Climate Policy and International Capital Reallocation*

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Abstract

This study utilizes bilateral data on external assets to investigate the influence of climate policies on international capital reallocation. We find that the stringency of climate policy in the destination country is significantly and positively associated with an increase in the allocation of portfolio equity and banking investment to that country, however, it does not exhibit a significant influence on the allocation of FDI and portfolio debt. Moreover, our findings are not driven by valuation effects, and we provide evidence suggesting a diversification mechanism for the reallocation of both equity and banking assets and a suasion mechanism for the reallocation of portfolio equity.

Keywords: Climate Change Policy; International Asset Allocation; Capital Flows; Green Investment

JEL Codes: F21, F36, F64

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1 Introduction

The urgent need to address climate change has brought forth a new frontier in global governance regarding climate policies aimed at reducing carbon emissions and curbing temperature increases. Nevertheless, the stringency of climate policies varies among countries, and regulatory risk is identified as the top climate-related risk to businesses and investors over the next five years according to a survey of finance academics, professionals, regulators, and policy economists (Stroebel and Wurgler 2021). The question arises as to how the international financial market responds to this divergence in climate policies across nations. Will more capital be allocated to countries with lax policies, thereby undermining efforts to combat climate change? Alternatively, will capital favor countries with more rigorous climate policies, thus fostering a global improvement in environmental regulation? Understanding the consequences has important implications for the efficiency of global coordination of climate policies.

This paper uses bilateral asset holdings data to investigate the effect of climate policies on international capital reallocation. Importantly, we focus on the comparison of the impact on four different types of assets under the same framework: foreign direct investment (FDI), portfolio equity, portfolio debt, and bank investment. Specifically, we construct the weight of each destination country in the international assets holdings, in one of the four types of assets, of each source country, and then we examine whether and how the climate policies in the destination country are associated with the share of assets allocated to this country. With the granular bilateral data, we can saturate the identification using country pair and source country-year fixed effect in the empirical analyses, and the estimates arise from the variations in climate policies in the destination country that are exogenous to foreign investors. Therefore, we provide a clean identification of the role of the climate policy of the destination country on the capital allocation for a given source country in a given year.

To provide a glimpse of our baseline findings, Figure 1 shows a binscatter plot between a measurement of the climate policy of the destination country and the weight of cross-border assets allocated to this country. We take 50 bins that are equal in size based on the values of the climate policies in the horizontal axis and show the average weights of assets in each bin in the vertical axis. We control country-pair and source-country-year fixed effects in this exercise. The figure shows that the role of climate policies varies across asset types. FDI and portfolio debt are insignificantly correlated with the climate policy in the destination country, meanwhile, the allocation of portfolio equity and bank investment tend to be positively correlated with it. The more stringent the destination country is regarding climate change, the higher the weight of equity and banking assets allocated there.

Figure 1: Binscatter Plot

Notes: The vertical axis reports the share of assets allocated to the destination country for 50 equal-sized groups defined in terms of the climate policy stringency in the source country on the horizontal axis. The climate policy index is obtained from Germanwatch.

Our empirical analyses formally test and confirm these findings. Specifically, when the climate policy in the destination country tightens by one standard deviation, there is a noteworthy increase in the share of allocated portfolio equity assets and banking assets to this country of about 0.11 and 0.14 percentage points, respectively. Moreover, we find that advanced countries play a key role in driving the baseline results by directing their assets toward other advanced countries, and the magnitude almost doubles that in the baseline. In contrast, the reallocation effect is insignificant regarding emerging markets as either the source or destination country. Furthermore, we use local projections to show that the effect on portfolio equity reallocation is persistent over the five-year horizon.

Next, we conduct various tests to show the robustness of the baseline results. Our main findings remain when we use alternative measurements of climate policy stringency and external assets positions, examine the role of climate change performance in parallel to climate policies, and account for potential substitution effects between different types of assets. In addition, a set of placebo tests based on reshuffled climate policy data shows that it is the true policy stringency that drives our results.

Finally, we investigate three potential mechanisms behind the positive relationship between climate policy stringency and cross-border allocation of portfolio equity and banking assets. First, we examine the valuation effects on currency values and equity prices and show that our findings are not driven by passive reallocation. Second, we measure a country's overall exposure to climate policy stringency using the country composition of its international portfolios and find a more pronounced effect on both equity and banking assets allocation when the country's overall exposure is low, indicating a diversification mechanism. Third, we use the share of Green Parties in the parliament as a proxy of investors' green awareness in the country and find a more pronounced effect on portfolio equity reallocation when the country's green awareness is high, indicating a suasion mechanism.

We contribute to the literature by conducting a comprehensive examination of the heterogeneous impacts of climate policies on the international allocation of four different types of assets. We also look into the granular policy classifications and compare the effect of market-based and non-market-based policies. Moreover, we provide discussions on the mechanisms of diversification and suasion motivations. The policy implications are that international equity and banking investments tend to follow stringent climate policies, especially the non-market-based ones, and could foster the coordination of climate policies across countries.

The rest of the paper is organized as follows. Section 2 provides a review of related literature and highlights the innovation and contribution of this study. Section 3 describes the data source and construction of key variables used in the analysis. Section 4 presents the empirical analysis, including the identification strategy, the baseline findings, various robustness checks, and the investigation of mechanisms. Section 5 concludes.

2 Related Literature

This study contributes to the growing research on climate change and finance. There are many studies documenting the challenges that financial markets face during the transition to a green economy; see Giglio et al. (2021) for a review. This strand of literature includes the discussions on both regulatory risks (Krueger et al. 2020, Mueller and Sfrappini 2022, Bartram et al. 2022, Kacperczyk and Peydró 2022, Reghezza et al. 2022, Ramelli et al. 2021, Seltzer et al. 2022, Khalil and Strobel 2023) and psychical risks (Bernstein et al. 2019, Bakkensen and Barrage 2022, Nguyen et al. 2022) on the domestic financial markets including firm investment, equities, bonds, and bank loans. Surprisingly, however, there have been few studies examining the impact of climate policies on cross-border capital allocation until recently.

Moreover, among the recent literature relating climate change risks to international capital flows, all focus on a certain type of assets, with the effect on FDI being the most investigated (Cole et al. (2017) provides a survey). Theoretically, Dijkstra et al. (2011) provide a framework suggesting that more stringent environmental regulation can attract more FDI as it increases the production costs for all firms and foreign firms have a cost advantage due to more efficient technologies, and Gu and Hale (2023) propose a model for firm production location choice that incorporates transition and physical risks and predict a reduction in FDI while highlighting the role of emission productivity of firms. Habla (2018) model capital and fossil fuels as mobile production factors across countries and show that resource tax leads to capital and resource flight while capital subsidy reallocates both capital and resources back to the home country.

Empirical evidence is mixed as well. For instance, Gu and Hale (2023) do not find robust evidence on whether multinational firms react to climate-related physical risks and mitigation policies using cross-country data. Based on national policy changes, Hanna (2010) uses U.S. data to show that there is an increase in FDI in response to more stringent regulations as implemented by the Clean Air Act Amendments, Chung (2014) uses Korean data to show that polluting industries tend to invest more in countries with laxer environmental regulations, and Cai et al. (2016) and Ni et al. (2022) use Chinese data to demonstrate that environmental regulations lead to less FDI inflows on average.

There are also increasing efforts using syndicated loan data to test how banks' international lending activities respond to climate policies. Demirguc-Kunt et al. (2022) find that after authorities in the host country strengthen their climate-related actions, there is a marginal increase in the lending portfolio of banks, while Benincasa et al. (2022) show that global banks react to higher climate policy stringency in their home country by increasing their cross-border lending to exploit the lack of global coordination in climate policies. Regarding the portfolio market, De Haas and Popov (2023) show that countries with deeper stock markets reduce emissions faster by facilitating the development of cleaner technologies, and Ferriani et al. (2023) is one of the few studies investigating the effects of adverse catastrophic events using the data of capital flows to mutual funds and document a shortfall in investors' net inflows to the affected country, that is, investors "flight to climatic safety".

To the best of our knowledge, we are the first study examining the effect of climate policies on the bilateral allocation of four types of assets at the same time. Yang (2008) examines the impact of hurricanes on different types of international financial flows, but it is limited to the effect of hurricanes and only uses country-level data. In contrast, we contribute to the literature by focusing on the stringency of climate policies and comprehensively using bilateral holding data of all four categories of assets. We also provide discussions on the heterogeneity between advanced and emerging countries, granular categories of policies, and various mechanisms including valuation effects, diversification, and green awareness.

3 Data

3.1 Bilateral Holdings

We use various databases to access the bilateral holding positions of four types of assets between countries. Specifically, we obtain the data of FDI holdings from the Coordinated Direct Investment Survey (CDIS) by International Monetary Fund (IMF), the portfolio equity and debt holdings from the Coordinated Portfolio Investment Survey (CPIS) by IMF, and banking investment positions from the Locational Banking Statistics (LBS) launched by Bank for International Settlements (BIS). We use the end-of-year values of the outstanding external asset positions to ensure the consistency of annual frequency across different datasets. We exclude tax havens such as Cyprus, Ireland, Luxembourg, Malta, Netherlands, and Singapore from our sample to focus on transparent channels of capital reallocation. In the robustness section, we also use the data of restated bilateral positions for portfolio equity and portfolio debt provided by Coppola et al. (2021), as this framework adjusts external bilateral positions to isolate securities associated with tax havens. To compare the magnitude of the findings, in the appendix, we also report results using export data from the UN Comtrade Database.

Therefore, we have the investment positions of the above four types of assets from each source country s to each destination country d. To measure the capital reallocation, we construct a variable to capture the weight of each destination country in the total external positions of the source country: $\frac{Assets_{sdt}}{\Sigma_d Assets_{sdt}}$, and this measurement can be applied to each type of assets. We account for potential valuation effects that may contaminate investors' active reallocation in later discussion. In addition, we construct the intensity of assets by the ratio of investment positions in the destination country to the GDP in the source country, which is used as an alternative explained variable in the robustness check. Panel A of Table 1 summarizes the weight and intensity variables of bilateral investment variables.

3.2 Climate Policies

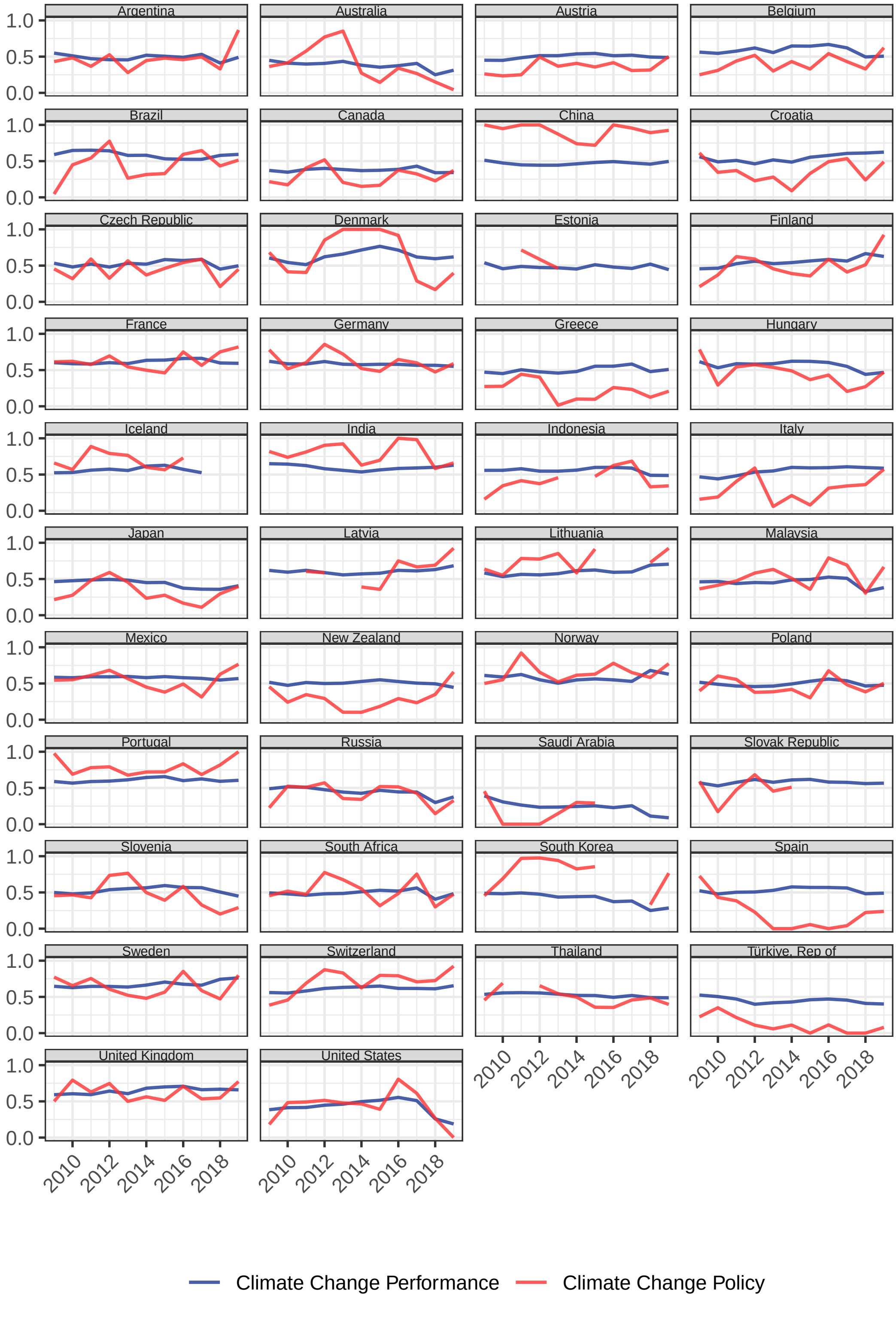
In the main analysis, we use the climate policy index published by Germanwatch to measure the stringency of each country's climate policies. The index examines countries' climate policies and governance frameworks that contribute to effective climate action. Specifically, expert evaluations of climate and energy policy, sourced from non-governmental organizations, universities, and think tanks, are used to assess the climate policy. These experts provide ratings by responding to a questionnaire that measures their government's performance on critical indicators including the existence and implementation of national climate strategies, emission reduction targets, adaptation plans, and measures to promote climate resilience. The ratings are given on a Likert scale ranging from one ("weak") to five ("strong"), which are subsequently transformed into an index ranging from 0 to 100.

This index is a transparent and comprehensive measure of a country's climate policy. With global comparability, it has been presented at the United Nations' annual climate change policy conferences and used by the financial industry, various policy institutions, and academic research (Beyene et al. 2021, Benincasa et al. 2022).

Moreover, we also use the overall climate change performance index (CCPI) from the same source. The overall performance combines the information of the following three aspects in addition to climate policy. First, the indicator considers the greenhouse gas (GHG) emission per capita and measures the total emissions of carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and other GHGs produced within a country's borders. Second, it accounts for the use of renewable energy by assessing the share of renewable energy in a country's total energy consumption, investment in renewable energy infrastructure, and policies promoting renewable energy deployment. Third, it also considers energy efficiency and accounts for factors such as energy consumption per unit of GDP, energy-saving measures, energy-efficient infrastructure, and energy labeling schemes. The overall performance index is a weighted average of the scores of the four aspects, where GHG emissions weigh 40%, and the other three aspects contribute 20% each. The separation of climate policy from climate performance helps eliminate the contamination of the regulatory transitions from physical transitions.

Both the original policy and performance indicators rank countries on a scale from 0 to 100, with higher scores indicating more restrictive policies or better performance. Throughout this study, we divide the original indicators by 100 to make them range from 0 to 1, in order to ease the interpretation of coefficients in the empirical analysis. Figure 2 shows the time series of both the climate policy and performance variables for each country in our sample. We observe large variations across time and countries, which provide a good base for identification in later empirical analysis.

Figure 2: Climate Change Indicators by Country



Notes: This figure shows the climate change policy and performance index from Germanwatch for each country. The missing data on the climate change policy index means that Germanwatch found no experts in that country-year to evaluate.

We also incorporate the Environmental Policy Stringency (EPS) Index developed by the Organization for Economic Co-operation and Development (OECD) as an alternative, though its country coverage is smaller than the climate policies in the CCPI database. Contrary to the CCPI, this index focuses on quantifying the stringency of environmental policies based on objective metrics rather than expert evaluations. It evaluates the stringency of environmental policies through a blend of market-based policies, non-market-based policies, and technology support policies, each carrying a weight of one-third. The market-based policy component encompasses a spectrum of measures, including taxes on carbon dioxide (CO2), nitrogen oxides (NOx), sulphur oxides (SOx), and diesel emissions, as well as trading schemes encompassing CO2 and renewable energy certificates. The non-market-based policy component assesses standards like emissions limit values for NOx, SOx, particulate matter (PM), as well as sulfur content limits for diesel. The indicator for technology support policies includes R&D subsidies directed towards low-carbon energy technologies as well as renewable energy support for solar and wind technologies.

Lastly, our analysis also integrates a range of control variables to account for potential economic and financial influences. We include the average real GDP growth rate in the previous two years, obtained from the World Development Indicators (WDI); the inflation rate, sourced from the IMF; and the average short-term central bank policy rate over two years, obtained from Oxford Economics and Datastream. Additionally, we control CO2 emission intensity when the CCPI index is not used; it is measured as CO2 emissions in kg per unit of GDP and sourced from the Climate Watch Historical GHG Emissions and WDI. Furthermore, we construct bilateral exchange rates using cross rates against the USD based on data from Thomson Reuters' Refinitiv, which furnishes valuable information on currency fluctuations and trade dynamics, and we express the bilateral exchange rate in the way that an increase in its value indicates an appreciation of the destination country's currency. Panel B of Table 1 reports the summary statistics of these variables.

The country and year coverage of the final dataset are the results of the availability of both bilateral holdings and climate policy data. Our sample starts from 2009 and ends in

2019. We exclude the years of the global financial crisis and the COVID-19 pandemic due to the very different characteristics of the global economy during these periods. Regarding FDI, portfolio equity, and portfolio debt, 27 out of 41 source countries and 27 out of 42 destination countries are advanced countries. For banking assets, 17 out of 20 source countries and 19 out of 28 destination countries are advanced countries. Table A1 in the appendix lists the countries in the sample for each type of asset.

Table 1: Summary Statistics

	Mean	Standard Deviation	Min	Max	N
Panel A: Bilateral Variables					
Allocated Share of FDI Assets (%)	2.52	5.90	0.00	53.15	12608
FDI Assets/GDP	0.60	1.98	0.00	58.85	12608
Allocated Share of Portfolio Equity Assets (%)	2.52	7.28	0.00	67.26	13842
Portfolio Equity Assets/GDP	0.45	2.26	0.00	83.60	13842
Allocated Share of Portfolio Debt Assets (%)	2.45	5.95	0.00	56.58	13844
Portfolio Debt Assets/GDP	0.58	1.87	0.00	35.37	13844
Allocated Share of Banking Assets (%)	3.60	7.67	0.00	63.11	4899
Banking Assets Assets/GDP	1.66	4.38	0.00	53.19	4899
Allocated Share of Exports (%)	2.08	3.76	0.00	28.82	16146
Exports/GDP	0.56	1.22	0.00	19.13	16146
Exchange Rate	109.60	967.78	0.00	20471.62	10285
Panel B: Country Characteristics					
Climate Policy - Destination	0.50	0.23	0.00	1.00	436
Climate Policy - Source	0.50	0.23	0.00	1.00	409
Climate Change Performance - Destination	0.53	0.09	0.23	0.77	436
Climate Change Performance - Source	0.54	0.09	0.24	0.77	409
GDP Growth Rate - Destination	2.25	3.06	-9.36	13.48	436
GDP Growth Rate - Source	2.09	2.84	-9.36	9.81	409
Inflation - Destination	3.37	5.58	-16.91	42.03	436
Inflation - Source	3.35	5.48	-16.91	42.03	409
Policy Rate - Destination	3.29	4.23	-0.75	35.92	436
Policy Rate - Source	3.28	4.32	-0.75	35.92	409
CO2 Intensity - Destination	0.39	0.31	0.05	1.59	436
CO2 Intensity - Source	0.37	0.29	0.05	1.56	409

4 Empirical Analysis

4.1 Identification Strategy

We first examine the responses of international capital allocation to the climate change policies in both the source and destination countries using the following specification:

$$Share^{type}_{s,d,t} = \beta_{s1} CP_{s,t-1} + \beta_{d1} CP_{d,t-1} + \beta_{s2} X_{s,t-1} + \beta_{d2} X_{d,t-1} + \alpha_{s,d} + \delta_t + \epsilon_{s,d,t} \quad (1)$$

where s, d, and t denote source country, destination country, and year, respectively. The dependent variable $Share^{type}_{s,d,t}$ is the share of total external assets of country s allocated in country d in year t, and *type* denotes one of the four types of assets: FDI, portfolio equity, portfolio debt, and banking investment.[1]. On the right hand side, $CP_{s,t-1}$ and $CP_{d,t-1}$ are the climate policy index for the source and destination country as described before. X is a set of control variables including the average real GDP growth rate in the previous two years, the inflation rate, the central bank policy rate, the log bilateral exchange rate, and the log CO2 emission intensity. We take the lagged terms of climate change policies and control variables to mitigate the concern about reverse causality. $\alpha_{s,d}$ and δ_t are country-pair and year fixed effects, which are important for the identification as they absorb any confounding factors that are constant across the source-destination pair such as cultural distance and language similarities and that are common for all countries such as global financial conditions. The coefficients we are interested in are β_{s1} and β_{d1}, which capture the impact of climate change policies of the source country s and destination country d, respectively, on the capital allocation from country s to country d. Moreover, focusing on the effect of the destination country's climate policies, we enhance the identification by adding the source country-year fixed effect $\theta_{s,t}$, thereby the estimated impact absorbs all push factors from the source country and arises from differences of the destination country alone:

[1] In addition, to compare with the effects on trade, we use the share of exports allocated to a destination country as the dependent variable and present the results in Table A2 the appendix

$$Share^{type}_{s,d,t} = \beta_{d1}\prime CP_{d,t-1} + \beta_{d2}\prime X_{d,t-1} + \alpha_{s,d} + \theta_{s,t} + \epsilon_{s,d,t} \quad (2)$$

In this specification, the estimates of all source country variables are absorbed, and the coefficient $\beta_{d1}\prime$ provides the impact on reallocation when the climate policy in the destination country changes by one unit, while holding the same source-country-year. Since the policy and economic conditions in the destination country are exogenous to the source country, and all confounding effects that are time-variant at the source country are removed, this specification provides a clean identification of changes in the destination country on capital reallocation. Throughout the paper, we cluster the standard errors at the country-pair and source country-year level to account for potential correlations.

4.2 Baseline Results

Table 2 shows the baseline results, where we report the estimates first without other control variables except the climate policies and then include them and gradually saturate the identification using more fixed effects.

We observe that climate policy is significantly associated with asset reallocation across borders, but this effect differs by types of capital flows. The coefficients of the climate policy in the destination country are significantly positive across all specifications for the allocation of portfolio equity and banking investment, but insignificant for the allocation of FDI and portfolio debt. Specifically, for a given source country in a year, when the climate policy in the destination country becomes more restricted by one standard deviation, the share of equity assets and banking assets allocated to this country is significantly increased by 0.11 and 0.14 percentage points, respectively. Given that the average share of equity and banking assets allocated across countries are 2.52% and 3.60%, the estimated effects are economically meaningful. These results indicate that equity investors and bank lenders care about climate change policies when constructing their overseas portfolios, and they intend to increase investment in countries that care more about the environment and climate change. Our findings are consistent with the literature showing that stock market investors help to reduce emissions of carbon-intensive industries and reallocate investment towards firms that are more responsible to climate (De Haas and Popov 2023, Ramelli et al. 2021) and bank lenders show strong preferences for green assets (Demirguc-Kunt et al. 2022, Reghezza et al. 2022).

Table 2: Baseline: Climate Policy and Reallocation Effect

	FDI			Equity			Debt			Bank		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
L.Climate Policy - Destination	0.045	-0.038	-0.039	0.524***	0.504***	0.461**	0.188	0.167	0.193	0.613**	0.608**	0.590**
	(0.147)	(0.135)	(0.132)	(0.190)	(0.186)	(0.187)	(0.194)	(0.189)	(0.190)	(0.269)	(0.273)	(0.270)
L.Climate Policy - Source	-0.002	0.019		-0.077	-0.079		-0.177	-0.154		0.076	0.104	
	(0.089)	(0.104)		(0.141)	(0.138)		(0.192)	(0.187)		(0.136)	(0.115)	
L.CO2 intensity - Destination		-0.796**	-0.770**		-0.775*	-0.705		-0.151	-0.028		0.566	0.877
		(0.383)	(0.372)		(0.457)	(0.453)		(0.355)	(0.352)		(0.639)	(0.645)
L.CO2 intensity - Source		0.001			-0.244			0.182			-0.240	
		(0.372)			(0.296)			(0.392)			(0.479)	
L.GDP Growth Rate - Destination		0.031***	0.032***		0.016	0.016		0.002	0.007		-0.028	-0.033
		(0.011)	(0.011)		(0.014)	(0.015)		(0.012)	(0.011)		(0.023)	(0.022)
L.GDP Growth Rate - Source		-0.002			-0.008			-0.008			0.012	
		(0.014)			(0.017)			(0.013)			(0.032)	
L.Inflation - Destination		-0.001	0.001		0.017***	0.017***		0.004	0.005		-0.001	0.003
		(0.006)	(0.005)		(0.005)	(0.005)		(0.004)	(0.004)		(0.009)	(0.008)
L.Inflation - Source		-0.005			-0.009			-0.003			0.003	
		(0.008)			(0.009)			(0.007)			(0.023)	
L.Policy Rate - Destination		0.022***	0.023**		0.006	0.012		0.008	0.013		0.002	0.003
		(0.008)	(0.009)		(0.008)	(0.008)		(0.007)	(0.008)		(0.043)	(0.044)
L.Policy Rate - Source		0.000			-0.003			-0.004			-0.003	
		(0.033)			(0.010)			(0.011)			(0.052)	
L.Exchange Rate		0.118*	0.211**		0.082	0.242***		0.060	0.137		0.500	1.019*
		(0.060)	(0.100)		(0.063)	(0.065)		(0.060)	(0.097)		(0.418)	(0.577)
Source-Destination Pair FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Source Country-Year FE	NO	NO	YES	NO	NO	YES	NO	NO	YES	NO	NO	YES
Year FE	YES	YES	-	YES	YES	-	YES	YES	-	YES	YES	-
Controls	NO	YES	YES	NO	YES	YES	NO	YES	YES	NO	YES	YES
Num.Obs.	12608	12608	12608	13842	13842	13842	13844	13844	13844	4899	4899	4899
R2 Adj.	0.901	0.901	0.900	0.908	0.909	0.907	0.846	0.846	0.851	0.952	0.952	0.950

Notes: *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Standard errors are clustered at the country-pair and source country-year level. The dependent variable is the share of total external assets that a source country has allocated in a destination country whereas we consider the following assets: foreign direct investment, portfolio equity, portfolio debt, and banking investment.

Considering other country characteristics, we observe that a higher CO2 intensity, a lower GDP growth rate, and a lower policy rate in the destination country are significantly linked to decreased FDI allocation. For an increase in the destination country's inflation rate, we observe a slight increase in portfolio equity allocation. Lastly, the allocation of

FDI, portfolio equity, and banking assets to the destination country increases when its currency appreciates.

In order to determine the role of specific country groups in our results, we introduce interaction dummies to differentiate the impact of climate policies on asset positions between advanced and emerging countries. The outcomes are presented in Table 3.

Table 3: Between Advanced and Emerging Countries

	FDI			Equity			Debt			Bank		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
EM to EM x L.Climate Policy - Destination	-0.384	-0.471	-0.353	0.341	0.345	0.360	0.000	-0.016	0.038	0.803	0.572	0.564
	(0.297)	(0.289)	(0.318)	(0.404)	(0.399)	(0.392)	(0.465)	(0.476)	(0.459)	(0.600)	(0.680)	(0.811)
EM to AE x L.Climate Policy - Destination	-0.174	-0.235	-0.329	0.678	0.652	0.500	-0.111	-0.116	0.087	-0.290	-0.240	-0.305
	(0.321)	(0.319)	(0.355)	(0.564)	(0.561)	(0.626)	(0.558)	(0.547)	(0.602)	(1.586)	(1.556)	(1.666)
AE to EM x L.Climate Policy - Destination	0.491*	0.381	0.375	-0.002	-0.041	-0.066	-0.045	-0.095	-0.059	0.078	-0.144	-0.157
	(0.294)	(0.270)	(0.280)	(0.100)	(0.109)	(0.121)	(0.085)	(0.103)	(0.109)	(0.111)	(0.174)	(0.146)
AE to AE x L.Climate Policy - Destination	0.019	-0.055	-0.044	0.778***	0.729***	0.704***	0.475*	0.446*	0.381	1.007***	1.040***	1.025***
	(0.180)	(0.178)	(0.178)	(0.236)	(0.230)	(0.234)	(0.269)	(0.263)	(0.270)	(0.292)	(0.285)	(0.286)
EM to EM x L.Climate Policy - Source	0.651	0.638		0.609*	0.515*		-0.555	-0.525		-0.738	-0.556	
	(0.537)	(0.591)		(0.316)	(0.293)		(0.491)	(0.492)		(1.204)	(1.193)	
EM to AE x L.Climate Policy - Source	-0.320	-0.264		-0.408	-0.411		0.252	0.295		0.448	0.526	
	(0.312)	(0.345)		(0.545)	(0.545)		(0.501)	(0.478)		(0.353)	(0.380)	
AE to EM x L.Climate Policy - Source	0.138	0.126		0.047	0.019		0.185	0.205*		0.471	0.556*	
	(0.131)	(0.127)		(0.138)	(0.140)		(0.118)	(0.121)		(0.300)	(0.319)	
AE to AE x L.Climate Policy - Source	-0.113	-0.080		-0.157	-0.123		-0.459	-0.434		-0.107	-0.110	
	(0.115)	(0.117)		(0.138)	(0.134)		(0.316)	(0.314)		(0.195)	(0.178)	
Source-Destination Pair FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Source Country-Year FE	NO	NO	YES	NO	NO	YES	NO	NO	YES	NO	NO	YES
Year FE	YES	YES	-	YES	YES	-	YES	YES	-	YES	YES	-
Controls	NO	YES	YES	NO	YES	YES	NO	YES	YES	NO	YES	YES
Num.Obs.	12608	12608	12608	13842	13842	13842	13844	13844	13844	4899	4899	4899
R2 Adj.	0.901	0.901	0.900	0.909	0.909	0.907	0.846	0.846	0.851	0.952	0.952	0.951

Notes: *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Standard errors are clustered at the country-pair and source country-year level. EM and AE denote emerging countries and advanced countries, respectively. The dependent variable is the share of total external assets that a source country has allocated in a destination country whereas we consider the following assets: foreign direct investment, portfolio equity, portfolio debt, and banking investment.

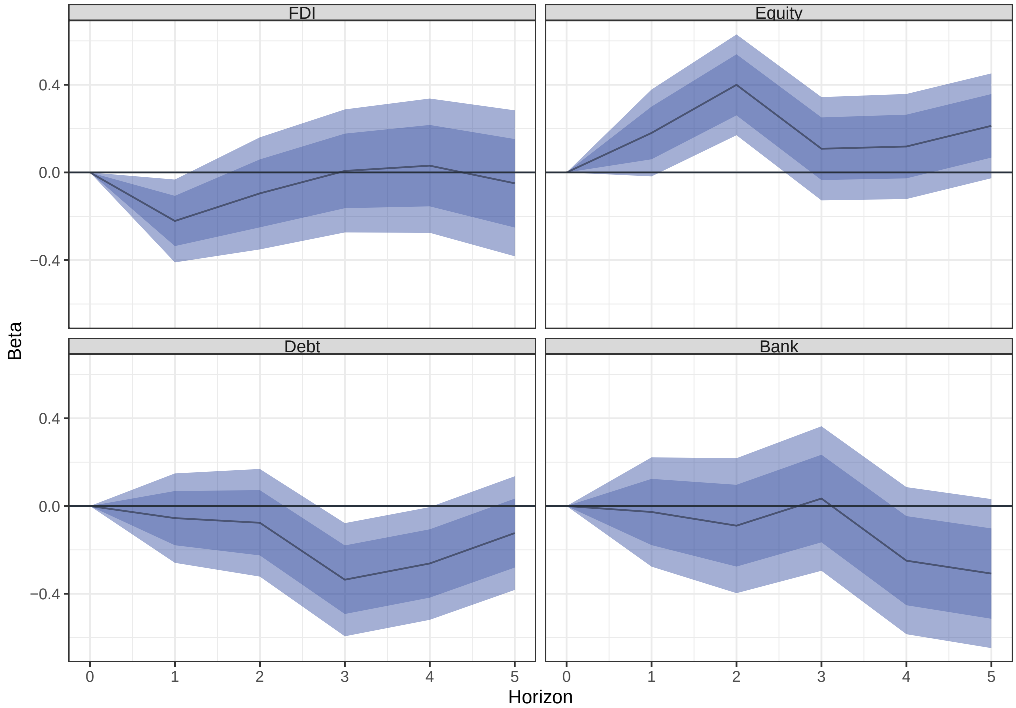
Two interesting findings stand out. First, it shows that the baseline results are driven by advanced countries directing their assets toward other advanced countries. Second, the effect is considerably larger for this specific group of countries, compared to the baseline findings. Accordingly, when both source and destination are advanced countries and the climate policy in the destination country becomes more restricted by one standard deviation, the share of equity assets and banking assets allocated to this country is significantly increased by 0.16 and 0.24 percentage points, respectively. Moreover, more stringent climate policies in the destination country are also marginally associated with an increase in the allocation of portfolio debt assets between advanced and advanced economies. In comparison, climate policies do not play a significant role in affecting asset allocation sourcing from emerging economies to either group of countries or sourcing from advanced economies to emerging economies. A possible explanation for these findings may be the convergence of similar priorities, higher environmental standards, and more developed financial markets typically found among advanced economies. The shared commitment to sustainability and climate-conscious policies could lead to a more pronounced response to destination climate policy scores within this subset of nations.

In a further step, to investigate the persistence of climate policy's impact on global capital reallocation, we employ local projections (Jordà 2005) with the equation:

$$\begin{aligned} Share^{type}_{s,d,t+h} - Share^{type}_{s,d,t} = \beta^{h\prime} CP_{d,t-1} + \Sigma^{2}_{k=1} \gamma^{h\prime}_{k} Share^{type}_{s,d,t-k} \\ + \eta^{h\prime} X_{d,t-1} + \alpha^{h}_{s,d} + \theta^{h}_{s,t} + \epsilon^{h}_{s,d,t}, \end{aligned} \tag{3}$$

where $h = 1, ...5$ denotes the forecasting horizon. In this setting, $\beta^{h\prime}$ measures the cumulative percentage points change in $Share^{type}_{s,d}$ from t to $t+h$, arising from the impulse variable $CP_{d,t-1}$. The simulated shock is a one-unit increase in the destination country's climate policy index. To allow for feedback effects within the model, we control for one- and two-period lagged values of the share of assets country s allocated in country d. We also control for the destination's lagged country characteristics ($X_{d,t-1}$), source-destination country pair, and source-country-year fixed effects. Figure 3 presents the estimated results. The dark- and light-shaded areas represent 90 and 68 percent confidence bands, respectively, with standard errors clustered on the country-pair and source-country-year levels. The positive effect of more stringent climate policies on the allocation of portfolio equity is significant and persistent over time, with the impact peaking after two years. However, the dynamic response of bank asset allocation becomes insignificant and the allocation of FDI and portfolio debt tend to be negatively affected by more stringent climate policies in this setting. To delve into these deviating results, we repeat the local projection analysis by splitting the sample into advanced and emerging economies as either source or destination countries.

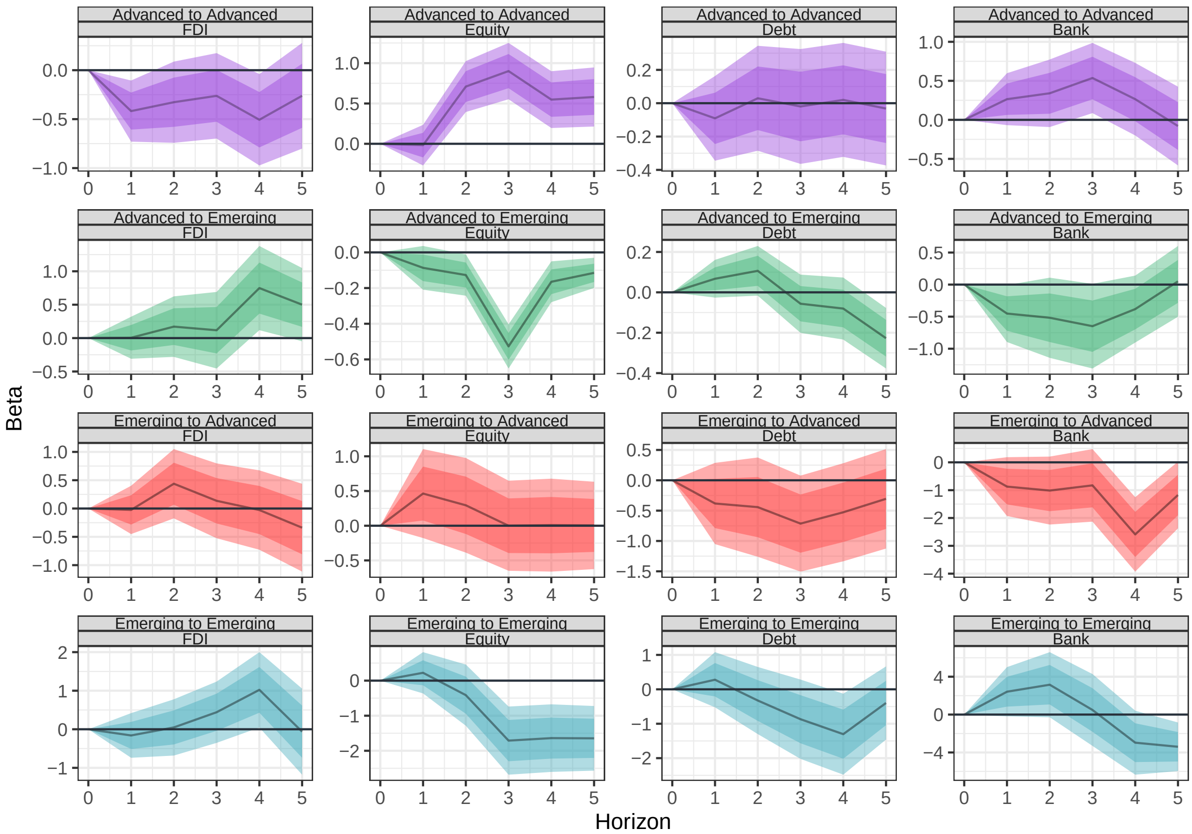
Figure 3: Local Projections



Notes: Responses to a one-unit increase in the destination country's climate policy index. The shaded areas represent 68 and 90 percent confidence bands, respectively, calculated by using standard errors clustered at the country-pair and source country-year level. The dependent variable is the share of total external assets that a source country has allocated in a destination country whereas we consider the following assets: foreign direct investment, portfolio equity, portfolio debt, and banking investment.

Results shown in Figure 4 indicate that there could be some offsetting forces for the dynamic effects in different country groups. Specifically, more restrictive climate policies in advanced countries are significantly and persistently associated with increased equity and banking assets allocated to them from other advanced countries. For the same two types of assets, the capital allocation sourcing from and directing to emerging countries are both negatively or insignificantly affected by an increase in the stringency of climate policies in the destination country. Regarding FDI, when emerging countries take more restrictive climate regulations, they will attract more allocations from both advanced and emerging countries; meanwhile, when advanced countries impose stricter climate policies, they will face reduced allocations from other advanced countries. Regarding portfolio debt, there appears a negative impact on capital allocation to emerging countries when their climate policies become more stringent. To sum up, in terms of persistence, the baseline findings of positive effects on equity and banking capital reallocation from more stringent climate policies apply well between advanced and advanced countries, while results are mixed concerning emerging countries as either recipients or investors.

Figure 4: Local Projections - Heterogeneity Across Country Groups



Notes: Responses to a one-unit increase in the destination country's climate policy index. The shaded areas represent 68 and 90 percent confidence bands, respectively, calculated by using standard errors clustered at the country-pair and source country-year levels. The dependent variable is the share of total external assets that a source country has allocated in a destination country whereas we consider the following assets: foreign direct investment, portfolio equity, portfolio debt, and banking investment.

4.3 Robustness and Discussion

Here we provide an array of robustness checks to our baseline findings. Specifically, we show that the main findings remain when we use alternative measurements of climate policy stringency and external assets positions, use the stock intensity rather than allocation share as the dependent variable, control climate performance in addition to climate policies, and account for potential substitution effects between different types of assets. Moreover, we randomly reshuffle the climate policy indicators and demonstrate that it is indeed the true policy stringency index that leads to our results.

First, we adopt the OECD's EPS index as an alternative measurement of climate policies. Although the EPS data has a smaller country coverage, it allows a more granular classification of subcategories of climate policies. We first use the aggregated EPS index and present the results in Table 4. Consistent with the baseline analysis, we observe a significant and positive association between the destination country's EPS index and the allocation of portfolio equity and banking assets towards it. Then we consider three categories of environmental policies: market-based policies, non-market-based policies, and technology support, each contributing a weight of 1/3 to the aggregated EPS index. Table 5 shows that our main findings arise from non-market-based policies such as NOx emission limits, SOx emission limits, PM emission limits, and sulfur emission limits. Moreover, positive effects are found across all types of assets except for FDI, which only shows marginal effects. Among the affected types of assets, portfolio equity is impacted the strongest, followed by banking assets and portfolio debt. In contrast, market-based policies and technology support policies, such as CO2 trading schemes, renewable energy trading schemes, CO2 tax, NOx tax, SOx tax, and diesel tax for the former and R&D expenditure on low-carbon energy technologies and renewable energy support for the latter, do not show significant effects on cross-border asset reallocation, with the exception that market-based policies tend to affect the allocation of banking assets positively.[2].

[2]We can further break down the EPS index into 13 subcategories of policies in details, and we present the results in the appendix in Table A3

Table 4: Robustness Check: Alternative Environmental Policy Stringency Index

	FDI			Equity			Debt			Bank		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
L.EPS - Destination	0.173	0.011	-0.003	0.485***	0.429***	0.435***	0.160	0.153	0.145	0.245	0.299*	0.331**
	(0.119)	(0.128)	(0.126)	(0.184)	(0.141)	(0.142)	(0.125)	(0.122)	(0.124)	(0.191)	(0.162)	(0.167)
L.EPS - Source	0.001	0.022		0.044	0.003		0.105	0.172		-0.003	0.016	
	(0.122)	(0.124)		(0.137)	(0.143)		(0.145)	(0.147)		(0.129)	(0.145)	
Source-Destination Pair FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Source Country-Year FE	NO	NO	YES	NO	NO	YES	NO	NO	YES	NO	NO	YES
Year FE	YES	YES	-	YES	YES	-	YES	YES	-	YES	YES	-
Controls	NO	YES	YES	NO	YES	YES	NO	YES	YES	NO	YES	YES
Num.Obs.	8292	8292	8292	9086	9086	9086	9047	9047	9047	4362	4362	4362
R2 Adj.	0.900	0.900	0.899	0.906	0.906	0.905	0.866	0.867	0.866	0.954	0.954	0.952

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the country-pair and source country-year level. The dependent variable is the share of total external assets that a source country has allocated in a destination country whereas we consider the following assets: foreign direct investment, portfolio equity, portfolio debt, and banking investment.

Table 5: Robustness Check: Market Policies, Non-Market Policies, and Technology Support

	FDI			Equity			Debt			Bank		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
L.Market Policies - Destination	0.125	-0.059	-0.066	0.252*	0.154	0.153	-0.043	-0.058	-0.072	0.314*	0.369**	0.342*
	(0.125)	(0.114)	(0.115)	(0.149)	(0.143)	(0.140)	(0.117)	(0.120)	(0.117)	(0.177)	(0.175)	(0.181)
L.Non-Market Policies - Destination	0.227**	0.173	0.179*	0.563***	0.579***	0.586***	0.365***	0.388***	0.376***	0.312**	0.390***	0.411***
	(0.104)	(0.108)	(0.107)	(0.158)	(0.152)	(0.154)	(0.095)	(0.095)	(0.096)	(0.140)	(0.143)	(0.147)
L.Tech. Support - Destination	-0.034	-0.060	-0.069	-0.031	-0.039	-0.039	-0.065	-0.075	-0.071	-0.075	-0.070	-0.058
	(0.044)	(0.049)	(0.050)	(0.055)	(0.050)	(0.050)	(0.052)	(0.054)	(0.054)	(0.063)	(0.063)	(0.063)
L.Market Policies - Source	-0.165	-0.146		0.002	-0.045		-0.014	0.077		-0.000	0.040	
	(0.113)	(0.106)		(0.079)	(0.081)		(0.116)	(0.108)		(0.099)	(0.088)	
L.Non-Market Policies - Source	0.092	0.075		-0.015	-0.032		0.063	0.082		-0.021	-0.023	
	(0.091)	(0.100)		(0.082)	(0.090)		(0.093)	(0.091)		(0.148)	(0.149)	
L.Tech. Support - Source	-0.000	0.006		0.023	0.016		0.033	0.043		-0.000	0.001	
	(0.047)	(0.047)		(0.054)	(0.051)		(0.056)	(0.054)		(0.062)	(0.063)	
Source-Destination Pair FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Source Country-Year FE	NO	NO	YES	NO	NO	YES	NO	NO	YES	NO	NO	YES
Year FE	YES	YES	-	YES	YES	-	YES	YES	-	YES	YES	-
Controls	NO	YES	YES	NO	YES	YES	NO	YES	YES	NO	YES	YES
Num.Obs.	8292	8292	8292	9086	9086	9086	9047	9047	9047	4362	4362	4362
R2 Adj.	0.900	0.901	0.900	0.906	0.907	0.905	0.867	0.867	0.867	0.954	0.955	0.953

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the country-pair and source country-year level. The dependent variable is the share of total external assets that a source country has allocated in a destination country whereas we consider the following assets: foreign direct investment, portfolio equity, portfolio debt, and banking investment.

Second, we use the stock intensity, measured by the ratio of external assets allocated in the destination country to the source country's GDP, as the dependent variable and re-estimate the baseline specification. Table 6 shows the results. The baseline findings are confirmed again, as we observe that the more restrictive the destination country's climate policy, the higher the intensity is the portfolio equity and banking assets invested in the country. In addition, the results also show that the intensity of portfolio debt is significantly affected by the climate policy in the destination country, and a more restrictive climate policy in the source country is likely to push more outward banking investments, which reconciles our findings with Benincasa et al. (2022).

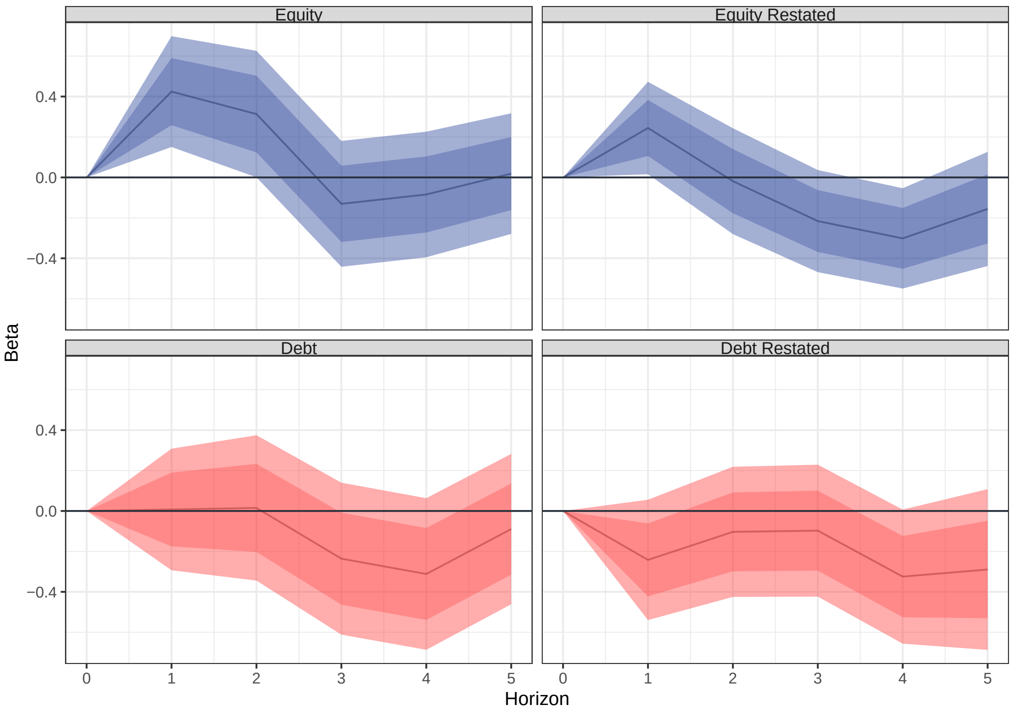
Table 6: Robustness Check: Stock Intensity as Dependent Variable

	FDI			Equity			Debt			Bank		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
L.Climate Policy - Destination	0.068	0.035	0.034	0.284***	0.260***	0.244***	0.147**	0.128**	0.129**	0.371***	0.377***	0.361***
	(0.059)	(0.056)	(0.054)	(0.100)	(0.089)	(0.086)	(0.062)	(0.059)	(0.058)	(0.142)	(0.134)	(0.134)
L.Climate Policy - Source	-0.046	-0.045		0.019	0.056		0.030	0.058		0.458**	0.491**	
	(0.044)	(0.059)		(0.048)	(0.063)		(0.047)	(0.049)		(0.184)	(0.197)	
Source-Destination Pair FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Source Country-Year FE	NO	NO	YES	NO	NO	YES	NO	NO	YES	NO	NO	YES
Year FE	YES	YES	-	YES	YES	-	YES	YES	-	YES	YES	-
Controls	NO	YES	YES	NO	YES	YES	NO	YES	YES	NO	YES	YES
Num.Obs.	12608	12608	12608	13842	13842	13842	13844	13844	13844	4899	4899	4899
R2 Adj.	0.864	0.864	0.866	0.865	0.866	0.870	0.923	0.923	0.925	0.917	0.917	0.924

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the country-pair and source country-year level. The dependent variable is the stock intensity, measured by the ratio of external assets allocated in the destination country to the source country's GDP.

Another way to show the robustness concerning external position data is to employ the restated bilateral positions for portfolio equity and portfolio debt from Coppola et al. (2021), which adjusts for securities associated with tax havens. We therefore reestimate the impulse responses from local projections for portfolio equity and portfolio debt and compare them to the ones obtained by using the original data. However, the downside of this approach is that it does not include data for FDI and banking assets, and countries belonging to the European Monetary Union are aggregated as one investor, leading to a substantial loss in variation. To ensure comparability, we restrict the original data for portfolio equity and debt to source countries that are also present in the adjusted bilateral position data. The results are presented in Figure 5. Averaged over all country pairs, the effect on the restated equity allocation remains positive for the first year after the impact while the whole impulse response is shifted downward after that. The results for portfolio debt are shifted downwards and are insignificant, similar to the findings using the original portfolio debt data.

Figure 5: Robustness Check: Local Projections - Restated Bilateral Positions



Notes: Responses to a one-unit increase in the destination country's climate policy index. The shaded areas represent 68 and 90 percent confidence bands, respectively, calculated by using standard errors clustered at the country-pair and source country-year level. The dependent variable is the share of total external portfolio equity or portfolio debt that a source country has allocated to a destination country. The right panels display the results from using restated bilateral positions, provided by Coppola et al. (2021).

Third, we account for the overall climate change performance in parallel to climate policies. In the baseline analysis, we use the CO2 emission intensity in a country as a common control variable, here we substitute it with the CCPI index from Germanwatch, which can account for the multidimensional nature of climate change. Specifically, the CCPI index combines climate policy evaluations with broader assessments of a country's greenhouse gas emissions, renewable energy use, and energy efficiency. This substitution allows us to explore whether the stringency of climate policy and the actual performance in addressing climate change have distinct influences on international capital allocation. Two findings stand out from the results shown in Table 7. First, the baseline results that more restrictive policies in the destination country are associated with higher weights in capital allocation of portfolio equity and banking investment still hold significantly when the performance indicator is controlled at the same time. Second, the actual environmental performance plays a role in banking asset allocation. Specifically, a worse climate change performance is associated with an increased allocation of bank assets to this country. Possible reasons for this finding relate to banks exploiting the variations of the climate change mitigation performances by increasing cross-border lending to "brown" firms in "brown" countries (Benincasa et al. 2022), and at the same time diversifying assets to countries with greener policies. More explorations on the diversification motivation are presented later in section 4.4.

Table 7: Robustness Check: CCPI Performance and Policy Together

	FDI			Equity			Debt			Bank		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
L.Climate Policy - Destination	-0.027	-0.068	-0.078	0.397**	0.431**	0.394*	0.131	0.110	0.144	0.977***	1.048***	1.035***
	(0.167)	(0.162)	(0.158)	(0.196)	(0.202)	(0.203)	(0.241)	(0.253)	(0.247)	(0.317)	(0.342)	(0.333)
L.Performance - Destination	0.657	0.554	0.564	1.176	0.907	0.770	0.545	0.542	0.424	-3.415***	-3.731***	-3.845***
	(0.700)	(0.689)	(0.688)	(0.844)	(0.860)	(0.839)	(0.986)	(1.023)	(0.992)	(0.983)	(0.978)	(0.998)
L.Climate Policy - Source	0.096	0.129		-0.196	-0.204		-0.082	-0.075		0.065	0.115	
	(0.128)	(0.133)		(0.204)	(0.216)		(0.237)	(0.236)		(0.228)	(0.195)	
L.Performance - Source	-0.782	-0.745		0.957	1.129		-0.712	-0.647		-0.013	-0.121	
	(0.638)	(0.593)		(0.761)	(0.773)		(0.696)	(0.684)		(1.024)	(0.787)	
Source-Destination Pair FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Source Country-Year FE	NO	NO	YES	NO	NO	YES	NO	NO	YES	NO	NO	YES
Year FE	YES	YES	-	YES	YES	-	YES	YES	-	YES	YES	-
Controls	NO	YES	YES	NO	YES	YES	NO	YES	YES	NO	YES	YES
Num.Obs.	12608	12608	12608	13842	13842	13842	13844	13844	13844	4899	4899	4899
R2 Adj.	0.901	0.901	0.900	0.909	0.909	0.907	0.846	0.846	0.851	0.953	0.953	0.951

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the country-pair and source country-year level. The dependent variable is the share of total external assets that a source country has allocated in a destination country whereas we consider the following assets: foreign direct investment, portfolio equity, portfolio debt, and banking investment.

Fourth, one of the benefits of comprehensively examining the impact on four types of assets is that we can take into account potential substitution effects between different types of assets. Specifically, it is a plausible argument that FDI and portfolio equity asset reallocation may be affected by each other, and the same applies to portfolio debt and banking assets, due to their similar features in terms of maturities and seniority (Beyene et al. 2021). To account for such substitution forces, we first construct measurements of the share of each type of asset in the total external assets in the destination country held by a source country. Note that the calculation of the denominator requires the observation of four types of assets at the same time, and this imposes stronger restrictions on the data and results in a smaller sample in this analysis. Then we additionally control for the importance of equity assets in the overall assets when the dependent variable is the allocated share of FDI in the destination country, and *vice versa*. In the same way, we control for the importance of banking assets in the overall assets when the dependent variable is the allocated share of portfolio debt in the destination country, and *vice versa*.[3] We present the results in Table 8. It demonstrates some substitutions between FDI and portfolio equity, and between portfolio debt and banking assets. More importantly, again, our baseline findings remain after accounting for these substitution effects, based on the significant and positive coefficients of destination countries' climate policies on equity and banking asset allocation.

Finally, we conduct placebo tests by reshuffling the climate policy indices across countries. Specifically, we randomly assign the true climate policy index data of a country to another country, thereby generating pseudo datasets with falsified climate policies. In this test, we randomly permute the values of whole countries with each other, while keeping the order of the time dimension.[4] We repeat this reshuffling for 1000 times and estimate the baseline specification using the pseudo datasets. Then we construct the distribution of the coefficients of our interest, that is, the coefficients of the destination countries' climate policy index, and compare our estimated coefficients from the baseline analysis using the true data with the distributions of the coefficients using the pseudo

[3] As an additional test, we use the importance of each type of assets in total external assets as the dependent variable and regress them on climate policies as in the baseline specification. Results are reported in the appendix in Table A4. It does not show significant associations between climate policies and substitutions between types of assets.

[4] We also conduct a reshuffling exercise by permuting the values of climate policies and randomize the country and year at the same time. Results are presented in the appendix in Figure A1.

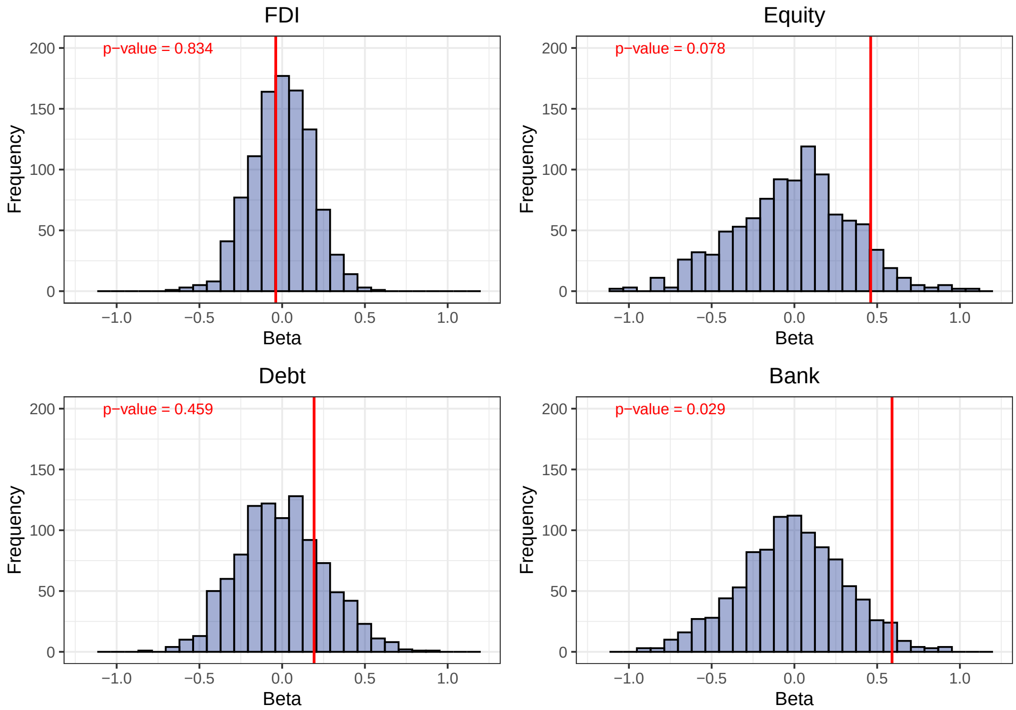
data. Figure 6 shows the results, where the red vertical lines represent the estimates from our baseline results. For portfolio equity and banking investment, the p-value is one-sided and measures the fraction of times in which the coefficient from the original data is smaller than the coefficient from the permuted data. As the results for FDI and portfolio debt from using the original data are insignificant, we use a two-sided p-value in these cases. Results show that our estimates for the effect of climate policies on portfolio equity and banking asset allocation in the baseline are statistically significantly larger than the estimates from placebo tests.

Table 8: Robustness Check: Accounting for Substitution Effects

	FDI			Equity			Debt			Bank		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
L.Climate Policy - Destination	-0.015	-0.341	-0.366	1.093***	0.967***	0.932***	0.496	0.358	0.375	0.765**	0.817***	0.838***
	(0.289)	(0.284)	(0.273)	(0.401)	(0.367)	(0.354)	(0.420)	(0.402)	(0.406)	(0.306)	(0.304)	(0.295)
L.Climate Policy - Source	0.054	0.229		-0.289*	-0.196		-0.197	-0.193		0.054	0.095	
	(0.108)	(0.177)		(0.152)	(0.163)		(0.278)	(0.232)		(0.173)	(0.144)	
FDI/Total Assets				-0.008*	-0.008**	-0.008**						
				(0.004)	(0.004)	(0.004)						
Equity/Total Assets	-0.043***	-0.047***	-0.047***									
	(0.014)	(0.015)	(0.018)									
Debt/Total Assets										-0.014*	-0.013*	-0.014*
										(0.007)	(0.007)	(0.007)
Bank/Total Assets							-0.006	-0.004	0.002			
							(0.008)	(0.008)	(0.007)			
Source-Destination Pair FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Source Country-Year FE	NO	NO	YES	NO	NO	YES	NO	NO	YES	NO	NO	YES
Year FE	YES	YES	-	YES	YES	-	YES	YES	-	YES	YES	-
Controls	NO	YES	YES	NO	YES	YES	NO	YES	YES	NO	YES	YES
Num.Obs.	3982	3982	3982	3965	3965	3965	3955	3955	3955	3959	3959	3959
R2 Adj.	0.902	0.904	0.904	0.963	0.964	0.963	0.931	0.931	0.932	0.953	0.953	0.951

Notes: *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Standard errors are clustered at the country-pair and source country-year level. The dependent variable is the share of total external assets that a source country has allocated to a destination country. The controls include a source country's respective external asset which is allocated in a destination as a share of its combined external assets in this destination. For FDI we consider the share of portfolio equity in total assets as control and for portfolio equity, we use the share of FDI in total assets. The same procedure applies to portfolio debt and banking investments.

Figure 6: Placebo Test: Permutations of Climate Policy Variable



Notes: The graph displays the distribution of estimated coefficients from using 1000 permutations of the climate policy in the destination country, and the red vertical lines represent the estimated coefficient from our baseline specification with the original data.

4.4 Mechanism Examination

Focusing on our main results of the positive relationship between climate policy stringency and reallocation of portfolio equity and banking assets, we investigate three possible mechanisms to explain the findings. First, we test the valuation effects on currency values and equity prices and do not find evidence suggesting passive reallocation drives the results. Second, we explore the diversification mechanism that investors might prefer countries with more stringent climate policies when their overall international asset exposure to environmental regulatory risk is low, and our results show that such a diversification explanation is consistent with the reallocation of banking assets but less so for equity assets. Third, we test whether green awareness drives the preference towards countries with more restrictive climate policies and we find results indicating so for international portfolio equity investors.

We begin with testing the valuation effect. Specifically, international capital flows could be affected by the exchange rates and asset prices (Tille and Van Wincoop 2010, Gourinchas and Rey 2007), and the climate policy in a respective country could influence both valuation factors against partner countries. For the impact on currency fluctuations, we first keep the bilateral setting and regress the log bilateral exchange rate between a pair, expressed as local currency vis-à-vis foreign currency, on the climate policy variable and control variables. The first three columns in Table 9 present the results. Notably, a more stringent climate policy in the destination (source) country is associated with currency appreciation in the destination (source) country. A one standard deviation increase in the stringency of the climate policy in the destination country leads to about 5% appreciation in the bilateral exchange rate against the source country, and vice versa. Our baseline results may be influenced by the positive currency valuation effect, as we find that more stringent climate policies in the destination lead to both currency appreciations of the destination and increased allocation towards it, however, this interpretation should be approached cautiously since we do not know the exact denomination currency of the assets in actual transactions. In addition, to examine the potential valuation effects when transforming the asset holdings from local currency to dollar terms, we use the log local exchange rate vis-à-vis the US dollar as the dependent variable and conduct country-level regressions on climate policies. The first two columns in Table 10 show that the currency-strengthening impact of a country's climate policy only marginally holds. For the stock prices, we first use the difference in stock returns for source and destination as the dependent variable in the bilateral setting and then use the stock returns as the dependent variable in the country-level setting. Results are shown in the other half of Tables 9 and 10 and they do not demonstrate any significant effects of climate policy on equity prices. Overall, these findings suggest that our observed reallocation effects are not driven by valuation effects stemming from currency denominations or equity price changes, and they are likely due to active reallocation by investors.

Table 9: Valuation effects - bilateral

	FX (s/d)			Difference Stock Return (s-d)		
	(1)	(2)	(3)	(4)	(5)	(6)
L.Climate Policy - Destination	0.151***	0.225***	0.225***	0.040***	0.000	0.001
	(0.021)	(0.023)	(0.020)	(0.009)	(0.014)	(0.008)
L.Climate Policy - Source	-0.141*	-0.224***		-0.005	0.034	
	(0.078)	(0.084)		(0.055)	(0.052)	
Source-Destination Pair FE	YES	YES	YES	YES	YES	YES
Source Country-Year FE	NO	NO	YES	NO	NO	YES
Year FE	YES	YES	-	YES	YES	-
Controls	NO	YES	YES	NO	YES	YES
Num.Obs.	16291	16291	16291	8254	8254	8254
R2 Adj.	0.988	0.991	0.995	0.211	0.272	0.621

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the country-pair and source country-year level. The dependent variable in columns (1) to (3) is the log bilateral exchange rate, expressed as local currency vis-à-vis foreign currency. In columns (4) to (6), it is the difference in stock returns between the source and destination country.

Table 10: Valuation effects - country level

	FX		Stock Return	
	(1)	(2)	(3)	(4)
L.Climate Policy	-0.151	-0.237*	-0.038	-0.001
	(0.110)	(0.132)	(0.053)	(0.054)
Country	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Controls	NO	YES	NO	YES
Num.Obs.	425	425	311	311
R2 Adj.	0.988	0.990	0.506	0.533

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the country level. FX is the log exchange rate, expressed as local currency vis-à-vis the US-Dollar.

Next, we investigate the motivation of diversification in reallocating international assets with respect to differences in climate policies. Diversification is an important factor in constructing equity and banking portfolios (DeMiguel et al. 2009, Conine Jr and Tamarkin 1981, Winton 1999, Gorton and Winton 2003). It is plausible that investors diversify assets to countries with more restrictive climate policies when their portfolios are exposed to lax environmental regulations. To test this, we construct a variable measuring the source country's overall exposure to climate policies leaving out a given destination country. Specifically, for a given source country and a destination country, we weigh the climate policy stringency index of other destination countries using the share of assets allocated to them and then calculate the sum to obtain the climate policy exposure. Based on the median value of this exposure measurement, we define two dummies $D(LowExposure)$ and $D(HighExposure)$ to indicate a low and high exposure and interact them with the climate policy stringency index of the destination country as in the baseline specification. The diversification motivation would predict a more pronounced effect of a tighter climate policy on capital reallocation if the country is in the low exposure group. Results in Table 11 show that the reallocation of both equity and banking assets is consistent with the diversification mechanism, as the coefficient of climate policies in the destination country is significantly larger in the first row when the source country is more exposed to other countries with lax climate policies.

Table 11: Mechanism Investigation: Diversification

	Equity			Bank		
	(1)	(2)	(3)	(1)	(2)	(3)
L.Climate Policy - Destination x D(Low Exposure)	0.878***	0.818***	1.485***	0.935***	0.938***	1.299***
	(0.250)	(0.244)	(0.329)	(0.306)	(0.307)	(0.360)
L.Climate Policy - Destination x D(High Exposure)	0.367*	0.303	-0.382	0.268	0.255	-0.184
	(0.207)	(0.197)	(0.242)	(0.253)	(0.254)	(0.246)
Source-Destination Pair FE	YES	YES	YES	YES	YES	YES
Source Country-Year FE	NO	NO	YES	NO	NO	YES
Year FE	YES	YES	-	YES	YES	-
Controls	NO	YES	YES	NO	YES	YES
Num.Obs.	11667	11667	11667	4853	4853	4853
R2 Adj.	0.907	0.907	0.908	0.953	0.953	0.951

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the country-pair and source country-year level. We interact the climate policy in the destination with an indicator for the level of a source country's share weighted exposure to climate policies from destination countries, grouped into low and high exposure.

Lastly, we examine the suasion mechanism arising from green awareness. Our results are consistent with a positive message that investors care about climate issues and would allocate assets to destinations that impose more stringent policies to mitigate climate change. To test this mechanism, we access the share of a source country's Green Party seats in its national parliament. As not all countries in our sample have a multi-party system with identified Green Parties, in this analysis the sample is limited to Austria, Belgium, Canada, Switzerland, Germany, Denmark, Spain, Finland, France, Hungary, Latvia, Mexico, Norway, New Zealand, Portugal, Sweden, and the United Kingdom. Similar to the diversification mechanism investigation, we create two dummies to indicate the source country with low and high green awareness based on the median values of the Green Party shares and then interact them with the climate policy stringency of the destination countries.

Table 12: Mechanism Investigation: Green Awareness

	Equity			Bank		
	(1)	(2)	(3)	(4)	(5)	(6)
L.Climate Policy - Destination x D(Low Share Green Party - Source)	0.433**	0.366*	0.225	0.959***	1.090***	1.210***
	(0.218)	(0.202)	(0.248)	(0.284)	(0.304)	(0.380)
L.Climate Policy - Destination x D(High Share Green Party - Source)	0.744***	0.705***	0.837***	0.911***	1.033***	0.980***
	(0.256)	(0.250)	(0.307)	(0.348)	(0.347)	(0.374)
Source-Destination Pair FE	YES	YES	YES	YES	YES	YES
Source Country-Year FE	NO	NO	YES	NO	NO	YES
Year FE	YES	YES	-	YES	YES	-
Controls	NO	YES	YES	NO	YES	YES
Num.Obs.	6088	6088	6088	3058	3058	3058
R2 Adj.	0.963	0.964	0.963	0.949	0.948	0.946

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the country-pair and source country-year level. We use the median value of the share of Green Parties in the parliament to separate the source countries into low and high groups.

Table 12 shows the results. We observe a clear indication of green awareness in driving the reallocation of portfolio equities as the coefficients of the climate policies in the destination country are more pronounced and significant when the source country has a high share than a low share of Green Parties. For banking assets allocation, source countries with both a low and high share of Green Parties demonstrate a positive effect of climate policy stringencies in the destination country. Therefore, we provide evidence that is consistent with the green awareness mechanism for international equity but not banking asset reallocation.

To sum up, in this section, we look into the mechanisms behind our main findings of international equity and banking assets allocation following more stringent climate policies. We document evidence of a diversification motivation for banking assets reallocation and a green awareness motivation for equity reallocation, while no evidence of a valuation channel concerning currency values and stock prices.

5 Conclusion

This study investigates the impact of climate change policies on international capital reallocation using bilateral external assets data, which allows granular fixed effects to saturate other potential confounding factors and provides clean identification. We distinguish between four types of investment, i.e., FDI, portfolio equity, portfolio debt, and banking investment, and look at the reallocation effects for each type of investment in the same framework.

Our results suggest that climate change policies matter, and the effects are heterogeneous across different country groups and asset types. The prudence of the climate policy in the destination country is significantly and positively associated with the share of portfolio equity and banking investment allocated to the country, meanwhile, it does not play a significant role in the allocation of FDI and portfolio debt. Moreover, our results highlight that the investment between advanced and advanced countries manifests the most pronounced response to the climate policies of the destination country, while the impact is inconclusive regarding emerging countries. Our main findings hold in various robustness checks and are not driven by valuation effects. In addition, we provide evidence indicating a diversification mechanism for banking assets reallocation and a green awareness mechanism for portfolio equity reallocation.

The findings of this study carry significant policy implications, suggesting that international capital tends to gravitate towards destinations with rigorous climate policies, especially the no-market-based ones. As such, fostering international cooperation and coordination in climate policy endeavors could contribute to a harmonized global response to climate change.

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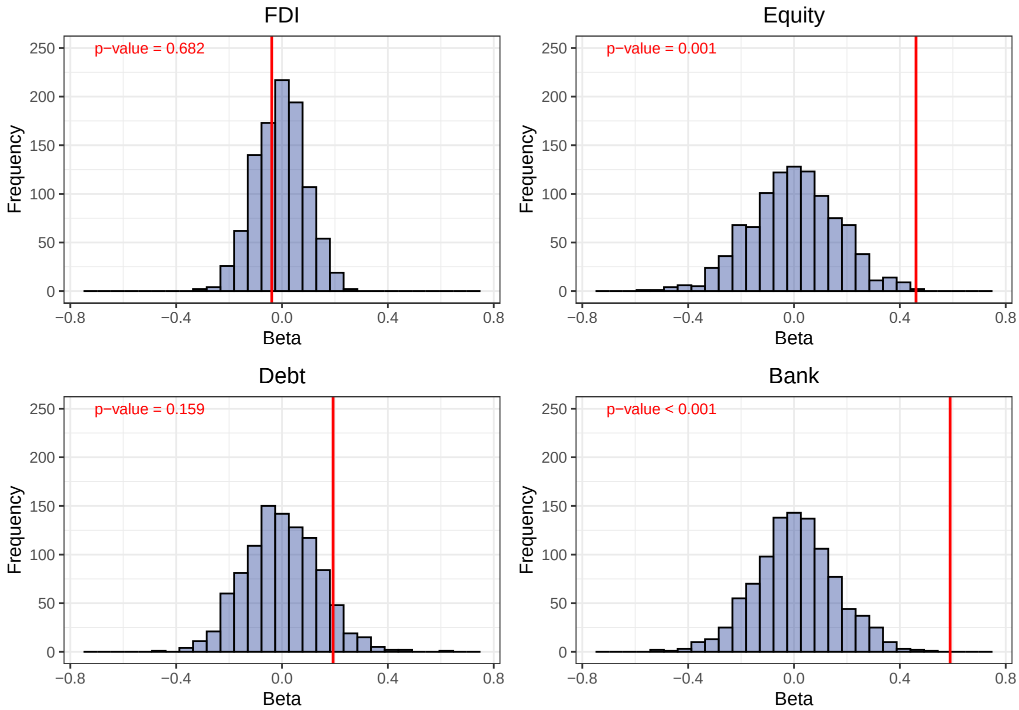
Online Appendix

Figure A1: Placebo Test: Permutations of Climate Policy Variable - Country and Time



Notes: The graph displays the distribution of estimated coefficients from using 1000 permutations of the climate policy in the destination country. In this test, we randomly permute the values for both countries and years. The red vertical lines represent the estimated coefficient from our baseline specification with the original data. For portfolio equity and banking investment, the p-value is one-sided and measures the fraction of times in which the coefficient from the original data is smaller than the coefficient from the permuted data. As the results for FDI and portfolio debt from using the original data are insignificant, we use a two-sided p-value in this case.

Table A1: Country coverage

FDI/Equity/Debt/Exports	**Bank**
Argentina (EM)	Australia
Australia	Austria
Austria	Belgium
Belgium	Brazil (EM)
Brazil (EM)	Canada
Canada	China (EM)
China (EM)	Denmark
Croatia (EM)	Finland
Czech Republic	France
Denmark	Germany
Estonia	Greece
Finland	India (EM)
France	Indonesia (EM)
Germany	Italy
Greece	Japan
Hungary* (EM)	South Korea
Iceland	Malaysia (EM)
India (EM)	Mexico (EM)
Indonesia (EM)	Norway
Italy	Portugal
Japan	Saudi Arabia (EM)
Latvia	South Africa (EM)
Lithuania	Spain
Malaysia (EM)	Sweden
Mexico (EM)	Switzerland
New Zealand	Turkey (EM)
Norway	United Kingdom
Poland (EM)	United States
Portugal	
Russia (EM)	
Saudi Arabia** (EM)	
Slovak Republic	
Slovenia	
South Africa (EM)	
South Korea	
Spain	
Sweden	
Switzerland	
Thailand (EM)	
Turkey (EM)	
United Kingdom	
United States	

* Only included for bilateral holdings of FDI. ** Only included for bilateral holdings of portfolio equity and debt. (EM) represents emerging countries.

Table A2: Baseline Results for Trade Reallocation

	Exports		
	(10)	(11)	(12)
L.Climate Policy - Destination	0.103**	0.088**	0.078**
	(0.040)	(0.039)	(0.039)
L.Climate Policy - Source	-0.026	-0.014	
	(0.032)	(0.032)	
Source-Destination Pair FE	YES	YES	YES
Source Country-Year FE	NO	NO	YES
Year FE	YES	YES	-
Controls	NO	YES	YES
Num.Obs.	16146	16146	16146
R2 Adj.	0.978	0.978	0.977

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the country-pair and source country-year level. The dependent variable is the share of exports a source country has allocated towards a destination country.

Table A3: OECD-EPS: all subcategories

	FDI			Equity			Debt			Bank		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Market based Policies												
L.CO2 Certificates - Destination	0.062	-0.034	-0.040	0.040	0.006	0.001	0.017	0.021	0.029	0.105**	0.124**	0.122**
	(0.046)	(0.051)	(0.049)	(0.067)	(0.057)	(0.057)	(0.052)	(0.059)	(0.058)	(0.051)	(0.051)	(0.052)
L.Renewable Energy Certificates - Destination	0.072	0.033	0.031	0.069	0.085	0.089	-0.045	-0.020	-0.024	-0.136	-0.104	-0.098
	(0.107)	(0.104)	(0.103)	(0.097)	(0.095)	(0.095)	(0.085)	(0.085)	(0.085)	(0.086)	(0.080)	(0.080)
L.CO2 Tax - Destination	0.087	0.094	0.099	-0.115	-0.099	-0.098	-0.106	-0.097	-0.101	0.071	0.062	0.050
	(0.075)	(0.077)	(0.077)	(0.071)	(0.072)	(0.071)	(0.079)	(0.082)	(0.083)	(0.074)	(0.078)	(0.081)
L.NOx Tax - Destination	-0.048	-0.079	-0.083	0.016	0.020	0.026	-0.045	-0.034	-0.034	-0.063	-0.020	-0.003
	(0.081)	(0.080)	(0.077)	(0.038)	(0.043)	(0.044)	(0.054)	(0.052)	(0.055)	(0.076)	(0.079)	(0.080)
L.SOx Tax - Destination	-0.016	-0.038	-0.046	0.121	0.047	0.036	0.098	0.049	0.041	0.263	0.234	0.221
	(0.145)	(0.150)	(0.150)	(0.144)	(0.149)	(0.148)	(0.121)	(0.130)	(0.130)	(0.166)	(0.171)	(0.173)
L.Diesel Tax - Destination	0.014	-0.020	-0.009	0.135*	0.181**	0.168**	0.050	0.106*	0.109*	-0.008	-0.004	-0.022
	(0.052)	(0.046)	(0.044)	(0.074)	(0.087)	(0.085)	(0.059)	(0.063)	(0.062)	(0.045)	(0.046)	(0.046)
Non-Market based Policies												
L.NOx Emission Limit - Destination	-0.052	-0.025	-0.033	0.028	-0.011	-0.005	-0.242**	-0.297***	-0.328***	0.199**	0.102	0.059
	(0.079)	(0.076)	(0.073)	(0.094)	(0.104)	(0.109)	(0.103)	(0.107)	(0.108)	(0.084)	(0.090)	(0.089)
L.SOx Emission Limit - Destination	0.189	0.176	0.176	0.431***	0.523***	0.534***	0.463***	0.553***	0.584***	0.098	0.238**	0.297**
	(0.121)	(0.133)	(0.132)	(0.098)	(0.113)	(0.118)	(0.121)	(0.131)	(0.133)	(0.086)	(0.112)	(0.128)
L.PM Emission Limit - Destination	0.133*	0.087	0.101	0.109	0.116	0.109	0.110	0.131*	0.120*	-0.097	-0.064	-0.058
	(0.071)	(0.070)	(0.068)	(0.082)	(0.086)	(0.085)	(0.069)	(0.073)	(0.073)	(0.060)	(0.059)	(0.058)
L.Sulphur Emission Limit - Destination	-0.080	-0.082*	-0.084*	-0.125**	-0.113**	-0.110**	0.050	0.060	0.084	0.097	0.140*	0.173**
	(0.050)	(0.049)	(0.048)	(0.049)	(0.046)	(0.046)	(0.048)	(0.050)	(0.051)	(0.085)	(0.080)	(0.084)
Technology Support												
L.R&D Expenditure - Destination	0.045	0.041	0.036	-0.069	-0.101*	-0.102**	0.023	-0.005	-0.011	-0.187***	-0.191***	-0.181***
	(0.042)	(0.041)	(0.042)	(0.047)	(0.051)	(0.051)	(0.041)	(0.041)	(0.040)	(0.046)	(0.046)	(0.044)
L.Adoption support Solar - Destination	-0.034	-0.046	-0.048	-0.020	-0.011	-0.015	0.027	0.038	0.040	-0.008	0.016	0.029
	(0.036)	(0.040)	(0.039)	(0.044)	(0.042)	(0.041)	(0.028)	(0.028)	(0.028)	(0.029)	(0.030)	(0.030)
L.Adoption support Wind - Destination	0.022	0.001	0.002	0.059	0.042	0.044	-0.068*	-0.076*	-0.076*	-0.004	-0.013	-0.021
	(0.033)	(0.032)	(0.031)	(0.041)	(0.043)	(0.044)	(0.041)	(0.042)	(0.041)	(0.043)	(0.045)	(0.044)
Source-Destination Pair FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Source Country-Year FE	NO	NO	YES	NO	NO	YES	NO	NO	YES	NO	NO	YES
Year FE	YES	YES	-	YES	YES	-	YES	YES	-	YES	YES	-
Controls	NO	YES	YES	NO	YES	YES	NO	YES	YES	NO	YES	YES
Num.Obs.	8292	8292	8292	9086	9086	9086	9047	9047	9047	4362	4362	4362
R2 Adj.	0.901	0.901	0.900	0.907	0.907	0.906	0.867	0.868	0.868	0.955	0.955	0.954

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the country-pair and source country-year level. The dependent variable is the share of total external assets that a source country has allocated in a destination country whereas we consider the following assets: foreign direct investment, portfolio equity, portfolio debt, and banking investment.

Table A4: Climate Policies and Substitution Effects Between Different Types of Assets

	FDI/Total Assets			Equity/Total Assets			Debt/Total Assets			Bank/Total Assets		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
L.Climate Policy - Destination	-1.768	-2.238	-2.300*	0.726	0.571	0.553	0.660	1.058	0.695	1.712	1.597	1.825
	(1.478)	(1.436)	(1.379)	(0.858)	(0.855)	(0.788)	(0.990)	(0.928)	(0.955)	(1.266)	(1.196)	(1.107)
L.Climate Policy - Source	-0.481	0.180		-2.341**	-2.011*		-1.456	-1.723		5.052***	4.291***	
	(1.648)	(1.492)		(1.102)	(1.023)		(1.374)	(1.259)		(1.799)	(1.573)	
Source-Destination Pair FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Source Country-Year FE	NO	NO	YES	NO	NO	YES	NO	NO	YES	NO	NO	YES
Year FE	YES	YES	-	YES	YES	-	YES	YES	-	YES	YES	-
Controls	NO	YES	YES	NO	YES	YES	NO	YES	YES	NO	YES	YES
Num.Obs.	3990	3990	3990	4005	4005	4005	3985	3985	3985	3989	3989	3989
R2 Adj.	0.802	0.805	0.818	0.891	0.895	0.900	0.865	0.867	0.872	0.808	0.813	0.833

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clusterd at the country-pair and source country-year level. The dependent variable is a source country's respective external asset which is allocated in a destination as share of its combined external assets in this destination.