When greener is more attractive: environmental factors and capital flows to emerging markets

Jose Aurazo, Rafael Guerra, Pablo Tomasini, Alexandre Tombini and Christian Upper[1]

Abstract

Environmental considerations are likely to play a growing role in capital allocation in the coming years. We estimate the impact of environmental factors on international capital flows (ie portfolio, bank and FDI inflows) to emerging market economies (EMEs). By using annual data for 21 EMEs from 1996 to 2023, we focus on how the energy mix transition, physical risks (eg extreme weather events) and transition risks (eg climate-related regulation) affect capital flows to EMEs. Four key results stand out. First, we found a negative lagged effect of physical risks on FDI inflows, following an increase in extreme weather events. Second, after that the Paris Agreement came into force, EMEs with a cleaner energy mix attracted more FDI and portfolio investment, while there is no evidence of this effect before the Agreement. Third, home-country climate policies are associated with higher portfolio inflows to EMEs. Finally, green reporting requirements from the home-country private sector can increase both portfolio flows and FDI over a two-year horizon.

Keywords: environmental factors, capital flows, emerging markets, energy mix.

JEL classification: F21, F23, F64.

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1. Introduction

Environmental considerations – covering climate-related issues, pollution and the destruction of habitats – are likely to play a growing role in public and private sector capital allocation in the coming years. Some activities will become more expensive or simply unfeasible whereas others will gain importance. This will change the risk-return profile of many assets, which should affect capital allocation both within and between countries.

The impact of environmental factors and capital flows remains under-researched. Gu and Hale (2023) and Pienknagura (2024) show that environmental factors affect FDI. Gu and Hale explore whether FDI reacts to physical and transition risks at different levels of aggregation as well as at the firm level for both advanced economies (AEs) and emerging market economies.[2] They found that emerging market economies (EMEs) are more exposed to physical risks, which affects FDI inflows. Pienknagura reports that climate policies can boost "green" FDI in a large sample of countries, including EMEs. Regarding bank lending flows, which is a third variable explored in this paper, the evidence is mixed (Aiello (2024), Degryse et al. (2023), Erten and Ongena (2023), and Gambacorta et al. (2023)). Additionally, Kacperczyk and Peydró (2022) found that banks lend less to firms with high carbon emissions but are more willing to lend to high-emission firms with ambitious reduction targets.[3]

This paper aims to answer how environmental factors related to physical and transition risks affect capital flows to EMEs. Our strategy follows a host country approach (ie regressing capital inflows as a function of host country-related variables and a full set of time fixed effects to control for push factors that are common across destination countries) for a panel of 21 EMEs, using a sample from 1996 to 2023. By performing panel local projections à la Jordà (2005), our findings suggest that countries with a higher incidence of extreme weather events, a less green energy mix, fewer climate-related policies, and a lower share of firms reporting emissions receive

[2] **Physical risk** refers to the potential for damage and disruption caused by extreme weather events and other climate-related phenomena. This risk can lead to substantial economic and infrastructural damage, making these markets less attractive to investors due to heightened uncertainty and potential losses. **Transition risk** is associated with the process of adjusting to a lower-carbon economy. These risks emerge from increased awareness of climate change and the subsequent political and regulatory actions taken to mitigate its effects. Transition risks, arising from increased climate awareness and regulatory changes, can alter investment patterns as capital shifts towards more sustainable and low-carbon opportunities. This reallocation can result in reduced capital inflows to emerging markets that are perceived as lagging in climate adaptation and mitigation efforts, thereby affecting their economic growth and development prospects.

[3] There is also a larger literature that studies the impact of environmental factors on asset prices, without going the full step from asset prices to capital allocation. The surveys by Eren et al (2022) and De Bandt (2023) find evidence for financial markets and banks pricing climate-related risks. That said, the size of the price effects (*greenium*) is generally quite small and, given the absence of accepted benchmarks it is unclear whether it does capture the full amount of risk. Gormsen et al (2024) show that firms' *perceived cost of capital* extracted from earning calls was about one percentage point lower for "green" than for "brown" firms.[3] This discrepancy had real effects, as firms that perceived this differential as being large pledged larger emission reductions than those that believed that it was small. Some large firms also used lower discount rates for their green than their brown operations.

less foreign capital than others. Specifically, we find evidence that physical risk matters for FDI but not for portfolio investment. An increase in extreme weather events can reduce FDI inflows. On transition risk, we find that a green energy mix helped attract capital flows to EMEs, but only after the Paris Agreement came into effect in 2016. This applies to both portfolio and FDI but not bank flows. Also, climate-related policies in the home country can increase portfolio inflows, while don't find any effect on FDI. Finally, a higher share of firms reporting emissions helps attract both portfolio and FDI inflows to EMEs.

To better identify the channels through which environmental considerations affect capital flows, we are currently working on a home-host country approach that allows for variations in regulations and other factors across home countries as well as host counties. For example, stricter environmental regulations in the home country may lead investors to seek greener investments abroad, which are more likely to be found in more environmental-friendly host countries. [the results should be available by end-February].

To the best of our knowledge, this is the first paper that extends the analysis beyond FDI to other types of capital flows portfolio and bank flows. Furthermore, we go deeper into mechanisms through which these factors may influence and adjust capital flows to EMEs.

The paper is structured as follows. Section 2 discusses the potential mechanisms through which environmental factors may affect capital flows. Section 3 presents our empirical strategy following a host country approach and local projections à la Jordà (2005). In Section 4, we present the data. We present our results in section 5. A section 6 is included to show further steps and discusses the home-host country approach. A final section concludes.

2. Potential mechanisms

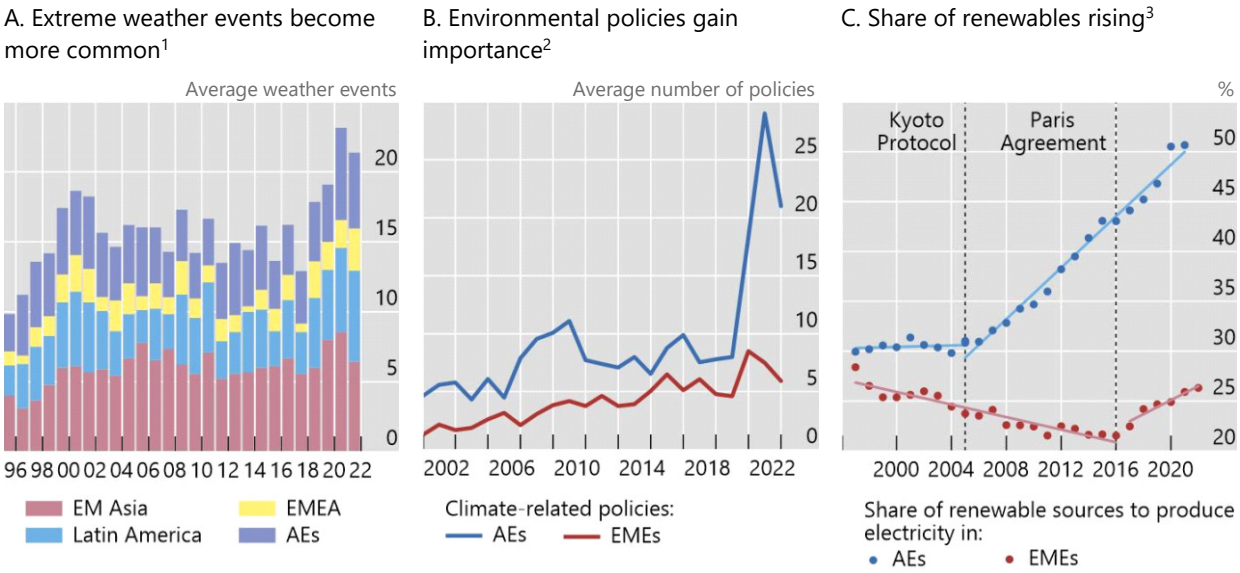
There are a variety of channels for why environmental factors might affect capital flows. First, physical risk and environmental degradation may damage assets, increasing costs or rendering some activities less profitable. The second channel works through the policies intended to address environmental degradation and climate change (transition risk). These range from outright prohibitions of certain activities to quantity ceilings to taxes or subsidies aimed at shifting incentives to emissions reporting requirements. A third channel works through the preferences of investors. Some investors (or the ultimate asset holders) may shun activities that are perceived as doing harm to the environment and prefer "greener" assets. We will discuss these mechanisms in more detail in the next subsections.

2.1 Physical risks

The globe is warming, and extreme weather events are becoming more common (Graph 1.A). Many EMEs, especially in Asia and Latin America, are strongly exposed to physical risks. For example, many Asian economic centres are close to the coast and prone to flooding. Building dykes or relocating activities will increase production

costs and may not always be feasible. Most EMEs are in the hot regions of the globe, so further increases in temperatures can lower agricultural yields, increase cooling costs and reduce productivity of outdoor activities. At the same time, environmental degradation and physical risk may spur the demand for some goods and services. Global warming may also benefit some regions, even if the global effects are negative.

Physical and transition risks gain ground — Graph 1



[1] Climatological, hydrological and meteorological events that caused ten or more deaths. [2] Policies in force or announced since 2000. [3] Simple mean across AEs and EMEs.

Sources: CRED, EM-DAT; IEA; BIS.

2.2 Transition risk

The second effect comes through the policies intended to address environmental degradation and climate change, ie transition risk. Such policies have gained importance, first in advanced economies (AEs) but increasingly also in EMEs (Graph 1.B). They come in a wide variety of flavours, ranging from outright prohibitions of certain activities to quantity ceilings to taxes or subsidies aimed at shifting incentives to emissions reporting requirements.

An important objective of environmental policies is the shift from fossil fuel to renewables sources of energy. In AEs, the share of renewables in electricity production (which is easier to shift to renewables than other activities, for instance transport) had been increasing after the Kyoto protocol of 2005. In EMEs, the share of renewables actually declined until 2016, when the Paris agreement – that contains much more wide-ranging climate commitments than the Kyoto protocol – came into force in 2016. Since then, the share of renewables rose by some five percentage points to 27%, compared to well over 50% in AEs (Graph 1.C).

Environmental policies can induce capital flows through pollution shifting. There is some evidence that multinational firms relocate polluting activities to countries with

less stringent environmental standards.[4] But pollution shifting has its limits as jurisdictions with tight environmental standards may require imports to conform to certain standards or, in some cases, face duties based on the size of the perceived shortfall. For instance, the European Union introduced a Carbon Border Adjustment Mechanism, which requires firms importing certain goods to report their direct and indirect carbon emissions and eventually pay a duty based on the emissions of the imported goods.[5]

Reporting requirements can also deter pollution shifting. For example, investors and regulators are increasingly requiring firms and banks to report their carbon emissions and, less frequently, publish transition plans on how they plan to reduce them (Graph 2.A). Reporting can have major implications for the location choice of multinational firms, as firms may prefer locations with a greener energy mix in order to meet their reduction targets. This could limit FDI inflows to countries that rely heavily on fossil fuels.[6]

Banks are facing pressure from regulators and supervisors to consider physical and transition risks within existing financial risk categories, eg by requiring climate stress tests or similar exercises. This can affect lending decisions, with firms with a smaller carbon footprint more likely to receive loans and at cheaper rates than polluting firms.[7] In addition, more and more banks are preparing transition plans. Since banks' own emissions tend to be fairly small, the main emphasis is on their loan and securities books (so-called "financed emissions"). In 2021, only some 27% of bank lending was to firms that report emissions, but this rate is set to increase. By sector, reporting firms related to carbon-intensive sectors such as energy, manufacturing and construction, accounted for more than 60% of the total sectoral bank debt in 2021 (Graph 2.B).

2.3 Investor preferences

Some investors are also giving increasing prominence to environmental considerations. Many large asset managers report ESG metrics for their investment

[4] Ben David et al (2021) and Koch and Mama (2019) find some evidence of leakage from the European Union's Emissions Trading System.

[5] Initially, the application of Mechanism will be limited to iron and steel, aluminium, cement, fertilisers, electricity and hydrogen, and then be broadened to other goods. Initially, importers of these goods will only have to report the emissions embedded in their imports, without having to buy and surrender certificates. From 2026 onwards, they also need to purchase certifications corresponding to the carbon price they would have paid if they had produced in the EU.

[6] A shift towards the reporting of scope 3 emissions, which cover the entire supply chain, could also lead to an adjustment of the supply chain towards countries with a green energy mix. Currently, firms tend to report their direct emissions (scope 1) and those from the energy they purchase (scope 2). Very few firms report scope 3 emissions, although this may change with the wide-spread adoption of ISSB environmental reporting standards.

[7] The evidence on the degree to which this is taking place already today is mixed. Evidence for the euro area shows that some banks tend to factor in environmental considerations into their lending decisions, but others do not. See Aiello (2024), Degryse et al (2023), Erten and Ongena (2023) and Gambacorta et al (2023). Kacperczyk and Peydró (2022) find that while banks reduce lending to firms with high carbon emissions, they do not lend to high-emissions firms with ambitious carbon reduction targets, perhaps because of their limited credibility.

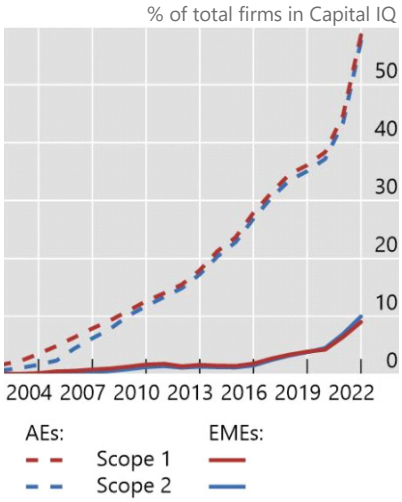
funds.[8] Some funds also have dedicated "green" mandates. The assets under management of funds with ESG mandates increased from close to zero ten years ago to $2.7 trillion in early 2024 (Graph 2.C).[9] Despite their moderate share of just over 5% in AEs and around one half of a percent in EMEs, recent research suggests that their actions may have significant repercussions on asset prices.[10]

Environmentally oriented investors can use a number of strategies to obtain a portfolio with a low carbon footprint (or to achieve another environmental benchmark).[11] The simplest and most common one is to exclude highly polluting firms or sectors. More sophisticated strategies focus not on current emissions but on planned reductions announced by firms. Or they can follow a best-in-class approach, only investing in firms that are among the least-polluting in their respective sector. Finally, investors can engage with the board of the firms in their portfolio and push them to cut emissions. Of course, they can also use a mix of these various approaches.

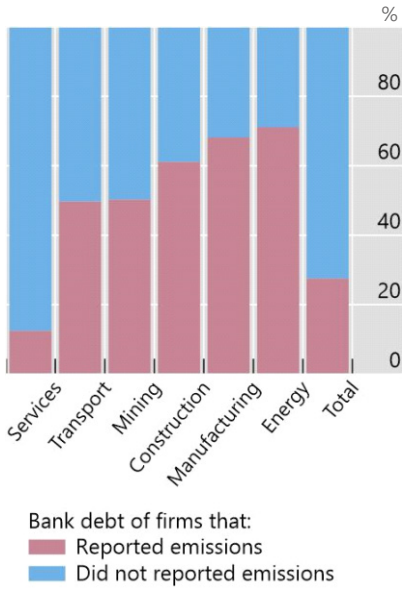
Environmental reporting and green investors gaining importance

Graph 2

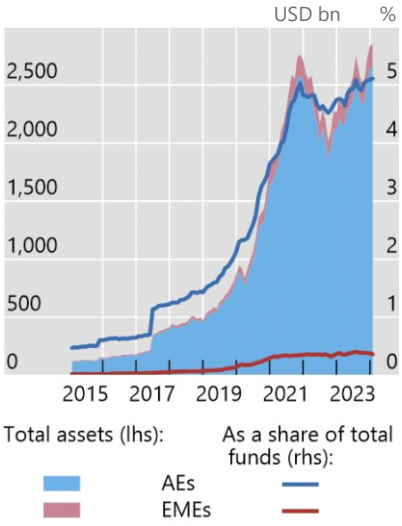
A. More firms are reporting greenhouse gas emissions



B. Bank lending by sector to firm reporting emissions[1]



C. Asset under management in ESG funds[2]



[1] Considering outstanding balance for banks and bank overdraft. [2] Includes funds socially responsible investment (SRI) mandates, and older designation. ESG = environmental, social and government.

Sources: Capital IQ; EPFR; BIS.

[8] ESG stands for *Environmental, Social* and *Governance*. In practice, most funds appear to focus primarily on the environmental aspects.

[9] Much of the increase took place before late-2021. Since then, assets under management of such funds have see-sawed, presumably reflecting a perceived worsening of the risk-return trade-offs and controversy about the quality and integrity of ESG ratings.

[10] See Chen et al (2023).

[11] See Angelini (2024) and Atta-Darkua et al (2023).

3. Empirical strategy and econometric specification

With the potential mechanisms through which environmental factors (eg physical and transitions risks) may affect capital flows in hand, we now move to explain the empirical strategy employed.

To delve deeper into how changes in physical and transitions risks may influence capital flows, we draw on the literature concerning capital flows related to push and pull factors that can either increase or decrease capital flows to EMEs. In a comprehensive literature review on the determinants of capital flows, Koepke (2019) identifies four common areas as pull factors: i) the growth of the real sector, ii) risk premia and risk aversion, iii) the level and spread of policy rates, and iv) country risk. Based on these findings, we follow Aguilar et al (2025) to include a vector of domestic variables to control for key pull factors. We limit this set of variables to maintain a parsimonious model while incorporating our green pull factor variable of interest. Additionally, given that our focus in this work is not on analysing push factors, we control for their dynamics by including time fixed effects. Finally, we employ local panel projections (Jordà, 2005) for 21 EMEs to assess the statistical significance of the quarterly projections following the impact. We estimate the following equation:

$$Y_{i,t+h} = \beta Y_{i,t-1} + \theta \text{Green Factor}_{i,t} + \sum_{j=1}^{4} \gamma_j \text{Domestic controls}_{i,t-j} + \alpha_t + \alpha_i + \varepsilon_{i,t} \quad (1)$$

where $Y_{i,t+h}$ are gross capital inflows to country i (portfolio, bank or FDI) over the next $h = 0...8$ quarters; $Y_{i,t-1}$ is the lag of the dependent variable. $Green\ Factor_{i,t}$ is the environmental factor to test. This variable will test the extreme weather events variable as a proxy for physical risks, and the variables representing the share of green energy use in electricity production, climate-related policies, and Scope 1 reporting by firms as proxies for transition risks. We also include a vector $Domestic\ controls_{it-j}$ to control for country-specific (pull) factors. It includes four lags of the policy rate, government debt as percentage of GDP, short-term GDP growth expectations and domestic equity volatility. Time fixed effects (α_t) control for global (push) factors and common events across countries (eg movements in international prices of oil and gas) and country fixed effects (α_i) for time-invariant country characteristics.[12] We report Driscoll and Kraay standard errors, accounting for cross-sectional dependence.

4. Data

This section details the data utilised in this study. Our sample comprises 21 EMEs.[13] The data spans from Q1 1996 to Q3 2023, though the sample analysis will vary as

[12] When testing the use of green energy to produce electricity variable, we include as a control the share of nuclear energy to produce electricity as a control variable. The coefficients of these shares should be interpreted relative to the use of fossil sources (these three shares sum up to 100).

[13] Argentina, Brazil, Chile, China, Colombia, Hong Kong, India, Indonesia, Korea, Malaysia, Mexico, Peru, the Philippines, Poland, Saudi Arabia, Singapore, South Africa, Thailand, Türkiye, United Arab Emirates and Vietnam.

necessary. For instance, when examining the impact of the Paris Agreement, we will bifurcate the sample into two periods: 1996-2015 and 2016-2023. Additionally, when analysing the effect of climate-related policies, which are closely linked to the Paris Agreement, we will focus exclusively on the period from 2016 onwards. For other analyses, we will use the sample from 2007 onwards, as our variable of interest is available from that year.

a. Environmental factors considered

We focused on the following data to analyse how environmental factors could affect capital flows to EMEs:

- Extreme weather events: Data is from the EM-DAT, The International Disaster Database. Following the methodology of Gu and Hale (2023), an extreme weather event is defined as one that results in ten or more fatalities in the host country.
- Use of renewable, brown and nuclear energy to produce electricity (as a share of total use of the energy used): The data is from the International Energy Agency (IEA), which maintains a comprehensive database on the energy mix for a wide range of countries.
- Climate-related policies: data is from the policies database reported by the International Energy Agency (IEA). This database encompasses a comprehensive set of categories, including the description of the policy, the year of implementation, status, and jurisdiction.
- Climate-related policies: we used the policies database reported in the IEA. This database contains a rich set of categories related to the description of the policy, the year of implementation, status and jurisdiction.
- Greenhouse Gas Emissions (Scope 1): data is from S&P Global Market Intelligence, which reports on the emissions of a representative sample of firms in each country that comply with green regulations by disclosing their greenhouse gas emissions.

b. Macroeconomic and financial variables

We use capital flows data from the IMF Balance of Payments. Non-resident portfolio investment in EMEs is defined as the sum of debt and equity portfolio investments. Additionally, we consider foreign direct investment (FDI) flows, and we define the category of other flows as a proxy for cross-border bank loans to EMEs, which constitute the majority of investment flows within this residual category.

For our vector of macroeconomic and financial domestic variables implemented in our baseline regressions, we use national data sources for the policy rate. Government debt levels (as a percentage of GDP) are sourced from the IMF World Economic Outlook. GDP growth expectations are derived from private sector surveys conducted by Consensus Economics. For the equity volatility variable, we utilise data from Bloomberg.

Summary table 1 shows the main descriptive statistics of the mentioned data.

Summary statistics

Table 1

	Observations	Mean	Std dev	Min	Max
Extreme weather events (# events)	2,000	3.4	4.6	0	26
Use of renewable energy to produce electricity (%)	2,296	25.2	25.8	0	93.6
Use of brown energy to produce electricity (%)	2,296	72.1	25.5	5.6	100
Use of nuclear energy to produce electricity (%)	2,296	2.7	7.1	1	42.7
Climate-related policies implemented (# policies)	1,808	4.8	4.7	1	29
Greenhouse gas emissions reported (# firms)	1,704	175.9	395.3	-57.3	3,698
Portfolio flows (% of GDP)	1,764	1.6	5.1	-246.7	70.3
Bank flows (% of GDP)	2,053	2.2	17.4	-17.9	207.8
FDI flows (% of GDP)	2,061	4.8	8.5	0.2	99.8
Nominal monetary policy rate (%)	2,189	7.3	9.4	0.5	126.18
Government debt (% of GDP)	2,296	45.8	27.4	-9.3	177.2
One-year-ahead GDP growth expectations (%)	2,320	4.0	2.4	-9.3	10.8
Equity volatility (std)	2,131	1.3	0.8	0.3	6.1

Source: Authors' calculations.

5. Results

This section shows the results from estimating Eq (1). We divide our results in two sections: i) one relates to the physical risk, measured by the number of extreme weather events, and ii) the other is related to transition risk, measured by three variables the number of climate-related policies, the share of green energy use and the degree of scope 1 regulation.

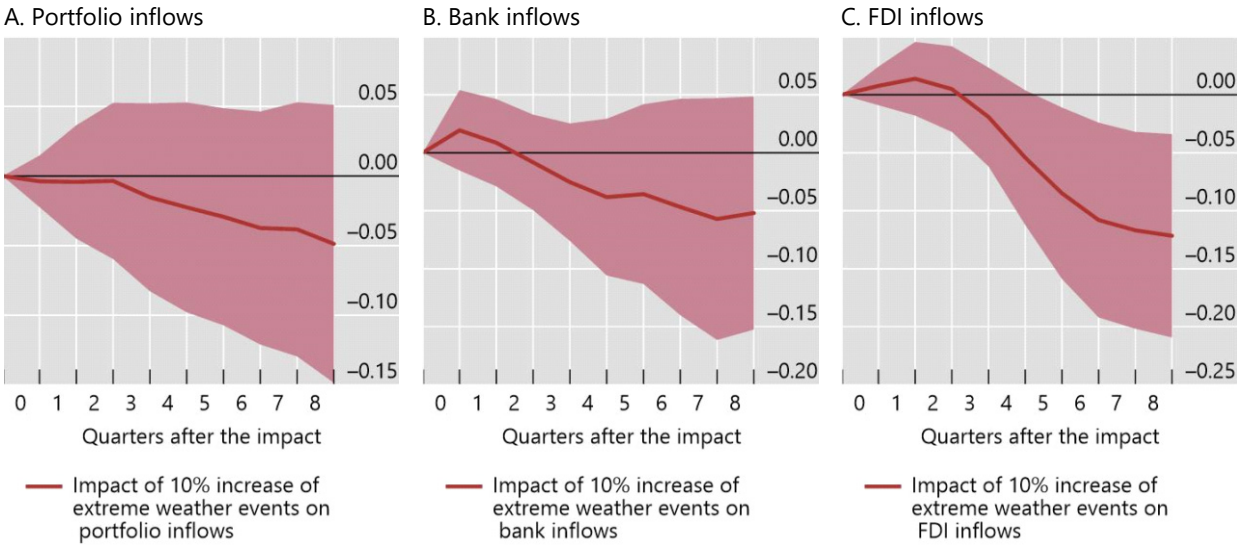
5.1 Physical risk

We find evidence that physical risk, such as an increase in extreme weather events, can depress FDI inflows to EMEs (Graph 3). Specifically, an estimation of the impact of a 10% annual growth rate in extreme weather events reported in the host country indicates a lagged effect of a drop of 0.13% of GDP in FDI inflows. In addition, there is no statistical evidence that physical risks, under this specification, affect portfolio and bank inflows.

Our findings underscore the significant impact of physical risks on FDI inflows to EMEs, highlighting the vulnerability of these economies to extreme weather events. The lack of evidence linking physical risks to portfolio and bank inflows suggests that FDI is more sensitive to such risks.

Physical risk matters for FDI but not for other inflows

As a percentage of GDP Graph 3



[1] Response functions from local panel projections for 21 EMEs from Q1 2007 to Q3 2023. We regress capital flows as percentage of GDP on the lag of the same variable, the year-on-year change of extreme weather events, a vector of domestic variables to control for pull factors that includes four lags of the policy rate, the government debt as percentage of GDP, the short-term GDP growth expectations and domestic equity volatility. The regressions include time fixed effects to control for push factors and global events and country fixed effects.

Source: Authors' calculations.

5.2 Transition risk

The first environmental factor related with the transition risks is the use of green energy to produce electricity. We find that after the Paris agreement, a higher share of green energy is associated with greater portfolio and FDI inflows relative to the use of fossil energies (green lines in Graphs 4.A and 4.C). A 1 percentage point (pp) shift in electricity production from fossil fuels to renewables tends to be followed by a cumulative increase in both portfolio and FDI inflows of up to 0.4 pp of GDP in the following quarters. Prior to the Paris Agreement, this relationship was negative (purple lines). For, bank flows, the effect is not statistically significant either before or after the Paris agreement (Graph 4.B).[14] Of course, this is only early evidence that would need to be confirmed by more thorough work.[15]

Gormsen et al (2024) also find a break around 2016. Before, firms did not discern any differences in the cost of capital whereas afterwards they didn't.

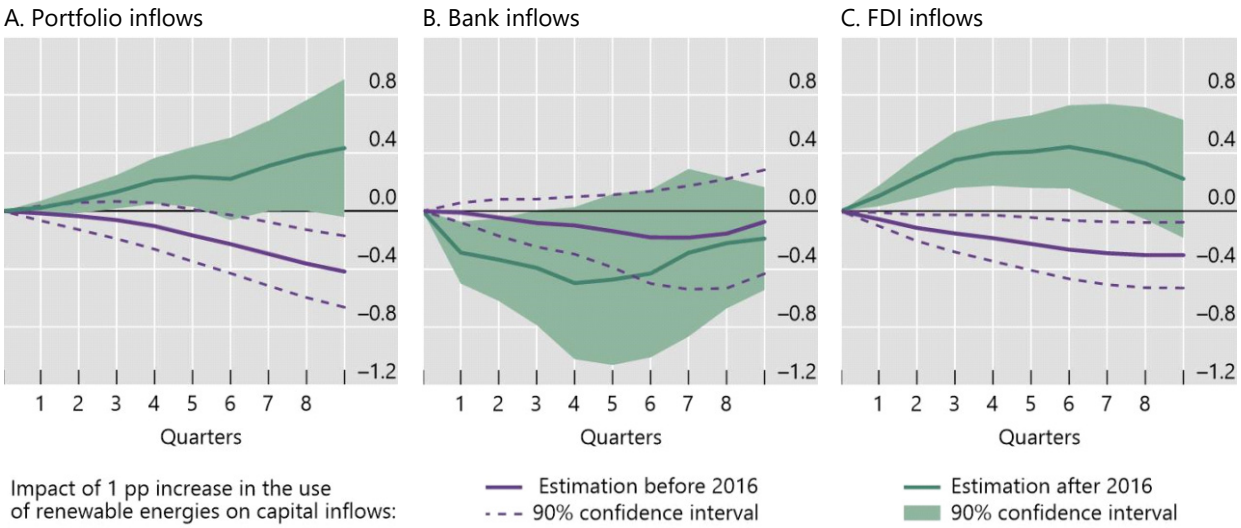
[14] This is in line with mixed evidence on how banks are considering environmental issues in their lending. In the euro area, that some banks appear to factor them into their lending decisions, but others do not. See Aiello (2024), Degryse et al (2023), Erten and Ongena (2023) and Gambacorta et al (2023). Kacperczyk and Peydró (2022) find that while banks reduce lending to firms with high carbon emissions, they do not lend to high-emissions firms with ambitious carbon reduction targets, perhaps because of their limited credibility.

[15] The significance of the results disappears in a placebo test with random breakpoints.

A rising share of renewable energy is associated with higher portfolio and FDI inflows[1]

As percentage of GDP

Graph 4



[1] Response functions from local panel projections for 21 EMEs from Q1 1996 to Q4 2016 and Q1 2016 to Q3 2023 for before and after estimations, respectively. We regress capital flows as percentage of GDP on the lag of the same variable, the share of the use of renewable energy in electricity production, the share of the use of nuclear energy in electricity production, a vector of domestic variables to control for pull factors that includes four lags of the policy rate, the government debt as percentage of GDP, the short-term GDP growth expectations and domestic equity volatility. The regressions include time fixed effects to control for push factors and global events and country fixed effects.

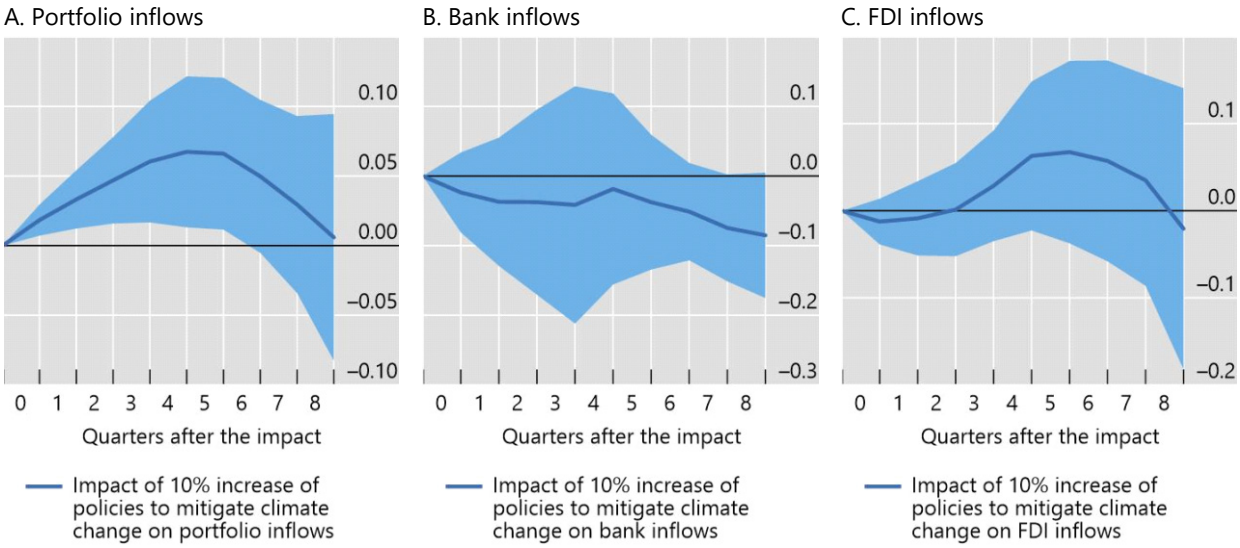
Source: Authors' calculations.

A second element of transition risk is the implementation of policies to tackle climate change. When this factor is implemented, we estimate a positive impact on portfolio inflows, while there is no evidence of an effect on the other two types of capital flows. Specifically, after a 10% increase in the annual growth rate of green policies implemented, we found an increase in the first six quarters of of 0.07% of GDP in portfolio inflows (Graph 5).

Our analysis highlights the importance of climate policies in attracting portfolio investments to EMEs. The positive response of portfolio inflows to the implementation of green policies underscores the role of regulatory frameworks in shaping investment decisions. However, the absence of a similar effect on FDI and bank inflows suggests that different types of capital flows respond distinctively to transition risks.

Home country climate policies are associated with higher portfolio inflows

As a percentage of GDP Graph 5



[1] Response functions from local panel projections for 21 EMEs from Q1 2016 to Q3 2023. We regress capital flows as percentage of GDP on the lag of the same variable, the year-on-year change of policies to mitigate climate change, a vector of domestic variables to control for pull factors that includes four lags of the policy rate, the government debt as percentage of GDP, the short-term GDP growth expectations and domestic equity volatility. The regressions include time fixed effects to control for push factors and global events and country fixed effects.

Source: Authors' calculations.

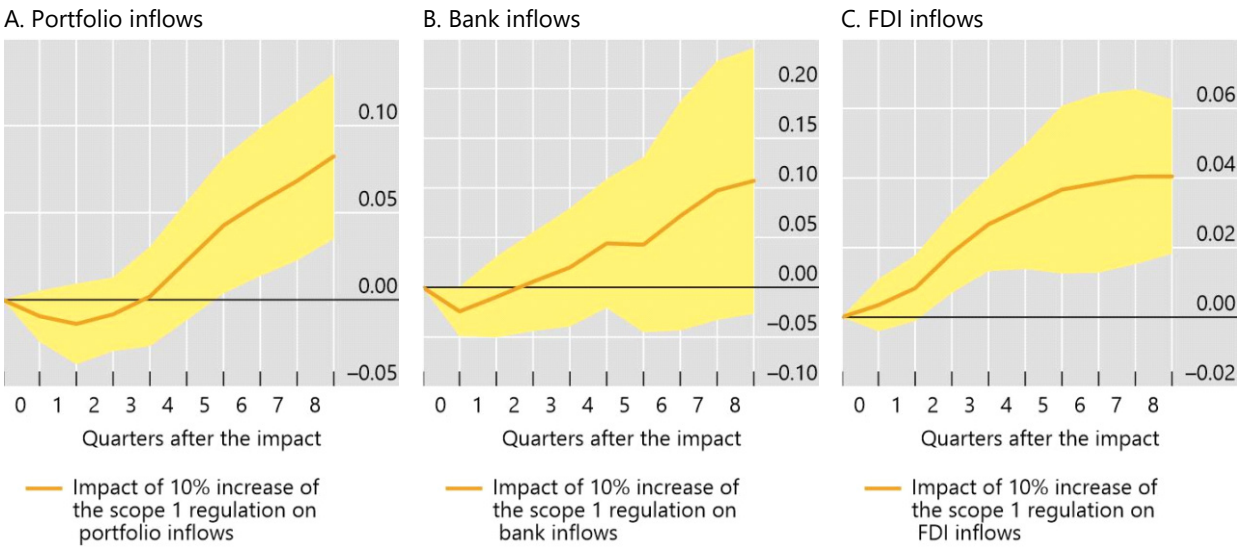
Finally, a third transition risk factor is Scope 1 regulation. The implementation and enforcement of robust Scope 1 regulations can enhance the attractiveness of EMEs to foreign investors by demonstrating a commitment to sustainability, mitigating risks, and potentially offering financial incentives. This can lead to increased capital inflows, particularly from investors who prioritise ESG criteria.

Specifically, a 10% increase in the annual growth rate of Scope 1 regulation can increase portfolio inflows and FDI inflows one-year after the impact by 0.08% and 0.04% of GDP, respectively. However, there is no statistical evidence to suggest an impact on bank inflows (Graph 6).

These results suggest the critical role of Scope 1 regulations in attracting foreign investment to EMEs. By prioritising sustainability and implementing stringent environmental policies, EMEs can effectively leverage these regulations to enhance their appeal to ESG-focused investors.

Reporting requirements in EMEs facilitate portfolio and FDI inflows

As a percentage of GDP Graph 6



[1] Response functions from local panel projections for 21 EMEs from Q1 2007 to Q3 2023. We regress capital flows as percentage of GDP on the lag of the same variable, the year-on-year change of scope 1 regulation, a vector of domestic variables to control for pull factors that includes four lags of the policy rate, the government debt as percentage of GDP, the short-term GDP growth expectations and domestic equity volatility. The regressions include time fixed effects to control for push factors and global events and country fixed effects.

Source: Authors' calculations.

6. Next steps and robustness check

Although the host-country methodology described above has the advantage of filtering out any time-varying factors that affect capital flows to EMEs and shows very interesting and novel findings, it could provide an incomplete picture of the dynamics of capital flows. Capital allocation, when considering environmental factors, is not only determined by host country-related variables (eg a greener energy mix) but also by home country-related aspects. For instance, bilateral capital flows could be influenced by the degree or number of climate-related policies implemented in the home country, as these may impose restrictions or guidelines for investors abroad (eg reducing minimising carbon emissions, supporting sustainable development goals, etc.). In other words, stricter environmental regulations in the home country may lead investors to seek greener investments abroad, which are more likely to be found in more environmental-friendly host countries.

Focusing on bilateral data on capital flows from home to host countries, we should be able to give a more comprehensive analysis and complement our previous findings on the effect of environmental considerations on capital flows. Our regression may consider the following specification, based on the gravity models used in trade analysis (Xu, 2019):

$$y_{i,j,t} = \alpha_0 + \alpha_1 policy_{i,t} + \alpha_2 policy_{j,t} + \alpha_3 green_{i,t} + \alpha_4 green_{j,t} + \alpha_5 policy_{i,t} \times green_{j,t} + \alpha_6 Dist_{ij} + \beta' X_{i,t} + \phi' X_{j,t} + \theta_i + \gamma_j + \delta_t + \varepsilon_{i,j,t} \quad (2)$$

Where $y_{i,j,t}$ are gross capital inflows (portfolio, bank or FDI) from the home country i to host country j in period t. $policy_{i,t}$ and $policy_{j,t}$ refers to the number (or intensity) of climate-friendly policies already implemented in home country i and host country j in year t. $green_{i,t}$ and $green_{j,t}$ defines the shares of renewable energy in total electricity generation in home country i and host country j in year t. $policy_{i,t} \times green_{j,t}$ is the interaction between the number of climate-related policies in the home country i and the share of renewable energy in host country j. $Dist_{ij}$ is the logarithm of the geographical distance between the home and host countries. $X_{i,t}$ and $X_{j,t}$ refer to control variables, ie push and pull factors in home and host countries in year t. θ_i, γ_j and δ_t refer to home-country, host-country and time-fixed effects. $\varepsilon_{i,j,t}$ is the error term.

Our parameters of interest are α_1, α_1 and α_5, which are expected to be positive. This would mean that the higher the number of climate-related policies in the home country and the share of green energy in the host country, the higher the capital flows between them. We eventually can also include other variables that reflect transition and physical risks to assess its interplay on capital flows.

To assess the potential impact of the Paris Agreement, as suggested by our findings above, we can include a variable that takes the value of 1 after 2016 and 0 before that. This new variable, $Post2016_t$, can interact with our two other variables of interest. With this, we should be able to observe any difference in the impact of the energy mix and climate-related policies on attracting capital flows before and after the enactment of the Paris Agreement.

7. Conclusion

Environmental considerations are likely to play a growing role in capital allocation in the coming years. Some activities will become more expensive or simply unfeasible whereas others will gain importance.

In this paper, we provided an initial look at how environmental factors related to physical and transition risks affect capital flows (ie portfolio, bank, and foreign direct investment (FDI) flows), focusing on 21 emerging market economies. Our strategy follows a host-country approach and consists of regressing capital inflows as a function of host country-related variables, including environmental factors such as extreme weather events, energy mix and the number of climate-related policies.

Our findings suggest that physical risk matters for FDI but not for portfolio investment. On the transition risk side, we found that the commitment to using green energies is effective in attracting capital flows to EMEs, but only after the Paris Agreement in 2016. We found statistical evidence for this in both portfolio and FDI flows. Additionally, climate-related policies in the home country can increase portfolio inflows, while no significant reaction is observed for FDI inflows. Furthermore, an increase in green commitment by firms (measured by scope regulation) can attract both portfolio and FDI inflows to EMEs.

To provide a complete overview of how environmental considerations affect capital flows and to complement our findings, we plan to follow a home-host country approach. Capital allocation, when considering environmental factors, is not only determined by host country-related variables but also by home country-related aspects. In particular, stricter environmental regulations in the home country may lead investors to seek greener investments abroad, which are more likely to be found in more environmental-friendly host countries. This approach would involve regressions considering the number of climate-related policies and the energy mix in both home and host countries, based on the gravity models used in trade analysis.

Our results open avenues for future research focusing on the interaction between capital flows and environmental considerations in emerging economies. Our contribution is to provide novel evidence on this relationship, which has become clearer after the Paris Agreement. Including home country-related factors in our next steps would complement our findings.

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