aspects of sustainability in one label.

In Switzerland, there is currently a momentum towards developing green bonds markets and improving transparency in climate-related issues. First, Switzerland issued the inaugural green Confederation bond in autumn 2022. Second, the Federal Council is aiming to improve transparency regarding climate-related issues. The framework concerns both financial institutions and the real economy. For example, the Swiss Climate Scores were recently launched by the Federal Council. These are a set of current and forward-looking criteria that investors can use to assess how climate-friendly investment products actually are. Although currently a voluntary instrument, financial institutions are encouraged to use the Swiss Climate Scores for their products, while retail and institutional investors are encouraged to stay knowledgeable about the climate risks that their investments pose. Furthermore, from 2024, large companies will be required to disclose their impact on climate change. Public companies, banks and insurance companies with 500 or more employees and more than CHF 20 million in total assets or more than CHF 40 million in turnover will be legally bound to report on two aspects of their business. First, the firms have to disclose their financial or investment risks linked to climate change. Second, they have to report on the impact that the firm's commercial activities concretely have on the environment. This "double materiality" corresponds to the approach of the European Union.

25 The ISSB is a new international body that was announced at the 2021 United Nations Climate Change Conference (COP26) in November 2021. It aims to deliver a comprehensive global baseline of sustainability-related disclosure standards that provide investors and other capital market participants with information about companies' sustainability related risks and opportunities to help them make informed decisions.

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Appendix A: What types of data do EPFR and IMF BOPS record?

There are some differences in the type of data EPFR and IMP BOPS collect and compile, particularly regarding the residency of the investor. Figure A1 illustrates this point.

Assume that there is an investment fund domiciled in Switzerland. Both resident and nonresident investors can purchase and redeem shares of the fund. Depending on its mandate, the fund may be investing in assets issued in Switzerland, abroad or both.

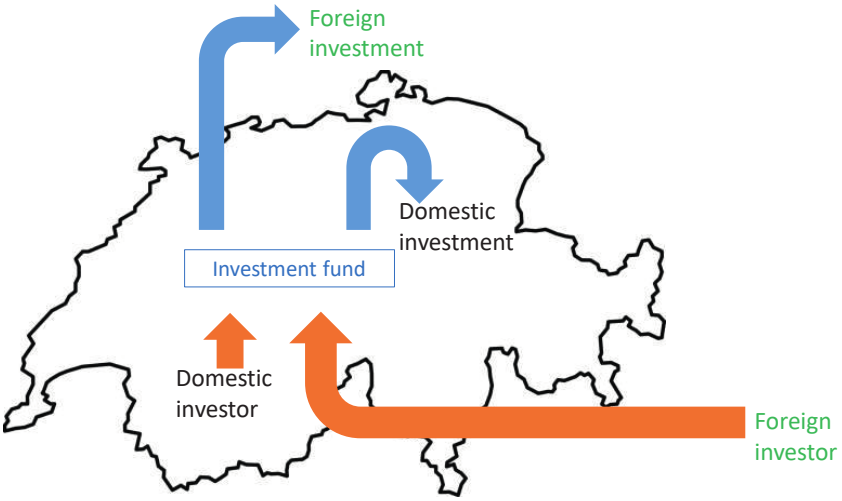
EPFR data do not record the country where the investor in the fund is located, only where the investment fund is domiciled and which countries the investment fund invests in. Thus, it is possible to allocate total assets of investment funds to those countries where the asset has been issued, but it is not possible to allocate total liabilities of investment funds to those countries where the investors are domiciled. In other words, in Figure A1, blue arrows can be identified, but red arrows cannot be identified when EPFR data are used.

This is in contrast to what IMF BOPS data record. All asset purchases by nonresident investors – including purchases of shares of investment funds by nonresident investors – are recorded in the financial account as capital inflows to Switzerland and lead to an increase in portfolio investment liabilities of Switzerland, as shown in the IIP. In other words, the red arrow coming into Switzerland as well as the blue arrow going out of Switzerland are relevant for the IMF BOPS but not for those that remain in Switzerland.

For a few countries, portfolio liabilities data can distinguish liabilities toward foreign-domiciled investment funds from those liabilities toward all the other nonresident investors. For those countries with data on the country of the investor in the investment fund, it would be possible to determine the true financial linkages/exposures of countries that are channeled via investment funds based on the IMF BOPS data (see also Coppola et al., 2021). However, many countries do not record the country of residency of the investor in the investment funds in their BOP and IIP data. All nonresident investors are grouped together in aggregate statistics, and the liabilities of investment funds are not compiled separately. Similarly, the investments of an investment fund into assets issued abroad are recorded in the financial account as capital outflows from Switzerland and lead to an increase in portfolio investment assets of Switzerland, as well as an increase in portfolio investment liabilities of the country that issued the financial asset. However, the Swiss BOP and IIP data do not provide a country, currency or investment-type breakdown of portfolio assets of Swiss-domiciled investment

funds. In this respect, the EPFR data provide more detailed information than the BOP and IIP data so that portfolio investment channeled by foreign domiciled investment funds can be disentangled.

Figure A1: Assets and liabilities of an investment fund and data sources



Notes: The figure shows the assets and liabilities of an investment fund vis-à-vis domestic and foreign counterparties.

Source: Authors' illustration.

Appendix B

Table B1: Sample of countries

Country	iso3 code	Group	Portfolio investment liabilities, 2019 (USD billions)	GDP, 2019 (USD billions)
Argentina	ARG	EME	72	445
Australia	AUS	AE	1,402	1,397
Austria	AUT	AE	434	445
Belgium	BEL	AE	716	533
Brazil	BRA	EME	570	1,878
Canada	CAN	AE	1,817	1,742
Chile	CHL	EME	106	279
China	CHN	EME	1,453	14,280
Czech Rep.	CZE	EME	69	251
Denmark	DNK	AE	499	350
Egypt	EGY	EME	40	303
Finland	FIN	AE	471	269
France	FRA	AE	3,946	2,716
Germany	DEU	AE	3,390	3,861
Hong Kong	HKG	AE	573	363
India	IND	EME	250	2,871
Indonesia	IDN	EME	299	1,119
Ireland	IRL	AE	4,439	399
Italy	ITA	AE	1,533	2,005
Japan	JPN	AE	3,631	5,065
Korea	KOR	EME	742	1,647
Mexico	MEX	EME	522	1,269
Netherlands	NLD	AE	2,704	907
Norway	NOR	AE	406	406
Russia	RUS	EME	302	1,687
Singapore	SGP	AE	276	374
South Africa	ZAF	EME	249	351
Spain	ESP	AE	1,368	1,393
Sweden	SWE	AE	740	531
Switzerland	CHE	AE	1,458	731
Thailand	THA	EME	164	544
UK	GBR	AE	4,765	2,831
USA	USA	AE	21,565	21,433
Sample total			*60,971*	*74,675*
World			*69,250*	*86,267*

Sources: IMF BOPS; World Bank WDI; authors' own calculations.