# A Gravity Model of Geopolitics and Financial Fragmentation

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## Abstract

We show that geopolitical distance affects investment funds' cross-border portfolio allocations. Following the extant political science literature, we first quantify geopolitical distance between countries via the differences in their voting behavior in the United Nations General Assembly. We then show that investment equity/bond funds allocate smaller shares of their assets to recipient countries that are geopolitically more distant, after controlling for conventional gravity-type variables, bilateral trade, and time-varying recipient and source country characteristics. The results are strongly robust to alternative geopolitical distance measures, and stronger for recipient emerging market or developing economies, and for countries with lower institutional quality and less developed financial systems.

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## 1. Introduction

Geopolitical tensions have been rising globally over the past few years amid deteriorating relations between the United States and China, and Russia's invasion of Ukraine. Against this backdrop, addressing the following question has become increasingly important: do geopolitical tensions between countries influence the cross-border capital allocation of international investment funds?

If international investment funds reallocate their asset portfolios away from geopolitically distant countries due to uncertainty, or to mitigate risks associated with expropriation, asset freezing, or financial restrictions, then rising geopolitical tensions could trigger cross-border capital flow reversals with potentially destabilizing macrofinancial effects.

Building on the literature on gravity in international finance (Portes and Rey, 2005; Coeurdacier and Rey, 2013; and Okawa and van Wincoop, 2012), we estimate models of investment funds' cross-border equity and bond portfolio allocations to examine whether, and if so how, they are influenced by geopolitical factors.

We rely on geopolitical distance measures that capture dissimilarity in the foreign policy orientation of countries based on their voting behavior in the United Nations General Assembly (UNGA). The literature offers different ways to map the observed voting behavior of countries into bilateral geopolitical distance measures (see, e.g., Gartzke 1998; Signorino and Ritter 1999; Häge 2011; and Bailey and others 2017), and we examine whether these measures help explain investment funds' bilateral cross-border portfolio allocations.

We find evidence that investment funds allocate smaller shares of capital to recipient countries with greater geopolitical distances to their country of origin. This implies that a sudden rise in

geopolitical tensions (distance) between countries can weaken their bilateral financial linkages, as the portfolio reallocation decisions of investment funds drive capital outflows.

More specifically, we find that after controlling for a range of country-specific and bilateral factors, an increase of one standard deviation in geopolitical distance between a source and a recipient country—equivalent, for example, to the decline in the similarity of US–China voting behavior in the United Nations since 2016—is associated with a reduction in bilateral cross-border portfolio allocation of investment funds by about 25 percent.

We find that these results are robust to using alternative geopolitical distance measures proposed in the literature, such as the "π" measure of Häge (2011) and the "ideal distance point" measure of Bailey, Strezhnev, and Voetens (2017). We also find that the effects of geopolitical distance on investment funds' cross border portfolio allocation are stronger for recipient emerging market and developing economies than advanced economies. They are also stronger for countries with less developed financial systems and lower institutional quality.

**Related Literature.** Gravity models of international finance (Portes and Rey, 2005; Coeurdacier and Rey, 2013; and Okawa and van Wincoop; 2012); Geopolitical factors and cross-border investment (Kempf et. al, 2022; Fisman et al, 2022); financial globalization (Broner and Ventura, 2016; Giannetti Mariassunta and Yrjö Koskinen, 2010; Gelos and Wei, 2005); financial fragmentation (Claessens, Stijn. 2019; Aiyar et al., 2023).

## 2. Empirical Model

We estimate a gravity model to examine whether geopolitical factors matter for investment funds' cross-border portfolio allocation. The specification of the model is based on Okawa and van Wincoop (2012), which provides theoretical foundations for gravity-type models in

international finance that link (log) of portfolio shares to gravity variables that act as proxies for bilateral information frictions, as follows:

$$\log(X_{c,c',t}) = \beta \cdot Geopolitical\ Distance_{c,c',t-1} + \delta \cdot Gravity\ Controls_{c,c'} + \nu_{c',t} + \nu_{c,t} + \epsilon_{c,c',t} \quad (1)$$

where $X_{c,c',t}$ is the portfolio share of recipient country *c* in the total cross-border allocation of investment funds from source country *c'* at time *t*; $Geopolitical\ Distance_{c,c',t-1}$ is the (lagged) *S* measure of geopolitical distance between countries *c* and *c'*; and $Gravity\ Controls_{c,c'}$ include bilateral (country-pair-specific) variables that reflect the degree of access to the recipient country's local information or impact the cost of financial transactions between the source and recipient countries, including (i) $Distance_{c,c'}$ (log of geographical distance in kilometers between the most populated cities in each country), (ii) $Common\ language_{c,c'}$ (a dummy variable that takes on the value 1 if the countries share a common language spoken by at least nine percent of the population, and 0 otherwise), (iii) $Common\ colonial\ history_{c,c'}$ (a dummy variable that takes on the value 1 if the countries share a common colonizer post 1945, and 0 otherwise), (iv) $Common\ religion_{c,c'}$ (an index variable bounded between 0 and 1 that is increasing if the country pair has a common religion by vast majority of populations), and (v) $Contiguity_{c,c'}$ (a dummy variable that takes on the value 1 if the countries share a common border, and 0 otherwise). $\nu_{c',t}$ denote source country-time fixed effects (FEs) to account for relevant time-varying characteristics of source country *c'*. $\nu_{c,t}$ denote recipient-country-time FEs to capture any relevant time-varying recipient country-specific factors. $\epsilon$ is a random error term. In later analyses, we also include $Bilateral\ Trade_{c,c',t-1}$ as an addition control, defined as total volume of trade (sum of exports and imports) relative to the geometric average of nominal GDPs

of countries *c* and *c'*. We also explore whether results differ for recipient countries depending on their levels of $Financial\ Devlopment_{c,t-1}$ and $Institutional\ Quality_{c,t-1}$ (Broner and Ventura, 2016).

Note that in equation (1), the main parameter of interest is $\beta$: if investment funds from source countries allocate a smaller share of their cross-border investment toward countries that are geopolitically more distant, then $\beta < 0$ holds.

The model is estimated for bilateral (country-level) "equity" and "bond" portfolio allocations of investment funds. The portfolio allocations are obtained from the Emerging Portfolio Fund Research (EPFR) database, and the gravity controls are obtained from the CEPII Gravity Database (Conte, Cotterlaz, and Mayer 2022).[9] Bilateral trade is calculated using IMF Direction of Trade Statisticsand country nominal GDPs from IMF World Economic Outlook database. The geopolitical distance measures are updated up to 2022 using U.N. voting records database and methodology provided by Hage (2011). For institutional quality, we use The International Country Risk Guide (ICRG)'s average score for bureaucracy quality, corruption, democratic accountability, government stability and law and order. And for financial development, we use the IMF Financial Development Index Database and take the overall combined score which comprises of depth, access and efficiency of financial institutions and markets.

Table 1 shows descriptive statistics for the variables defined above. Appendix 1 presents further details about the geopolitical distance measures, including their construction and data sources.

[9] The EPFR database covers a large subset of cross-border portfolio investors, mainly mutual funds, ETFs, closed-end funds, variable annuity funds, and insurance-linked funds.

## 3. Results

Table 2 presents baseline results for regressions corresponding to equation (1). Columns (1) to (3) show regression results for cross-border *equity* portfolio allocation and columns (4) to (6) show results for cross-border *bond* portfolio allocation. The gravity model is estimated by Poisson Pseudo Maximum Likelihood (Santos Silva and Tenreyro, 2006) and the standard errors are clustered at source-recipient country level. In the baseline regressions, geopolitical distance is measured with the Signorino and Ritter's *S* score (Signorino and Ritter, 1998; Hage, 2011) and lagged one period to mitigate potential endogeneity concerns.[10]

Regressions (1) and (4) include bilateral geopolitical distance as an explanatory variable but fail to control for the influence of time-varying recipient and source country factors. Regressions (2) and (5) add recipient- and source-country time effects, which absorb the influence of time varying factors such as macroeconomic variables and expected returns of investments in the recipient economy, which are likely to embed a geopolitical risk premium component. Regressions (3) and (6) also add the gravity controls.

The results indicate that investment equity/bond funds tend to allocate smaller shares of their assets to recipient countries that are geopolitically more distant, even after controlling for conventional gravity-type variables and time-varying factors in the recipient and source countries. Note that the inclusion of gravity-type controls in the regressions reduces the estimated effects of geopolitical distance on both investment funds' cross-border equity and bond portfolio allocations by about ½, reflecting their importance. Also, the gravity controls have the

[10] Note that, depending on the underlying data source, equation (1) may utilize variables with different frequencies. For example, portfolio shares are available at monthly frequency in the EPFR database, whereas geopolitical distance and bilateral trade are available at yearly frequency. The way variables are lagged is compatible with the frequency of the variables. For instance, geopolitical distance and bilateral trade are lagged by one year. We later report that the results are robust to using annual data consistently across all the variables, and to also including recipient-time fixed effects.

intended impact on portfolio shares (e.g., similar in sign to the related literature), with lower geographic distance or closer cultural ties implying higher cross-border portfolio shares.

The results are not only statistically significant, but also economically relevant. An increase of one standard deviation in geopolitical distance between a source and a recipient country—equivalent, for example, to the divergence in the voting behavior of the United States and China in the United Nations since 2016—is associated with a reduction in investment funds' cross-border equity (bond) portfolio allocation by about 25 percent.

Table 3 presents an extended set of regression results, with regressions that differentiate between recipient advanced economies and emerging market and developing countries. Columns (2)-(3) and (7)-(8) show that the estimated impact of geopolitical distance on cross-border portfolio allocation is (on average) stronger for emerging market and developing economies compared to advanced economies. The effect for advanced economies is in fact insignificant, as shown in regressions (2) and (7).

Table 3 also presents regression results for the cases in which the United States or offshore financial centers (OFCs) are excluded from the source countries. The United States is the largest portfolio investor country besides the OFCs.[20] OFCs act as intermediaries between ultimate investor countries and recipient countries and measuring bilateral geopolitical distance of recipient countries vis-à-vis ultimate investors is not feasible. Columns (4)-(5) and (9)-(10) in Table 3 show that the main result—that geopolitical distance matters for investor funds' cross-

[20] Offshore financial centers (OFCs) are jurisdictions that provide financial services disproportionate to its size and the financing of the domestic economy. Based on a measure of corporates with few or no employees, little or no production in the host economy, and little or no physical presence, Damgaard and others (2018) provide the following list of OFCs: Bermuda, British Virgin Islands, Cayman Islands, Hong Kong SAR, Ireland, Luxembourg, Netherlands, and Singapore. For a wider list/criteria and further discussion, see also IMF (2000).

border portfolio investment—hold even if the United States or OFCs are excluded as sources of investments.

Table 4 assesses whether the previous results are robust to using alternative geopolitical distance measures, and to the inclusion of bilateral trade (in goods and services) as a control variable. The results are robust to using alternative measures of geopolitical distance, namely Häge (2011)'s $\pi$ and Bailey and others (2017)'s "ideal point distance" (IPD) measures (columns (2) and (3) for equity, and columns (8) and (9) for bonds) and imply effects of a similar magnitude. We also find that inclusion of bilateral trade as a control variable does not change the magnitude or significance of the coefficient for geopolitical distance. In Table 4, the coefficient of the bilateral trade variable is either insignificant or has the "wrong" sign (given that previous studies suggest a positive association between bilateral trade and investment)—the sign of the bilateral trade coefficient, however, becomes positive when the gravity controls are excluded from the regressions.

To assess whether results vary across different types of recipient countries, Table 5 presents estimates in which equation (1) is augmented with interaction terms of the geopolitical distance variables with (lagged) recipient country characteristics, including measures of financial development and institutional quality. The results indicate that investment funds reduce their cross-border capital allocations—in response to a rise in geopolitical distance—more strongly for (ex-ante) less financially developed countries or for countries with lower institutional quality, and these results are (broadly) robust to using alternative measures of geopolitical distance.

## Table 1. Descriptive Statistics

| Variables | Mean | Std. Deviation | Minimum | 25th percentile | Median | 75th percentile | Maximum | Observations |
|---|---|---|---|---|---|---|---|---|
| *Portfolio allocation* | | | | | | | | |
| Equity portfolio allocation to recipient country (percent | 1.51 | 4.53 | 0.00 | 0.01 | 0.09 | 0.81 | 33.37 | 372,781 |
| Bond portfolio allocation to recipient country (percent) | 1.03 | 2.78 | 0.00 | 0.01 | 0.11 | 0.60 | 18.80 | 357,612 |
| *Geopolitical distance* | | | | | | | | |
| S measure | -0.62 | 0.30 | -1.00 | -0.89 | -0.62 | -0.46 | 0.70 | 355,578 |
| Häge (2011) π measure | -0.23 | 0.49 | -1.00 | -0.75 | -0.08 | 0.19 | 1.00 | 355,578 |
| Bailey et al. (2017) measure | 1.15 | 0.86 | 0.00 | 0.33 | 1.16 | 1.73 | 4.59 | 355,410 |
| *Gravity controls* | | | | | | | | |
| Distance | 8.46 | 0.98 | 4.09 | 7.78 | 8.79 | 9.18 | 9.89 | 372,781 |
| Common language | 0.16 | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 372,781 |
| Common colonial history | 0.02 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 372,781 |
| Common religion | 0.17 | 0.24 | 0.00 | 0.01 | 0.04 | 0.26 | 0.99 | 372,781 |
| Contiguity | 0.03 | 0.18 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 372,781 |
| *Bilateral trade* | 0.01 | 0.02 | 0.00 | 0.00 | 0.00 | 0.01 | 0.34 | 355,358 |
| *Institutional development* | | | | | | | | |
| Institutional quality of recipient country | 4.38 | 0.84 | 2.10 | 3.70 | 4.30 | 5.10 | 6.50 | 359,623 |
| Financial development of recipient country | 4.38 | 0.84 | 2.10 | 3.70 | 4.30 | 5.10 | 6.50 | 359,623 |

## Table 2. Baseline Results

| Dependent variable: | Cross-border equity allocation: $X_{c,c',t}$ | | | Cross-border bond allocation: $X_{c,c',t}$ | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Geopolitical distance$_{c,c',t-1}$ | -1.488*** | -1.636*** | -0.814*** | -1.426*** | -1.784*** | -0.848*** |
| | (0.162) | (0.175) | (0.132) | (0.188) | (0.216) | (0.205) |
| Distance$_{c,c'}$ | | | -0.333*** | | | -0.371*** |
| | | | (0.050) | | | (0.044) |
| Common language$_{c,c'}$ | | | 0.225*** | | | 0.236** |
| | | | (0.079) | | | (0.096) |
| Common colonial history$_{c,c'}$ | | | 1.490*** | | | 0.874** |
| | | | (0.209) | | | (0.363) |
| Common religion$_{c,c'}$ | | | 0.083 | | | 0.337** |
| | | | (0.166) | | | (0.152) |
| Contiguity$_{c,c'}$ | | | -0.084 | | | -0.183 |
| | | | (0.156) | | | (0.125) |
| Source Country FE | Yes | -- | -- | Yes | -- | -- |
| Recipient Country FE | Yes | -- | -- | Yes | -- | -- |
| Source Country x Month FE | No | Yes | Yes | No | Yes | Yes |
| Recipient Country x Month FE | No | Yes | Yes | No | Yes | Yes |
| Observations | 372,781 | 372,781 | 372,781 | 357,612 | 357,612 | 357,612 |

Notes: The dependent variable is the share of recipient country *c* in the total cross-border portfolio of investment funds domiciled in source country *c'* at time *t*. Columns (1) to (3) show regression results for cross-border equity portfolio allocation and columns (4) to (6) show results for cross-border bond portfolio allocation. The model is estimated by Poisson Pseudo Maximum Likelihood. The geopolitical distance is the Signorino and Ritter's S measure (Signorino and Ritter, 1998; Hage, 2011). "FE" denotes fixed effects and "Yes" indicates that they are included in the specification; "--" indicates that the indicated fixed effects are absorbed by a more granular set of fixed effects. Standard errors are clustered at source-destination country and shown in parentheses; significance at the levels 1%, 5%, and 10% are denoted ***,**,*, respectively.

## Table 3. Baseline Results with Extended Discussion

| Dependent variable: | Cross-border equity allocation: $X_{c,c',t}$ | | | | | Cross-border bond allocation: $X_{c,c',t}$ | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Specification: | Baseline | AE recipient country | EMDE recipient country | Excluding US from source countries | Excluding OFC from source countries | Baseline | AE recipient country | EMDE recipient country | Excluding US from Source | Excluding OFC from source countries |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Geopolitical distance$_{c,c',t-1}$ | -0.814*** | 0.050 | -0.820** | -0.822*** | -0.679*** | -0.848*** | 0.044 | -1.047*** | -0.929*** | -0.797*** |
| | (0.132) | (0.159) | (0.391) | (0.144) | (0.138) | (0.205) | (0.287) | (0.329) | (0.239) | (0.219) |
| Distance$_{c,c'}$ | -0.333*** | -0.224*** | -0.659*** | -0.348*** | -0.347*** | -0.371*** | -0.300*** | -0.495*** | -0.386*** | -0.301*** |
| | (0.050) | (0.053) | (0.068) | (0.053) | (0.054) | (0.044) | (0.055) | (0.079) | (0.050) | (0.049) |
| Common language$_{c,c'}$ | 0.225*** | 0.165** | 0.296** | 0.229*** | 0.176** | 0.236** | 0.175** | 0.208 | 0.282*** | 0.046 |
| | (0.079) | (0.070) | (0.147) | (0.085) | (0.088) | (0.096) | (0.088) | (0.214) | (0.106) | (0.095) |
| Common colonial history$_{c,c'}$ | 1.490*** | 0.918*** | 1.094*** | 1.467*** | 1.525*** | 0.874** | 1.383 | 0.455 | 0.840** | 1.604*** |
| | (0.209) | (0.270) | (0.245) | (0.209) | (0.254) | (0.363) | (0.852) | (0.434) | (0.362) | (0.575) |
| Common religion$_{c,c'}$ | 0.083 | 0.029 | -0.346 | 0.052 | 0.089 | 0.337** | 0.529*** | 0.177 | 0.299* | 0.407** |
| | (0.166) | (0.156) | (0.213) | (0.170) | (0.181) | (0.152) | (0.152) | (0.178) | (0.155) | (0.170) |
| Contiguity$_{c,c'}$ | -0.084 | -0.040 | -0.075 | -0.073 | -0.006 | -0.183 | -0.149 | 0.182 | -0.186 | 0.035 |
| | (0.156) | (0.115) | (0.197) | (0.158) | (0.170) | (0.125) | (0.108) | (0.239) | (0.131) | (0.133) |
| Source Country x Month FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recipient Country x Month FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 372,781 | 136,060 | 236,061 | 354,179 | 307,246 | 357,612 | 357,612 | 112,196 | 238,120 | 338,892 |

Notes: The dependent variable is the share of recipient country *c* in the total cross-border portfolio of investment funds domiciled in country *c'* at time *t*. Columns (1) to (5) show regression results for cross-border equity portfolio allocation and columns (6) to (10) show results for cross-border bond portfolio allocation. The model is estimated by Poisson Pseudo Maximum Likelihood. The geopolitical distance is the Signorino and Ritter's S measure (Signorino and Ritter, 1998; Hage, 2011). "AE" and "EMDE" denote advanced economy and emerging market and developing economy, respectively. "FE" denotes fixed effects and "Yes" indicates that they are included in the specification. Standard errors are clustered at source-destination country and shown in parentheses; significance at the levels 1%, 5%, and 10% are denoted ***,**,*, respectively.

## Table 4. Robustness

| Dependent variable: | Cross-border equity allocation: $X_{c,c',t}$ | | | | | | Cross-border bond allocation: $X_{c,c',t}$ | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Specification: | Baseline | Häge (2011)'s π | Bailey et al. (2017) | Baseline | Häge (2011)'s π | Bailey et al. (2017) | Baseline | Häge (2011)'s π | Bailey et al. (2017) | Baseline | Häge (2011)'s π | Bailey et al. (2017) |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| Geopolitical distance$_{c,c',t-1}$ | -0.814*** | -0.613*** | -0.308*** | -0.807*** | -0.608*** | -0.305*** | -0.848*** | -0.721*** | -0.325*** | -0.845*** | -0.719*** | -0.324*** |
| | (0.132) | (0.097) | (0.046) | (0.130) | (0.097) | (0.046) | (0.205) | (0.172) | (0.069) | (0.206) | (0.173) | (0.070) |
| Distance$_{c,c'}$ | -0.333*** | -0.322*** | -0.337*** | -0.393*** | -0.382*** | -0.395*** | -0.371*** | -0.336*** | -0.373*** | -0.358*** | -0.322*** | -0.358*** |
| | (0.050) | (0.050) | (0.049) | (0.054) | (0.056) | (0.054) | (0.044) | (0.050) | (0.043) | (0.048) | (0.052) | (0.047) |
| Common language$_{c,c'}$ | 0.225*** | 0.207*** | 0.209*** | 0.241*** | 0.224*** | 0.226*** | 0.236** | 0.209** | 0.216** | 0.229** | 0.202** | 0.208** |
| | (0.079) | (0.078) | (0.078) | (0.081) | (0.079) | (0.079) | (0.096) | (0.093) | (0.093) | (0.095) | (0.092) | (0.092) |
| Common colonial history$_{c,c'}$ | 1.490*** | 1.432*** | 1.424*** | 1.521*** | 1.465*** | 1.454*** | 0.874** | 0.755** | 0.792** | 0.840** | 0.721* | 0.754* |
| | (0.209) | (0.222) | (0.209) | (0.198) | (0.209) | (0.199) | (0.363) | (0.368) | (0.372) | (0.382) | (0.387) | (0.392) |
| Common religion$_{c,c'}$ | 0.083 | 0.081 | 0.067 | 0.060 | 0.058 | 0.044 | 0.337** | 0.338** | 0.328** | 0.338** | 0.339** | 0.329** |
| | (0.166) | (0.166) | (0.165) | (0.169) | (0.169) | (0.169) | (0.152) | (0.151) | (0.152) | (0.151) | (0.151) | (0.151) |
| Contiguity$_{c,c'}$ | -0.084 | -0.074 | -0.062 | 0.029 | 0.038 | 0.047 | -0.183 | -0.142 | -0.155 | -0.211 | -0.171 | -0.185 |
| | (0.156) | (0.154) | (0.155) | (0.177) | (0.175) | (0.175) | (0.125) | (0.123) | (0.125) | (0.148) | (0.146) | (0.148) |
| Bilateral Trade$_{c,c',t-1}$ | | | | -3.987** | -3.995** | -3.860** | | | | 0.917 | 0.927 | 0.985 |
| | | | | (1.813) | (1.822) | (1.817) | | | | (1.609) | (1.608) | (1.605) |
| Source Country x Month FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recipient Country x Month FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 372,781 | 372,781 | 372,280 | 372,781 | 372,781 | 372,280 | 357,612 | 357,612 | 357,553 | 357,612 | 357,612 | 357,553 |

Notes: The dependent variable is the share of recipient country *c* in the total cross-border portfolio of investment funds domiciled in country *c'* at time *t*. Columns (1) to (6) show regression results for cross-border equity portfolio allocation and columns (7) to (12) show results for cross-border bond portfolio allocation. The model is estimated by Poisson Pseudo Maximum Likelihood. "FE" denotes fixed effects and "Yes" indicates that they are included in the specification. Standard errors are clustered at source-destination country and shown in parentheses; significance at the levels 1%, 5%, and 10% are denoted ***,**,*, respectively.

## Table 5. Interaction of Geopolitical Distance with Financial Development and Institutional Quality

| Dependent variable: | Cross-border equity allocation: $X_{c,c',t}$ | | | | | | Cross-border bond allocation: $X_{c,c',t}$ | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Specification: | Baseline | | Häge (2011)'s π | | Bailey et al. (2017) | | Baseline | | Häge (2011)'s π | | Bailey et al. (2017) | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| Geopolitical Distance$_{c,c',t-1}$ | -1.013*** | -1.318*** | -0.934*** | -1.031*** | -0.404*** | -0.503*** | -1.084*** | -1.110*** | -1.029*** | -0.980*** | -0.425*** | -0.440*** |
| | (0.154) | (0.147) | (0.125) | (0.123) | (0.059) | (0.053) | (0.190) | (0.222) | (0.179) | (0.227) | (0.075) | (0.087) |
| Geopolitical Distance$_{c,c',t-1}$ x Financial Development$_{c,t-1}$ | 0.223 | | 0.357*** | | 0.106* | | 0.349* | | 0.418* | | 0.138 | |
| | (0.152) | | (0.132) | | (0.062) | | (0.194) | | (0.222) | | (0.093) | |
| Geopolitical Distance$_{c,c',t-1}$ x Institutional Quality$_{c,t-1}$ | | 0.942*** | | 0.746*** | | 0.383*** | | 0.680*** | | 0.548*** | | 0.280*** |
| | | (0.173) | | (0.152) | | (0.067) | | (0.184) | | (0.187) | | (0.094) |
| Distance$_{c,c'}$ | -0.333*** | -0.338*** | -0.321*** | -0.323*** | -0.337*** | -0.335*** | -0.371*** | -0.358*** | -0.336*** | -0.322*** | -0.373*** | -0.358*** |
| | (0.049) | (0.049) | (0.050) | (0.049) | (0.049) | (0.048) | (0.044) | (0.048) | (0.050) | (0.052) | (0.043) | (0.047) |
| Common language$_{c,c'}$ | 0.224*** | 0.220*** | 0.206*** | 0.208*** | 0.208*** | 0.213*** | 0.236** | 0.229** | 0.209** | 0.202** | 0.216** | 0.208** |
| | (0.080) | (0.076) | (0.078) | (0.075) | (0.078) | (0.075) | (0.096) | (0.095) | (0.093) | (0.092) | (0.093) | (0.092) |
| Common colonial history$_{c,c'}$ | 1.500*** | 1.511*** | 1.457*** | 1.487*** | 1.440*** | 1.470*** | 0.874** | 0.840** | 0.755** | 0.721* | 0.792** | 0.754* |
| | (0.210) | (0.199) | (0.224) | (0.218) | (0.211) | (0.198) | (0.363) | (0.382) | (0.368) | (0.387) | (0.372) | (0.392) |
| Common religion$_{c,c'}$ | 0.079 | 0.070 | 0.073 | 0.064 | 0.062 | 0.066 | 0.337** | 0.338** | 0.338** | 0.339** | 0.328** | 0.329** |
| | (0.166) | (0.164) | (0.165) | (0.164) | (0.165) | (0.164) | (0.152) | (0.151) | (0.151) | (0.151) | (0.152) | (0.151) |
| Contiguity$_{c,c'}$ | -0.081 | -0.075 | -0.067 | -0.073 | -0.057 | -0.051 | -0.183 | -0.211 | -0.142 | -0.171 | -0.155 | -0.185 |
| | (0.157) | (0.153) | (0.155) | (0.151) | (0.155) | (0.151) | (0.125) | (0.148) | (0.123) | (0.146) | (0.125) | (0.148) |
| Source Country x Month FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recipient Country x Month FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 372,781 | 372,781 | 372,781 | 372,781 | 372,280 | 372,280 | 357,612 | 357,612 | 357,612 | 357,612 | 357,553 | 357,553 |

Notes: The dependent variable is the share of recipient country *c* in the total cross-border portfolio of investment funds domiciled in country *c'* at time *t*. Columns (1) to (6) show regression results for cross-border equity portfolio allocation and columns (7) to (12) show results for cross-border bond portfolio allocation. The model is estimated by Poisson Pseudo Maximum Likelihood. "FE" denotes fixed effects and "Yes" indicates that they are included in the specification. Standard errors are clustered at source-destination country and shown in parentheses; significance at the levels 1%, 5%, and 10% are denoted ***,**,*, respectively.

## Appendix 1. Data

***Geopolitical distance measures based on U.N. voting behavior***. To measure the geopolitical distance between countries, we construct measures of dissimilarity in their foreign policy orientation using data on their voting behavior in the United Nations General Assembly (UNGA). The UNGA voting dataset (Voeten, version 29) includes roll-call votes of 196 countries in the UNGA sessions 1-76, which were held during the period 1946-2021.

The literature offers different ways to map the observed voting behavior of countries into bilateral geopolitical distance measures (see, e.g., Gartzke 1998; Signorino and Ritter 1999; Häge 2011; and Bailey and others 2017).

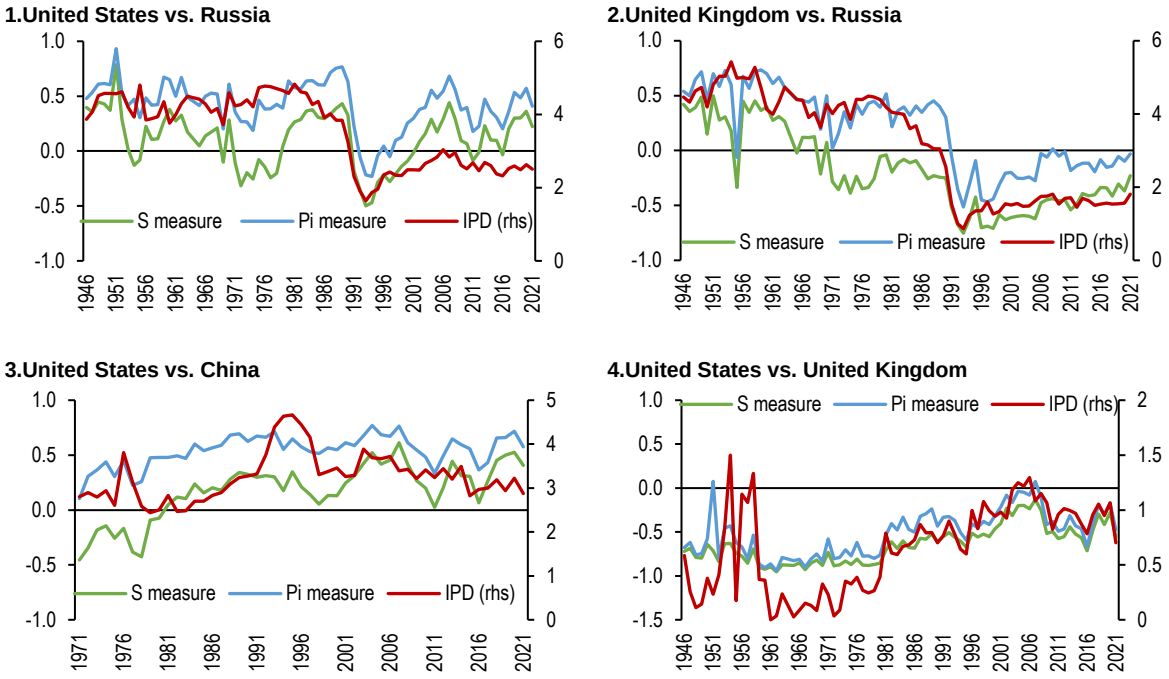
*1. S score*. Our baseline measure of geopolitical distance is the *S* score in Häge (2011), which is based on Signorino and Ritter (1999). This measure calculates the average disagreement in UNGA voting based on the squared sum of the distance between two countries and normalizes its value so that 1 and -1 represent complete disagreement and agreement, respectively. Computing the *S* score consists of three steps: (i) assigning numerical values to voting behavior in UNGA (excluding absences as these could be due to temporary lack of government), (ii) calculating the disagreement as the sum of squared differences of these values, and (iii) normalizing it. Hence, the bilateral *S* distance measure between countries a and b is given by:

$$Geopolitical\ Distance_{a,b} = (-1) * \overbrace{\left[1 - \frac{\sum_v (X_{av} - X_{bv})^2}{\frac{1}{2}\sum_v (d_{max})^2}\right]}^{S\ score} \qquad (1)$$

where $X_{av}$ denotes voting behavior ($v$) of country $a$, $X$ refers to votes (yea=1, abstain=2, and nay=3), and $v$ indexes voting during sessions in a calendar year (adjusted for sessions towards

the end of the year that could potentially run into January of the following year). The time dimension (year) is subsumed in the above formula. $d_{max}$ stands for the maximum possible distance between the country pairs (which is 3-1=2 in this case). For instance, for a country pair with one voting "yea" and the other "nay" in a session, the implied distance would be 1. If the two countries voted the same, then the distance would be -1. The normalization factor in the *S* score can also be interpreted as a "chance correction" (Häge 2011) as it reflects the dissimilarity expected by chance, which is constant at ½.

**Figure A1. Geopolitical Distance Measures Based on U.N. Voting Behavior**




Sources: Häge (2011); Bailey and others (2017); and IMF staff calculations
Note:Higher values indicate greater geopolitical distance. IPD=Ideal Point Distance of Bailey and others (2017).

*2. π measure*. Häge (2011) offers an alternative measure, π, that improves the "chance correction" and cost of forming ties. Häge (2011) argues that the π measure has more desirable distributional properties and passes some key face validity tests.

*3. Ideal point distance*. Bailey and others (2017) offer a further alternative to *S*, the "ideal point distance," by estimating a discrete choice model with latent preferences.

Overall, the three measures—*S*, pi, and ideal point distance (IPD)—are highly correlated, with the correlation ranging from 0.66 ($\pi$ vs. IPD) to 0.84 (*S* vs. IPD) and evolve quite similarly over time for country pairs (Figure A1). We rely on the *S* score as our default option because it is a commonly used measure in the literature, and then assess the robustness of the results when *S* is replaced by the other two measures.

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