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A Gravity Model of Geopolitics and Financial Fragmentation

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ABSTRACT:
Do geopolitical tensions between countries influence the cross-border asset allocation of investment funds? Our answer is yes. We estimate gravity models and find that investment funds allocate smaller shares of their portfolios to recipient countries that are geopolitically more distant to their country of origin—with geopolitical distance measured by dissimilarity in countries' voting behavior in the United Nations General Assembly. We also find an investment diversion effect: a recipient country attracts additional investments when its source countries get geopolitically more distant to third-party countries. These results are robust to instrumenting geopolitical distance and using alternative distance measures.

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Introduction

In recent years, geopolitical tensions have increased globally amid deteriorating relations between the United States and China, Russia's invasion of Ukraine, and the most recent war in the Middle East, raising the specter of global economic and financial fragmentation.[1] Motivated by these events, recent theoretical studies have focused on the financial effects of sanctions, freezing of reserves, and expropriation of foreign assets (Bianchi and Sosa Padilla, 2023 and 2024, and Lorenzoni and Werning, 2023) and rationalized the use of such policy measures within a framework for geoeconomics (Clayton, Maggiori, and Schreger, 2024). In addition, a broader literature has long recognized that geopolitical conflict can undermine globalization (Acemoglu and Yared, 2010, and references therein). Empirical evidence, however, remains scant. Against this background, we empirically address the question whether geopolitical tensions between countries influence the cross-border asset allocation of investment funds.

Building on the literature on gravity in international finance (Portes and Rey, 2005 and Okawa and van Wincoop, 2012), we estimate models of investment funds' cross-border portfolio allocations to examine whether these are influenced by bilateral "geopolitical distance" measures that capture dissimilarity in countries' voting behavior in the United Nations General Assembly (Signorino and Ritter 1999; Häge 2011; and Bailey and others 2017).

To the best of our knowledge, this is the first paper that identifies the role of geopolitical distance on cross-border portfolio investments. In doing so, we control for a broad range of bilateral and

[1] Financial fragmentation is defined as a policy-driven weakening of financial links between countries—a particular form of de-globalization (International Monetary Fund, 2023). For further background on changing global linkages and fragmentation, see also Gopinath and others (2024), and references therein.

country-specific factors that determine investments, including gravity variables and push and pull factors that have been identified in previous literature.[2]

To dispel concerns about reverse causation—the possibility that geopolitical distance could be influenced by cross-border investments instead of being exogenous—we first use the democracy scores of countries in a dyad as instruments for geopolitical distance.[3] We then estimate the gravity models in non-linear form using a two-stage instrumental variable method—where the Poisson Pseudo Maximum Likelihood (PPML) technique (Santos Silva and Tenreyro, 2006) is applied in the second stage—and a control function method (Wooldridge, 2014).

Our key finding is that investment funds allocate smaller shares of their equity and bond portfolios to recipient countries with greater geopolitical distances to their country of origin (Figure 1). This implies that a sudden rise in geopolitical distance between two countries can trigger cross-border capital flows, weakening bilateral financial links.[4]

In particular, an increase of one standard deviation in geopolitical distance between a source and a recipient country—equivalent, for example, to the observed increase in distance between the US and China from 2016 to 2019—is associated with a reduction in bilateral cross-border

[2] Performing the analysis with bilateral investment and geopolitical distance data allows for inclusion of both source and recipient country time effects in the gravity regressions. These time effects absorb the influence exerted by all push and pull factors that are time varying and country-specific but multilateral—because they do not vary in a differentiated manner across country pairs over time. Their inclusion also eliminates the potential confounding effects of variables that have been emphasized in recent studies of capital flows and cross-border asset allocation, including indicators of institutional quality, government transparency, investor protections, corporate governance, taxes, and capital controls; see, for instance, Gianetti and Koshinen (2010). Insightful studies that discuss the role of country-specific but multilateral determinants of investment funds' cross-border portfolio holdings and home bias include Gelos and Wei (2005), Hau and Rey (2008), and Chan, Covrig and Ng (2005).

[3] The literature on the relationship between international trade and military conflict has identified democracy scores, along with other variables, as valid instruments for military conflict (Hegre, Oneal and Russett, 2010, and references therein).

[4] Our view is that funds reallocate their asset portfolios away from geopolitically distant countries to mitigate various risks. Geopolitical distance is thus a proxy variable that captures risks highlighted in recent theoretical studies (Bianchi and Sosa Padilla, 2023 and 2024; Lorenzoni and Werning, 2023; and Clayton, Maggiori, and Schreger, 2024) such as expropriation, asset freezing, financial restrictions, and other policy decisions that reduce foreign investors' access to local information. Empirical analysis of the effect of particular policy interventions on cross-border investments, however, is beyond the scope of this paper.

portfolio allocation of investment funds by about 40 percent for equity investments, and 60 percent for bond investments.

Our key finding is robust to using alternative geopolitical distance measures proposed in the literature (Häge, 2011 and Bailey and others, 2017) or samples that exclude off-shore financial centers (for which geopolitical distances between recipient and ultimate investor countries are blurred) or the United States, which is the main investor country.

The results vary depending on characteristics of recipient countries. In particular, we find that the effects of geopolitical distance on investment funds' cross border portfolio allocation are weaker for recipient countries with stronger institutions—which comprise rules and practices that can help countries mitigate and better manage risks associated with international capital flows (Papaioannou, 2009; Broner and Ventura, 2016; and Gelos and Wei, 2005).[5]

We also find evidence of a cross-border investment diversion effect: a recipient country attracts additional investments when the geopolitical distance between its source countries and third-party countries—their financial partner countries, excluding the recipient country—increases.[6]

This paper makes a contribution to the literature on the determinants of cross border investments. It is closely related to a strand of the literature that develops gravity models of international finance to uncover factors that influence *bilateral* capital flows—beyond the effects of multilateral push and pull factors—and include the important contributions of Portes and Rey (2005), Okawa and van Wincoop (2012), and references therein, as well as the recent contribution of Mercado (2020). These studies show that cross-border investments are influenced

[5] Our finding that poor institutional quality can amplify the effects of geopolitical shifts complements those of previous studies that focus on how cross-country variation in institutional quality prevents capital from flowing from rich to poor countries, undermining long-run growth prospects in the latter countries (Alfaro, Kalemni-Ozkan, and Volosovych, 2008; Acemoglu, Johnson and Robinson, 2005).

[6] Investment diversion implies that some countries could potentially benefit from rising global geopolitical tensions by attracting new portfolio investments. The macro-financial implications of such investments, however, depend on the absorptive capacity and policy frameworks of the recipient countries, as well as the stability of such flows (Ghosh, Ostry, and Qureshi, 2017).

by informational asymmetries and costs of accessing local information and transacting, which are proxied by measures of geographical distance, contiguity, common colonial history, and common culture (e.g., language and religion) among others. Although these variables are time-invariant, other studies have also highlighted the role of (time-varying) bilateral trade in goods and services as a determinant of cross border investments (Cavallo and Frankel, 2008, and references therein).

The literature has not considered the role of bilateral geopolitical tensions (distance) on cross-border portfolio investments. We fill this gap by extending the gravity models of international finance to include bilateral geopolitical distance and showing that it has a significant, robust, and economically meaningful effect on cross-border capital allocation of investment funds.

More generally, this paper also relates to a broader strand of literature that grew after the large capital inflows to emerging markets in the 1990s (Calvo, Leiderman, and Reinhart, 1993 and 1996) and has recently expanded with the contributions of Ghosh and others (2014), Fratzscher (2012), Forbes and Warnock (2012), and Reinhart and Reinhart (2009). Those studies empirically disentangle the effects of domestic (pull) and global (push) factors on *aggregate* capital flows into or out of countries; but unlike this paper, they do not seek to explain *bilateral* capital flows among pairs of countries.[7]

The rest of this paper is organized as follows. Section 2 describes the empirical model and the data. Section 3 presents the empirical results. Section 4 concludes.

[7] This literature documents the role of push and pull factors on cross border capital flows in normal times and during episodes characterized as "sudden stops", "surges" or "bonanzas", "capital flights", or "current account reversals"; see Forbes and Warnock (2012) and references therein.

2. Empirical Model

We rely on three commonly used measures of geopolitical distance that reflect dissimilarity in countries' voting behavior in the United Nations General Assembly. Our baseline measure is the (negative of the) *S* score of Signorino and Ritter (1999), which calculates the geopolitical distance between countries a and b as follows:

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

where X_{av} and X_{bv} denote the votes of countries *a* and *b* (yea=1, abstain=2, and nay=3); v indexes the voting sessions in a calendar year; and $d_{max} = 2$ stands for the maximum possible distance between the countries in a given session.[8] For robustness, we also examine the π *measure* proposed by Häge (2011), and the *ideal point distance* (IPD) measure of Bailey and others (2017).[9] Although the three measures (*S*, π, and IPD) are highly correlated—with the correlation ranging from 0.66 (π vs. IPD) to 0.84 (*S* vs. IPD)—and evolve quite similarly over time for country pairs (Appendix Figure A1), we use the (the negative of the) S measure as a baseline as it has been historically used as a benchmark (see Häge, 2011).

The empirical model is specified as follows:

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

[8] Note that the distance measure ranges from -1 (agreement) to 1 (disagreement)—the normalization factor ½ can be interpreted as a "chance correction" that reflects the dissimilarity expected by chance (Häge 2011).

[9] Häge (2011) argues that the *π measure* improves the "chance correction" and captures the cost of forming ties, among other desirable properties. The π measure also has more desirable distributional properties and passes some key face validity tests. The *ideal point distance* measure of Bailey and others (2017) is obtained by estimating a discrete choice model with latent preferences. For further details, see the original articles.

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) measure of geopolitical distance between countries *c* and *c'*; and $Gravity\ controls_{c,c'}$ is a vector of bilateral (country-pair specific) variables that proxy for the degree of access to the recipient country's local information or impact the cost of carrying out financial transactions between the source and the 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 increases as larger shares of the countries' populations share a common religion), and (v) $Contiguity_{c,c'}$ (a dummy variable that takes on the value 1 if the countries share a common border, and 0 otherwise). $\nu_{c',t}$ and $\nu_{c,t}$ denote the time fixed effects (FEs) corresponding to the source and recipient countries, respectively. $\epsilon_{c,c',t}$ is a log normal random error with mean 1 and variance $\sigma^2_{c,c',t}$, where $\ln \epsilon_{c,c',t}$ is assumed to be independent across country-pairs for any given time *t*.

In some regressions presented in section 3, we also include additional time-varying bilateral controls: $Source\ country's\ geopolitical\ distance\ to\ others_{c,c',t-1}$, defined as the exposure-weighted average geopolitical distance between the source country c' and its financial partner countries in the rest of the world (excluding the recipient country *c*), and $Bilateral\ trade_{c,c',t-1}$, defined as the total bilateral volume of trade (sum of exports and imports) between the countries *c* and *c'* divided by the geometric average of their nominal GDPs. In addition, we

explore whether results differ for recipient countries depending on their $Institutional\ quality_{c,t-1}$ by interacting this variable with $Geopolitical\ distance_{c,c',t-1}$.

In equation (1), the main parameter of interest is β: if investment funds from source countries allocate smaller shares of their cross-border investments to recipient 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, which are obtained from the Emerging Portfolio Fund Research (EPFR) database. The gravity controls are obtained from the CEPII Gravity Database (Conte, Cotterlaz, and Mayer 2022).[10] Bilateral trade is calculated using IMF Direction of Trade Statistics and countries' nominal GDPs from the IMF World Economic Outlook database. The geopolitical distance measures are updated up to 2022 using the United Nations voting database and the methodology provided by Häge (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.

Table 1 shows descriptive statistics for the main variables defined above (panel A) and additional variables used in the instrumental variable and control function analysis (panel B). Appendix 1 presents further details about data sources and transformations.

3. Results

Table 2 presents baseline results for regressions corresponding to equation 1, where the dependent variable is either the cross-border *equity* allocation of investment funds (columns 1 to

[10] 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) or the cross-border *bond* allocation (columns 4 to 6). In the baseline regressions, geopolitical distance is measured with the (negative of the) Signorino and Ritter's *S* score (Signorino and Ritter, 1998; Häge, 2011) and lagged one period to mitigate potential endogeneity concerns.[11] The regressions are estimated by Poisson Pseudo Maximum Likelihood (Santos Silva and Tenreyro, 2006) and standard errors are clustered at source-recipient country level.

Regressions in columns 1 and 4 include bilateral geopolitical distance as an explanatory variable but do not control for the influence of time-varying source and recipient country factors or gravity variables. Columns 2 and 5 add source and recipient country time effects, which absorb the influence of time varying country-specific factors that are common across all foreign counterparts. These time effects thus absorb all the push- and pull factors that are not specific to the country pair, such as macroeconomic variables and expected returns of investments in the source and recipient countries.[12] Columns 3 and 6 also add the gravity controls.

The results indicate that investment funds tend to allocate smaller shares of their cross-border equity and bond investments to recipient countries that are geopolitically more distant. Note that the inclusion of gravity-type controls in the regressions reduces the estimated effects of geopolitical distance on investment funds' equity and bond portfolio allocations by almost ½, reflecting their importance. Also, the gravity controls have broadly the expected influence on portfolio shares (i.e., similar in sign to the related literature), with lower geographic distance,

[11] Note that equation 1 may be estimated using variables with different frequencies. Portfolio investment is available at monthly frequency in the EPFR database, whereas geopolitical distance and bilateral trade are available at yearly frequency. In the regressions, 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. In Appendix 2, we report that the results are robust to using annual data consistently across all the variables.

[12] The expected investment returns are likely to embed country-specific (nonbilateral) geopolitical risk premium components that are absorbed by the source and recipient country time effects.

common language, and common colonial origin implying higher cross-border portfolio allocation.[13]

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 similar reduction in both equity and bond portfolio allocations by about 25 percent.[14,15]

Table 3 presents an extended set of regression results to examine the robustness of the effect of geopolitical distance on cross-border *equity* (panel A) and *bond* (panel B) investments to alternative specifications. Column 1 reproduces the baseline regression shown in Table 2, which includes both source and recipient country time effects and gravity controls.

Column 2 includes *Source country's geopolitical distance to others* as an explanatory variable. Its positive and significant coefficient indicates that there is a cross-border investment diversion effect whereby a recipient country attracts additional equity and bond portfolio investments when the geopolitical distance between its source countries and their financial partners in the rest of the world (excluding the recipient country) increases. Put differently, this result suggests that when funds withdraw investments from countries that become geopolitically more distant to their countries of origin, they (partially) reallocate them to countries that continue being "friendly".

[13] Note that common religion only influences bond (but not equity) cross-border portfolio allocations, and contiguity does not exert a positive or robust influence on cross-border investments once geographic distance is included as a control.

[14] To illustrate with a numerical example, if the investment funds of a source country were allocating 5 percent of their foreign investments to a given recipient country, this allocation would decline to 3.8 percent following a one standard deviation increase in geopolitical distance between the two countries.

[15] Note that we have not saturated the model (additionally) with country-pair fixed effects because these could partially absorb the effect of bilateral geopolitical distance, which tends to move infrequently. Indeed, when the baseline specifications are augmented with country-pair fixed effects, the estimated coefficient of geopolitical distance becomes statistically insignificant. In contrast, when endogeneity is addressed by applying the control function method, the effect of geopolitical distance remains statistically significant even when country-pair fixed effects are included. We choose not to include country-pair fixed effects in the preferred specification due to the slow-moving nature of the geopolitical distance measures.

And the economic effect could be sizable: a one standard deviation increase in geopolitical distance between the source country and third-party countries—its financial counterparts, excluding the recipient country—doubles the investment allocation to the recipient country. Note that *Geopolitical distance* becomes insignificant due to the inclusion of *Source country's geopolitical distance to others* (comparison of columns 1 and 2 in Table 3)—this is partially due, however, to the endogeneity of geopolitical distance, which is addressed below.[16]

Column 3 augments the baseline specification with an interaction term of geopolitical distance and (lagged) institutional quality. The result indicates that, in response to a rise in geopolitical distance, investment funds reduce their cross-border equity and bond portfolio allocations more strongly in recipient countries with lower institutional quality.

Column 4 includes bilateral trade (in goods and services) as a control variable, excluding the gravity controls because these are well-known determinants of bilateral trade.[17] The inclusion of bilateral trade increases the (absolute) magnitude of the coefficient corresponding to geopolitical distance while preserving its strong statistical significance. Also, the positive coefficient on bilateral trade is consistent with previous studies that find a positive association between bilateral trade and investment (Cavallo and Frankel, 2008).

Columns 5 and 6 confirm that the key result about the impact of geopolitical distance on investments is robust to the use of alternative geopolitical distance measures, namely Häge (2011)'s π and Bailey and others (2017)'s "ideal point distance" (IPD) measures. The effect of a one standard deviation increase in geopolitical distance on equity and bond investments is

[16] We show below, in Tables 4 and 5, that *Geopolitical distance* and *Source country's geopolitical distance to others* are both statistically significant when the endogeneity of geopolitical distance is addressed through two stage instrumental variable or control function methods.

[17] Note that, in the literature, bilateral trade volumes are also determined by the output (GDP) of the trading partners. Column 4 in Table 3 includes bilateral trade and excludes gravity controls, but the presence of source and recipient country time fixed effects captures the influence of output (among other multilateral, country-specific, time-varying factors).

similar for different geopolitical distance measures (ranging between 25-29 percent for equity investments and 26-36 percent for bond investments).

Columns 7 and 8 exclude the United States or international financial centers (IFCs) from the set of source countries.[18] The United States is the largest portfolio investor country, while IFCs act as intermediaries between investor and recipient countries, turning infeasible the measurement of geopolitical distance between ultimate counterparts. The main result—that geopolitical distance matters for cross-border portfolio allocation of investment funds—holds in both cases, when the United States or IFCs are excluded as sources of investments.

Estimation based on Instrumental Variable and Control Function Methods

A proper identification of the impact of geopolitical distance on cross-border asset allocation (β coefficient in equation 1) could be hampered by endogeneity of geopolitical distance. Investments between two countries could influence their geopolitical distance by reducing the countries' incentives to engage in bilateral disputes. The recipient country may fear that tensions with foreign investors could trigger capital outflows that cause adverse effects on the domestic economy—such as funding liquidity pressures in financial and non-financial corporations or asset price declines. The source country, in turn, may fear that escalating bilateral tensions could result in policy decisions that reduce the returns on its foreign investments.

To further mitigate potential endogeneity, we now present instrumental variables estimates of the gravity model described above. We estimate equation 1 with geopolitical distance affecting investments contemporaneously, and consider instrumental variables taken from the trade and conflict literature. We conjecture that (bilateral) variables that have been found to be valid

[18] International financial centers (IFCs) are jurisdictions that provide financial services disproportionate to their size and the financing of their domestic economies. Following Damgaard and Elkjaer (2017), we define the following list of IFCs: Bermuda, British Virgin Islands, Cayman Islands, Hong Kong SAR, Ireland, Luxembourg, Netherlands, and Singapore.

instruments for military conflict could also serve as valid instruments for geopolitical distance (Hegre, Oneal and Russett, 2010, and references therein).

As noted in Hegre, Oneal, and Russett (2010), the empirical literature suggests that the probability of military conflict between two countries depends on the relative power of one country against the other. Conflict is deterred by "preponderance"—the probability of conflict declines as the probability that the more powerful state wins the conflict increases. And preponderance is found to be a significant determinant of conflict even when controlling for total (military) capabilities in the dyad.

The relative power and total capabilities of countries in the dyad are captured through two measures based on the Composite Indicator of National Capabilities (CINC) of the Correlates of War Project: the $Log\ capabilities\ of\ the\ larger\ economy_{c,c',t}$, and the $Larger\ economy's\ share\ of\ total\ capabilities_{c,c',t}$ (the larger state's CINC score divided by the sum of the two states' scores).

Following Hegre, Oneal, and Russett (2010), we capture the notion that countries are less likely to engage in military conflict, and more broadly in diplomatic disputes, when their democracy scores are higher and less dissimilar. Also, as discussed by Oneal, Russett, and Berbaum (2003), democracy scores also matter because a dispute can result from the actions of a single state, and the likelihood of this event depends on the degree of freedom prevailing in the less democratic state of the dyad. We thus consider $Democracy\ score\ (lower\ within\ the\ dyad)_{c,c',t}$ and $Democracy\ score\ (higher\ within\ the\ dyad)_{c,c',t}$ as possible instruments for geopolitical

distance. Binary democracy scores for individual countries are obtained from the updated database of Boix, Miller, and Rosato (2012).[19]

The trade and conflict literature also relies on instruments that capture the state of the economy $Expected\ real\ GDP\ growth\ (lower\ within\ the\ dyad)_{c,c',t}$, and controls on cross-border capital flows $Capital\ inflow\ controls\ (higher\ within\ the\ dyad)_{c,c',t}$—which are less suitable for our purposes and therefore not included in the baseline specification.

Table 4, panel A, shows first stage regression estimates of geopolitical distance on different sets of instrumental and control variables. Column 1 includes the set of instruments used in studies of trade and military conflict (Hegre, Oneal and Russett, 2010 and references therein). It shows that the coefficients of instrumental variables have the same signs found in regressions where the dependent variable is military conflict instead of geopolitical distance. For the purpose of mitigating the potential endogeneity of geopolitical distance in equation 1, however, the regression shown in column 1 presents important limitations, including a significant loss of observations due to insufficient data for some instrumental variables and the fact that time fixed effects do not vary across recipient and source countries. Column 2 excludes the instruments related to capital controls and expected real GDP growth and controls for source- and recipient-country time fixed effects and the gravity variables. The instrumental variables related to

[19] The main results presented below are robust to using alternative measures of "democracy," such as those of Acemoglu, Naidu, Restrepo and Robinson (2019), which are partially based on the Polity database and evaluate regimes in a democracy-autocracy spectrum. These additional results are available upon request. Moreover, the results are qualitatively robust to using an alternative instrument, bilateral arms trade, as reported below. Bilateral arms trade is found to be a significant predictor of bilateral geopolitical distance, and weakly correlated with investment funds' equity or bond portfolio share (with correlation coefficients of 0.07 and 0.04, respectively). The latter is not surprising given the fact that arms trade among countries is heavily regulated and controlled (Congressional Research Services, 2023), and it is unlikely that governmental restrictions on arms trade will be influenced by changes in short-term portfolio flows.

national capabilities (CINC) become insignificant, but the lower democracy score within the dyad remains significant and of the expected sign.[20]

The first stage regressions 3-8 in panel A are used to generate the corresponding $Geopolitical\ distance\ (instrumented)_{c,c',t}$ variables that are used in the second stage regressions (Table 4, panels B and C). Each first stage regression includes the same set of exogenous regressors used in the second stage regressions—including in all cases the full set of source- and recipient-country time fixed effects and gravity controls. All the second stage regressions are estimated with the Poisson Maximum Likelihood method (Santos Silva and Tenreyro, 2006). We manually bootstrap standard errors using the source-recipient country cluster with 500 replications for both first and second stages. In particular, for each specification, we randomly draw (with replacement) observations within each country pair cluster in the first stage and use the associated predicted geopolitical distance in the second stage; we repeat the procedure 500 times and report the standard deviation of estimated coefficients.

Regression 1 shows that $Geopolitical\ distance\ (instrumented)_{c,c',t}$ has a (contemporaneous) negative and sizable effect on investment funds' cross-border equity and bond allocations, after correcting for the endogeneity of geopolitical distance through the use of instrumental variables.

A comparison of the baseline regression results presented in Tables 3 and 4 reveals the quantitative implications of correcting for endogeneity of geopolitical distance while allowing it to impact cross border investments contemporaneously.

[20] Any of the two democracy scores (considered individually) remain significant in a first stage regression that controls for source- and recipient-country time fixed effects and the gravity variables. Table 4, panel A, only shows results for regressions that include the lower democracy score within the dyad, but the results are unchanged when the higher democracy score is used instead. Note that both democracy scores are significant and of the right sign when common time fixed effects are included in the regression (column 1), but one of them is absorbed when (a large number of) source- and recipient-country time fixed effects are included as controls (columns 2 to 8).

Specifically, results based on instrumental variable estimation (Table 4, panel B, column 1) indicate that a one-standard-deviation increase in (instrumented) geopolitical distance reduces cross-border *equity* allocation by 42 percent—a substantially higher magnitude than the 25 percent decline estimated before (based on the results presented in Table 3, panel B, column 1). Similarly, a one-standard-deviation increase in (instrumented) geopolitical distance reduces cross-border *bond* allocation by 60 percent (Table 4, panel C, column 1) instead of 25 percent, as estimated before (Table 3, panel C, column 1).[21] Note that, in contrast to previous estimates, *bond* investments are now found to be substantially more sensitive to changes in geopolitical distance than *equity* investments.

The regressions presented in columns 2 (Table 4, panels B and C) show that the main results hold when we control for the effect of geopolitical distance between the source country in the dyad and its financial partners in the rest of the world (excluding the recipient country). The inclusion of *Source country's geopolitical distance to others* reduces the estimated coefficients of *Geopolitical distance (instrumented)* substantially—55 percent in the case of *equity* allocation and 18 percent in the case of *bond* allocation—but these remain negative, and significant for bond allocation (in contrast with the previous result presented in Table 3, panel B).

It is worth highlighting that the distribution of geopolitical distance is bimodal and highly skewed (Appendix 2, Figure A2). This implies a higher sensitivity of investments to changes in geopolitical distance for country pairs that already have high initial levels of geopolitical

[21] Note that correcting for endogeneity via instrumental variable methods implies a significant downward revision of geopolitical distance coefficients. For instance, for cross-border equity allocation, the coefficient of geopolitical distance declines from -0.818 to -2.218 (Tables 3 and 4, panel B, column 1). This suggests that there is a positive correlation between geopolitical distance and the error in equation 1. This positive correlation may seem (at first) puzzling, because from a conceptual standpoint the expectation is that additional investments would tend to reduce geopolitical distance (not increase it). Intuitively, however, the positive association can be explained as follows. Because the dependent variable (cross-border investment share $X_{c,c',t}$) is non-negative, an increase in geopolitical distance that reduces investments forces more likely realizations of positive errors ($\epsilon_{c,c',t}$)—implying a positive association between geopolitical distance and the error that is a source of the endogeneity problem.

distance. To illustrate with the regression results presented in columns 2 (Table 4, panels B and C), an increase in geopolitical distance from the 25th percentile to the median of the distribution (a 0.4 standard deviation increase) reduces cross-border *equity* allocation by 7 percent. In sharp contrast, an increase in geopolitical distance from the median to the 75th percentile of the distribution (a 1.7 standard deviation increase) reduces cross-border *equity* allocation by 33 percent. For *bond* allocation, the declines in investments when geopolitical distance increases from the 25th percentile to median and from the median to the 75th percentile, are 18 percent and 83 percent, respectively.

Regression results presented in columns 3-8 (Table 4, panels B and C) confirm that, in an instrumental variables setting, the main result about the negative effect exerted by geopolitical distance on cross-border investments is strongly robust to (i) inclusion of additional controls such as the interaction of geopolitical distance with institutional quality, and bilateral trade, (ii) use of alternative geopolitical distance measures, and (iii) exclusion of the United States or international financial centers from the source countries.

Table 5 shows second stage regression results obtained using control function estimation methods instead of the instrumental variables approach. Note that residuals from first stage regressions shown in Table 4 (panel A), and their interactions with institutional quality (when applicable), are included as explanatory variables in the second stage regressions to control for the endogeneity of geopolitical distance. Wooldridge (2010) argues that in non-linear models with one or more endogenous explanatory variables, estimation through instrumental variables yields results that are generally more robust in terms of consistency, but less efficient, than those obtained through control function estimation. In our specific application, all the main results are found to be robust regardless of the estimation method that is applied.

In sum, we draw two main conclusions from the analysis aimed at correcting for endogeneity of geopolitical distance. First, the analysis yields higher estimated sensitivities of both cross-border *equity* and *bond* investments to changes in geopolitical distance. Second, *bond* investments are substantially more sensitive to geopolitical distance than *equity* investments.

We provide further robustness checks in the Appendix. Table A1 shows that the key results continue to hold when we estimate the empirical model with annual frequency data (thus assuring that all the variables are at a common annual frequency). Table A2 confirms that the baseline results are qualitatively robust to using an alternative instrument, bilateral arms trade, though statistically somewhat weaker at conventional threshold values. The results also continue to show that bond investments are more sensitive to geopolitical distance than equity investments.

4. Conclusion

In this paper, we present robust empirical evidence that bilateral geopolitical distance between countries exerts a significant and economically meaningful influence on cross-border portfolio equity and bond allocation of investment funds—beyond the effects of multilateral push and pull factors and gravity variables documented in previous studies. We also show that countries with lower institutional quality are more vulnerable to geopolitical shifts, and geopolitical tensions can generate cross-border investment diversion, whereby a recipient country attracts additional investments when the geopolitical distance between its source countries and their financial partner countries increases.

This paper, and possible future extensions of the framework presented here, are policy relevant. Since geopolitical tensions can lead to sudden reversals of cross-border capital flows, they can

also exacerbate financial stability risks. Future work could focus on providing more direct and detailed evidence about transmission of bilateral geopolitical tensions to domestic financial systems through capital flows—a promising direction for future research in light of recent analysis (IMF, 2023). With appropriate extensions, the framework could be used for design of stress test scenarios that capture the effects of geopolitical shocks or to assess the adequacy of policy and regulatory buffers (e.g., international reserves and bank capital requirements) and to improve the design of safety nets (IMF, 2023).

Table 1. Descriptive Statistics

Variables	Mean	Std. Deviation	Minimum	25th percentile	Median	75th percentile	Maximum	Observations
A) Main variables								
Cross-border portfolio allocation								
Equity (percent) $X_{c,c',t}$	1.39	4.18	0.00	0.00	0.07	0.72	31.04	430,805
Bond (percent) $X_{c,c',t}$	1.00	2.76	0.00	0.01	0.10	0.56	18.67	405,499
Geopolitical distance								
Baseline: Signorino and Ritter's (1999) $S_{c,c',t}$	-0.62	0.30	-1.00	-0.89	-0.62	-0.46	0.70	412,895
Häge's (2011) $\pi_{c,c',t}$	-0.23	0.49	-1.00	-0.76	-0.07	0.19	1.00	412,895
Bailey et al.'s (2017) $IPD_{c,c',t}$	1.14	0.86	0.00	0.32	1.15	1.73	4.59	378,248
Gravity controls								
$Distance_{c,c'}$	8.46	0.99	4.09	7.74	8.79	9.18	9.89	430,805
$Common\ language_{c,c'}$	0.15	0.36	0.00	0.00	0.00	0.00	1.00	430,805
$Common\ colonial\ history_{c,c'}$	0.02	0.15	0.00	0.00	0.00	0.00	1.00	430,805
$Common\ religion_{c,c'}$	0.16	0.23	0.00	0.01	0.04	0.25	0.99	430,805
$Contiguity_{c,c'}$	0.03	0.18	0.00	0.00	0.00	0.00	1.00	430,805
Other controls								
$Bilateral\ trade_{c,c',t}$	0.01	0.02	0.00	0.00	0.00	0.01	0.34	377,537
Source country's geopolitical distance to $others_{c,c',t}$	-0.57	0.19	-0.97	-0.69	-0.60	-0.52	0.31	407,719
Source country's geopolitical distance to $others_{c,c',t}$ based on Häge's (2011) π	-0.37	0.24	-0.92	-0.53	-0.39	-0.26	0.51	407,719
Source country's geopolitical distance to $others_{c,c',t}$ based on Bailey et al.'s (2017) IPD	0.95	0.37	0.00	0.73	0.91	1.07	2.84	373,762
Institutional quality (of recipient country)$_{c,t}$	4.37	0.82	2.10	3.70	4.30	5.00	6.50	388,527
B) Variables used in the instrumental variable and control function analysis								
Instrumental variables								
Log capabilities of the larger $economy_{c,c',t}$	-4.47	1.69	-8.80	-5.91	-4.53	-3.24	-1.46	108,165
Larger economy's share of total $capabilities_{c,c',t}$	0.89	0.21	0.05	0.90	1.00	1.00	1.00	108,165
Capital inflow controls (higher within the dyad)$_{c,c',t}$	0.39	0.30	0.00	0.07	0.27	0.60	1.00	356,842
Expected real GDP growth (lower within the dyad)$_{c,c',t}$	2.02	1.27	-4.29	1.37	1.88	2.80	9.00	258,855
Democracy score (lower within the dyad)$_{c,c',t}$	0.68	0.47	0.00	0.00	1.00	1.00	1.00	329,885
Democracy score (higher within the dyad)$_{c,c',t}$	0.98	0.14	0.00	1.00	1.00	1.00	1.00	341,138
$Bilateral\ arms\ trade_{c,c',t}$	0.01	0.04	0.00	0.004	0.002	0.010	1.08	161,921
Geopolitical distance (instrumented)								
Baseline: Signorino and Ritter's (1999) $S_{c,c',t}$	-0.63	0.19	-1.03	-0.78	-0.71	-0.38	-0.28	329,443
Häge's (2011) $\pi_{c,c',t}$	-0.22	0.37	-1.07	-0.51	-0.35	0.24	0.45	329,443
Bailey et al.'s (2017) $IPD_{c,c',t}$	1.17	0.67	-0.24	0.65	0.87	2.05	2.33	328,878
Predicted errors from first stage regression (baseline specification)								
Baseline: Signorino and Ritter's (1999) $S_{c,c',t}$	0.00	0.12	-1.57	-0.04	0.00	0.05	0.90	329,443
Häge's (2011) $\pi_{c,c',t}$	0.00	0.19	-1.44	-0.08	0.01	0.07	1.10	329,443
Bailey et al.'s (2017) $IPD_{c,c',t}$	0.00	0.37	-3.33	-0.12	0.02	0.14	2.48	328,878

Notes. Variable definitions, data sources, and the list of countries are presented in Appendix I. The statistics are calculated using the monthly data series used to obtain the regression results reported in Tables 2 to 5. The sub-indices *c*, *c'*, and *t* denote recipient country, source country, and time, respectively. Source country's geopolitical distance to $others_{c,c',t}$ is calculated using the (bilateral) geopolitical distance measure *S* of Signorino and Ritter (1999).

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$_{c,c',t-1}$	-1.418***	-1.557***	-0.818***	-1.491***	-1.791***	-0.866***
	(0.154)	(0.167)	(0.130)	(0.183)	(0.208)	(0.193)
Distance$_{c,c'}$			-0.350***			-0.384***
			(0.049)			(0.043)
Common language$_{c,c'}$			0.229***			0.255***
			(0.077)			(0.093)
Common colonial history$_{c,c'}$			1.209***			0.816**
			(0.230)			(0.355)
Common religion$_{c,c'}$			-0.054			0.344**
			(0.161)			(0.148)
Contiguity$_{c,c'}$			-0.129			-0.208*
			(0.151)			(0.121)
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	430,805	430,805	430,805	405,499	405,499	405,499

Notes. Columns 1 to 3 and 4 to 6 show regression results for cross-border equity and bond portfolio allocation of investment funds, respectively. The dependent variable is the share of recipient country *c* in the total cross-border portfolio allocation of investment funds domiciled in source country *c'* at time *t*. The model is estimated by Poisson Pseudo Maximum Likelihood. The geopolitical distance is the Signorino and Ritter's (1999) *S* measure. "FE" denotes fixed effects and "Yes" indicates that they are included in the specification; "—" indicates that the fixed effects are absorbed by a more granular set of fixed effects. Standard errors are clustered at source-recipient country and shown in parentheses; significance at the 1, 5, and 10 percent levels is denoted by ***,**, and *, respectively.

Table 3. Robustness: Alternative Specifications

A) Dependent variable:	Cross-border portfolio equity allocation: $X_{c,c',t}$							
Specification:	Baseline	Source country's geopol. distance to others	Geopol. distance x Inst. quality	Bilateral trade	Häge's (2011) π	Bailey et al.'s (2017) IPD	Excluding US from source countries	Excluding IFC from source countries
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Geopolitical distance$_{c,c',t-1}$	-0.818***	0.180	-4.795***	-1.355***	-0.600***	-0.322***	-0.814***	-0.697***
	(0.130)	(0.159)	(0.720)	(0.180)	(0.096)	(0.045)	(0.141)	(0.132)
Distance$_{c,c'}$	-0.350***	-0.295***	-0.363***		-0.338***	-0.348***	-0.367***	-0.362***
	(0.049)	(0.037)	(0.047)		(0.050)	(0.048)	(0.052)	(0.054)
Common language$_{c,c'}$	0.229***	0.192***	0.223***		0.214***	0.209***	0.233***	0.173**
	(0.077)	(0.069)	(0.074)		(0.076)	(0.075)	(0.083)	(0.085)
Common colonial history$_{c,c'}$	1.209***	0.943***	1.222***		1.159***	1.133***	1.187***	1.278***
	(0.230)	(0.289)	(0.217)		(0.243)	(0.230)	(0.230)	(0.284)
Common religion$_{c,c'}$	-0.054	-0.016	-0.071		-0.054	-0.053	-0.094	-0.062
	(0.161)	(0.125)	(0.160)		(0.161)	(0.160)	(0.164)	(0.176)
Contiguity$_{c,c'}$	-0.129	-0.150	-0.119		-0.119	-0.097	-0.113	-0.041
	(0.151)	(0.100)	(0.145)		(0.149)	(0.151)	(0.152)	(0.163)
Source country's geopolitical distance to others$_{c,c',t-1}$		5.047***						
		(0.482)						
Geopolitical distance$_{c,c',t-1}$ x Institutional quality$_{c,t-1}$			0.651***					
			(0.116)					
Bilateral trade$_{c,c',t-1}$				6.634***				
				(1.154)				
Source country x month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recipient country x month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	430,805	429,410	415,976	412,793	430,805	412,936	410,514	358,309

B) Dependent variable:	Cross-border portfolio bond allocation: $X_{c,c',t}$							
Specification:	Baseline	Source country's geopol. distance to others	Geopol. distance x Inst. quality	Bilateral trade	Häge's (2011) π	Bailey et al.'s (2017) IPD	Excluding US from source countries	Excluding IFC from source countries
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Geopolitical distance$_{c,c',t-1}$	-0.866***	-0.102	-3.481***	-1.319***	-0.731***	-0.326***	-0.952***	-0.820***
	(0.193)	(0.196)	(0.785)	(0.219)	(0.162)	(0.068)	(0.223)	(0.204)
Distance$_{c,c'}$	-0.384***	-0.335***	-0.399***		-0.349***	-0.381***	-0.397***	-0.322***
	(0.043)	(0.042)	(0.041)		(0.047)	(0.042)	(0.048)	(0.047)
Common language$_{c,c'}$	0.255***	0.218**	0.256***		0.227**	0.225**	0.302***	0.075
	(0.093)	(0.089)	(0.092)		(0.090)	(0.092)	(0.103)	(0.093)
Common colonial history$_{c,c'}$	0.816**	0.620**	0.884**		0.699*	0.760**	0.788**	1.391**
	(0.355)	(0.270)	(0.349)		(0.360)	(0.367)	(0.353)	(0.565)
Common religion$_{c,c'}$	0.344**	0.299**	0.313**		0.344**	0.332**	0.309**	0.415**
	(0.148)	(0.131)	(0.147)		(0.147)	(0.149)	(0.150)	(0.165)
Contiguity$_{c,c'}$	-0.208*	-0.284***	-0.199*		-0.168	-0.168	-0.211*	-0.011
	(0.121)	(0.102)	(0.118)		(0.118)	(0.122)	(0.126)	(0.127)
Source country's geopolitical distance to others$_{c,c',t-1}$		5.737***						
		(0.754)						
Geopolitical distance$_{c,c',t-1}$ x Institutional quality$_{c,t-1}$			0.440***					
			(0.123)					
Bilateral trade$_{c,c',t-1}$				8.883***				
				(1.060)				
Source country x month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recipient country x month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	405,499	404,370	384,232	383,675	405,499	385,435	385,238	336,140

Notes. Panels A and B show regression results for cross-border equity and bond portfolio allocation of investment funds, respectively. The dependent variable is the share of recipient country *c* in the total cross-border portfolio allocation of investment funds domiciled in country *c'* at time *t*. The model is estimated by Poisson Pseudo Maximum Likelihood. The geopolitical distance is the Signorino and Ritter's (1999) *S* measure. "AE" and "EMDE" denote advanced economy and emerging market and developing economy, respectively; IFC denotes international financial center; the list of countries included in the regressions and their classification into AE, EMDE, and IFC are presented in Appendix I. "FE" denotes fixed effects and "Yes" indicates that they are included in the specification. Source country's geopolitical distance to others$_{c,c',t-1}$ is calculated using the geopolitical distance measure *S* of Signorino and Ritter (1999). Standard errors are clustered at source-recipient country and shown in parentheses; significance at the 1, 5, and 10 percent levels is denoted by ***,**, and *, respectively.

Table 4. Instrumental Variable Estimation

A) Dependent variable:	Geopolitical Distance (first stage)							
Specification:	Hegre, Oneal and Russett (2010)'s instruments	Excluding capital controls and expected growth	Baseline	Source country's geopol. distance to others	Institutional quality	Bilateral trade	Häge's (2011) π	Bailey et al.'s (2017) IPD
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log capabilities of the larger economy$_{c,c',t}$	0.075***	0.006						
	(0.006)	(0.010)						
Larger economy's share of total capabilities$_{c,c',t}$	-0.263***	-0.057						
	(0.037)	(0.042)						
Capital inflow controls (higher within the dyad)$_{c,c',t}$	0.065**							
	(0.029)							
Expected Real GDP Growth (lower within the dyad)$_{c,c',t}$	0.019**							
	(0.007)							
Democracy score (lower within the dyad)$_{c,c',t}$	-0.199***	-0.540***	-0.383***	-0.374***	1.149***	-0.420***	-0.716***	-1.349***
	(0.025)	(0.068)	(0.029)	(0.029)	(0.112)	(0.031)	(0.052)	(0.096)
Democracy score (higher within the dyad)$_{c,c',t}$	0.669***							
	(0.069)							
Distance$_{c,c'}$	0.069***	0.017**	0.054***	0.049***	0.037***		0.125***	0.172***
	(0.010)	(0.007)	(0.006)	(0.006)	(0.005)		(0.009)	(0.018)
Common language$_{c,c'}$	0.238***	0.031**	0.018**	0.021**	0.017*		-0.006	0.035
	(0.029)	(0.014)	(0.009)	(0.009)	(0.009)		(0.013)	(0.028)
Common colonial history$_{c,c'}$	-0.025	-0.115**	-0.136***	-0.135***	-0.077**		-0.301***	-0.526***
	(0.161)	(0.051)	(0.028)	(0.029)	(0.031)		(0.045)	(0.089)
Common religion$_{c,c'}$	0.040	0.006	0.017*	0.017*	0.016*		0.020	0.056**
	(0.030)	(0.014)	(0.009)	(0.009)	(0.009)		(0.015)	(0.028)
Contiguity$_{c,c'}$	-0.135*	-0.095	0.010	0.013	-0.004		0.054**	0.064
	(0.076)	(0.061)	(0.018)	(0.017)	(0.018)		(0.024)	(0.049)
Source country's geopolitical distance to others$_{c,c',t}$				-0.794***				
				(0.214)				
Democracy score (lower within the dyad)$_{c,c',t}$ x Institutional quality$_{c,t-1}$					-0.261***			
					(0.018)			
Bilateral trade$_{c,c',t-1}$						-1.392***		
						(0.329)		
Time FE	Yes	--	--	--	--	--	--	--
Source country x month FE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recipient country x month FE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	56,786	134,767	442,851	430,669	363,084	382,915	442,851	441,494
R squared	0.404	0.896	0.833	0.837	0.862	0.837	0.837	0.821

B) Dependent variable:	Cross-border equity allocation: $X_{c,c',t}$ (second stage, instrumental variable)							
Specification:	Baseline	Source country's geopol. distance to others	Geopol. distance x Inst. quality	Bilateral trade	Häge's (2011) π	Bailey et al.'s (2017) IPD	Excluding US from source countries	Excluding IFC from source countries
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Geopolitical distance (instrumented)$_{c,c',t}$	-2.218**	-0.999	-8.615*	-3.033***	-1.188**	-0.631**	-2.192***	-3.297***
	(1.072)	(0.971)	(4.416)	(1.031)	(0.578)	(0.303)	(1.115)	(1.009)
Distance$_{c,c'}$	-0.243***	-0.209***	-0.269***		-0.214**	-0.254***	-0.243**	-0.222
	(0.085)	(0.075)	(0.060)		(0.096)	(0.079)	(0.099)	(0.843)
Common language$_{c,c'}$	0.222***	0.158**	0.198**		0.174**	0.204***	0.197**	0.184**
	(0.080)	(0.073)	(0.077)		(0.083)	(0.079)	(0.086)	(0.088)
Common colonial history$_{c,c'}$	1.166	0.763	1.058**		1.110**	1.137**	1.159**	1.103***
	(1.029)	(0.563)	(0.451)		(0.562)	(0.551)	(0.543)	(0.396)
Common religion$_{c,c'}$	0.093*	0.089	0.050		0.079	0.090	0.069	0.049
	(0.049)	(0.149)	(0.174)		(0.176)	(0.175)	(0.179)	(0.198)
Contiguity$_{c,c'}$	-0.235	-0.214*	-0.219		-0.193	-0.217	-0.200	-0.144
	(0.142)	(0.119)	(0.135)		(0.144)	(0.141)	(0.151)	(0.158)
Source country's geopolitical distance to others$_{c,c',t}$		3.963***						
		(1.537)						
Geopolitical distance (instrumented)$_{c,c',t}$ x Institutional quality$_{c,t-1}$			0.986					
			(0.616)					
Bilateral trade$_{c,c',t-1}$				2.158				
				(2.390)				
Source country x month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recipient country x month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	329,443	324,949	318,129	328,155	329,443	328,878	312,005	268,193

Table 4. Instrumental Variable Estimation (continued)

C) Dependent variable:	Cross-border bond allocation: $X_{c,c',t}$ (second stage, instrumental variable)							
Specification:	Baseline	Source country's geopol. distance to others	Geopol. distance x Inst. quality	Bilateral trade	Häge's (2011) π	Bailey et al.'s (2017) IPD	Excluding US from source countries	Excluding IFC from source countries
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Geopolitical distance (instrumented)$_{c,c',t}$	-3.160**	-2.529***	-10.445**	-3.711***	-1.692**	-0.898**	-3.235**	-5.987***
	(1.424)	(0.974)	(4.975)	(1.257)	(0.765)	(0.403)	(1.468)	(1.532)
Distance$_{c,c'}$	-0.230**	-0.156*	-0.207***		-0.189	-0.247***	-0.222*	-0.036
	(0.099)	(0.078)	(0.069)		(0.115)	(0.091)	(0.118)	(0.095)
Common language$_{c,c'}$	0.277***	0.246**	0.246***		0.209**	0.25***	0.291***	0.142
	(0.102)	(0.098)	(0.092)		(0.093)	(0.096)	(0.110)	(0.113)
Common colonial history$_{c,c'}$	0.288	0.132	0.125		0.208	0.246	0.316	1.657*
	(0.793)	(0.469)	(0.677)		(0.816)	(0.803)	(0.791)	(0.867)
Common religion$_{c,c'}$	0.359**	0.288*	0.317*		0.339**	0.356**	0.339*	0.388*
	(0.173)	(0.167)	(0.171)		(0.169)	(0.172)	(0.182)	(0.207)
Contiguity$_{c,c'}$	-0.189	-0.277**	-0.125		-0.129	-0.162	-0.153	0.047
	(0.136)	(0.133)	(0.134)		(0.131)	(0.131)	(0.145)	(0.176)
Source country's geopolitical distance to others$_{c,c',t}$		4.325*						
		(2.615)						
Geopolitical distance (instrumented)$_{c,c',t}$ x Institutional quality$_{c,t-1}$			1.064					
			(0.652)					
Bilateral trade$_{c,c',t-1}$				4.286				
				(2.887)				
Source country x month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recipient country x month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	286,924	284,210	275,628	285,935	286,924	286,924	270,521	232,434

Notes. Panel A shows first-stage instrumental variables regression results, where the dependent variable is the baseline Signorino and Ritter's (1999) *S* measure of bilateral geopolitical distance. Panels B and C show second-stage instrumental variables regression results for cross-border equity and bond allocation of investment funds, respectively, where the dependent variable is the share of recipient country *c* in the total cross-border portfolio allocation of investment funds domiciled in country *c'* at time *t*. The second-stage regressions are estimated by Poisson Pseudo Maximum Likelihood. "FE" denotes fixed effects and "Yes" indicates that they are included in the specification. Bootstrap standard errors are shown in parentheses; significance at the 1, 5, and 10 percent levels is denoted by ***,**, and *, respectively.

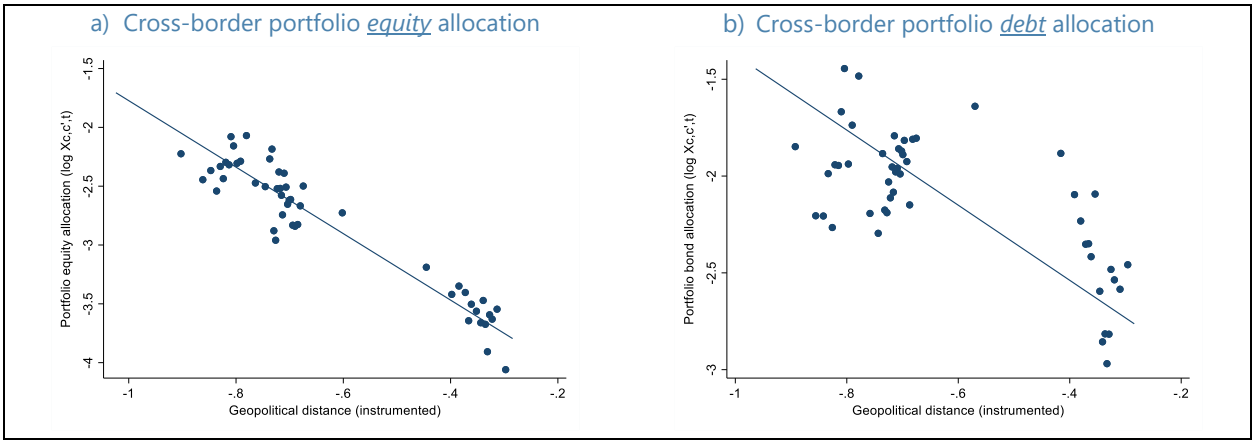
Table 5. Control Function Estimation (second stage)

A) Dependent variable:	Cross-border equity allocation: $X_{c,c',t}$ (second stage, control function)							
Specification:	Baseline	Source country's geopol. distance to others	Geopol. distance x Inst. quality	Bilateral trade	Häge's (2011) π	Bailey et al.'s (2017) IPD	Excluding US from source countries	Excluding IFC from source countries
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Geopolitical distance$_{c,c',t}$	-2.052**	-0.997	-4.403***	-2.650***	-1.130**	-0.592**	-2.022**	-2.994***
	(0.963)	(0.998)	(0.677)	(0.933)	(0.531)	(0.264)	(1.009)	(0.986)
Distance$_{c,c'}$	-0.249***	-0.207**	-0.297		-0.241***	-0.276***	-0.254**	-0.231**
	(0.084)	(0.078)	(0.623)		(0.093)	(0.078)	(0.099)	(0.088)
Common language$_{c,c'}$	0.202***	0.160**	0.204***		0.173**	0.181**	0.199**	0.162*
	(0.078)	(0.073)	(0.074)		(0.079)	(0.077)	(0.084)	(0.085)
Common colonial history$_{c,c'}$	1.054**	0.770	1.071***		1.018**	1.017**	1.042**	1.028***
	(0.460)	(0.585)	(0.338)		(0.488)	(0.446)	(0.457)	(0.355)
Common religion$_{c,c'}$	0.089	0.089	0.050		0.081	0.075	0.069	0.076
	(0.176)	(0.148)	(0.175)		(0.175)	(0.174)	(0.182)	(0.199)
Contiguity$_{c,c'}$	-0.249*	-0.212*	-0.249*		-0.227	-0.221	-0.231	-0.172
	(0.136)	(0.119)	(0.126)		(0.138)	(0.135)	(0.147)	(0.152)
Source country's geopolitical distance to others$_{c,c',t}$		4.007***						
		(1.555)						
Geopolitical distance$_{c,c',t}$ x Institutional quality$_{c,t-1}$			0.453***					
			(0.098)					
Bilateral trade$_{c,c',t-1}$				2.867				
				(2.445)				
$\hat{\epsilon}_{c,c',t}$	1.198	1.111	-0.884	1.308	0.519	0.267	1.164	2.255**
	(1.045)	(1.089)	(1.443)	(1.108)	(0.573)	(0.289)	(1.107)	(1.050)
$\hat{\epsilon}_{c,c',t}$ x Institutional quality$_{c,t-1}$			0.264					
			(0.231)					
Source country x month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recipient country x month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	329,443	324,949	318,129	328,155	329,443	328,878	312,005	268,193

B) Dependent variable:	Cross-border bond allocation: $X_{c,c',t}$ (second stage, control function)							
Specification:	Baseline	Source country's geopol. distance to others	Geopol. distance x Inst. quality	Bilateral trade	Häge's (2011) π	Bailey et al.'s (2017) IPD	Excluding US from source countries	Excluding IFC from source countries
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Geopolitical distance$_{c,c',t}$	-3.161**	-2.496**	-4.798***	-3.526***	-1.738**	-0.904**	-3.264**	-5.767***
	(1.314)	(0.993)	(1.021)	(1.151)	(0.710)	(0.369)	(1.351)	(1.506)
Distance$_{c,c'}$	-0.215**	-0.157*	-0.253***		-0.177	-0.242***	-0.203*	-0.038
	(0.093)	(0.081)	(0.062)		(0.108)	(0.085)	(0.114)	(0.096)
Common language$_{c,c'}$	0.268***	0.251***	0.253***		0.194**	0.227**	0.283***	0.119
	(0.100)	(0.097)	(0.091)		(0.092)	(0.094)	(0.108)	(0.112)
Common colonial history$_{c,c'}$	0.261	0.131	0.437		0.191	0.219	0.277	1.501*
	(0.721)	(0.486)	(0.581)		(0.737)	(0.722)	(0.714)	(0.846)
Common religion$_{c,c'}$	0.353**	0.287*	0.305*		0.339**	0.340**	0.342*	0.400*
	(0.172)	(0.166)	(0.172)		(0.169)	(0.171)	(0.183)	(0.205)
Contiguity$_{c,c'}$	-0.184	-0.285**	-0.135		-0.111	-0.142	-0.151	0.042
	(0.137)	(0.134)	(0.125)		(0.126)	(0.129)	(0.144)	(0.175)
Source country's geopolitical distance to others$_{c,c',t}$		4.502*						
		(2.594)						
Geopolitical distance$_{c,c',t}$ x Institutional quality$_{c,t-1}$			0.328***					
			(0.113)					
Bilateral trade$_{c,c',t-1}$				4.306				
				(2.905)				
$\hat{\epsilon}_{c,c',t}$	2.492*	2.743**	-0.610	2.477**	1.173	0.639*	2.539*	5.201***
	(1.348)	(1.081)	(2.045)	(1.214)	(0.720)	(0.377)	(1.397)	(1.626)
$\hat{\epsilon}_{c,c',t}$ x Institutional quality$_{c,t-1}$			0.499					
			(0.309)					
Source country x month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recipient country x month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	286,924	284,210	275,628	285,935	286,924	286,924	270,521	232,434

Notes. Panels A and B show second-stage regression results for cross-border equity and bond allocation of investment funds, respectively; the dependent variable is the share of recipient country *c* in the total cross-border portfolio allocation of investment funds domiciled in country *c'* at time *t*. The regressions are estimated by the control function method and $\hat{\epsilon}_{c,c',t}$ denotes the residual of the first stage regression. "FE" denotes fixed effects and "Yes" indicates that they are included in the specification. Bootstrap standard errors are shown in parentheses; significance at the 1, 5, and 10 percent levels is denoted by ***,**, and *, respectively.

Figure 1. Binned Scatter Plots



Notes. This Figure shows covariate adjusted binscatter plots implemented using the semi-linear least squares estimation with robust inference (Cattaneo, Crump, Farrell and Feng, 2024, and Cattaneo, Crump, Farrell and Feng 2023). Panels a and b show plots of cross-border portfolio equity and bond allocation ($log\ X_{c,c',t}$) against $Geopolitical\ distance\ (instrumented)_{c,c',t}$ based on an instrumental variables estimation where $Democracy\ score\ (lower\ within\ the\ dyad)_{c,c',t}$ is used as an instrument, and the controls include the gravity variables as well as source- and recipient-country time fixed effects.

Appendix 1. Data Sources and Transformations

Variable	Description	Source	Frequency (highest)
Cross-border portfolio allocation			
Equity (percent) $X_{c,c',t}$ Bond (percent) $X_{c,c',t}$	Share of recipient country *c* in the total cross-border portfolio allocation of investment funds domiciled in country *c'* at time *t*.	EPFR Global.	Monthly
Geopolitical distance			
Baseline: Signorino and Ritter's (1999) $S_{c,c',t}$ Häge's (2011) $\pi_{c,c',t}$ Bailey et al.'s (2017) $IPD_{c,c',t}$	Foreign policy disagreement based on countries' voting behavior in the UN General Assembly. For further details, see the main text in Appendix I below.	Signorino and Ritter (1999); Häge (2011); Bailey et al. (2017).	Annual
Gravity controls			
$Distance_{c,c'}$	(Log of) geographical distance (in kilometers) between the most populated city of each country.	CEPII Gravity database (Conte, Cotterlaz and Mayer, 2022).	NA
Common $language_{c,c'}$	Dummy variable that takes the value 1 if the countries share a common language (spoken by at least 9 percent of the population), and 0 otherwise.		
Common colonial $history_{c,c'}$	Dummy variable that takes the value 1 if the countries share a common colonizer after 1945, and 0 otherwise.		
Common $religion_{c,c'}$	Religious proximity index bounded between 0 and 1 that increases when the countries share a common religion practised by large shares of their populations.		
$Contiguity_{c,c'}$	Dummy variable that takes the value 1 if the countries share a common border, and 0 otherwise.		
Other controls			
Bilateral $trade_{c,c',t}$	Imports plus exports divided by the square root of the product of countries' nominal GDPs.	IMF Direction of Trade Statistics and IMF WEO.	Annual
Lender's distance to $others_{c,c',t}$	Average geopolitical distance of source country *c'* to other recipient countries (excluding *c*), weighted by portfolio allocation values.		Annual
Institutional quality (of recipient $country)_{c,t}$	Average of International Country Risk Guide Indicators.	The International Country Risk Guide Database.	Monthly
Instrumental variables			
Log capabilities of the larger $economy_{c,c',t}$	See "Correlates of War" database.	Correlates of War and IMF WEO.	Annual
Larger economy's share of total $capabilities_{c,c',t}$			Annual
Capital inflow controls (higher within the $dyad)_{c,c',t}$			Annual
Expected real GDP growth (lower within the $dyad)_{c,c',t}$			Annual
Democracy score (lower within the $dyad)_{c,c',t}$			Annual
Democracy score (higher within the $dyad)_{c,c',t}$			Annual
Bilateral arms trade	The total volume of bilateral arms trade (imports plus exports) normalized by the geometric mean of the GDP of the source and recipient country.	UN COMTRADE and IMF WEO	Annual

List of countries included.

Equity

Source countries. **AE (32)**: Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States. **EMDE (19)**: Bahamas, Bahrain, Brazil, Bulgaria, Chile, China, Colombia, India, Indonesia, Malaysia, Mauritius, Mexico, Poland, Romania, Russia, South Africa, Thailand, Turkey, United Arab Emirates.

Recipient countries. **AE (31)**: Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States. **EMDE (75)**: Angola, Argentina, Bahrain, Bangladesh, Belarus, Bolivia, Botswana, Brazil, Bulgaria, Cambodia, Chile, China, Colombia, Costa Rica, Croatia, Côte d'Ivoire, Dominican Republic, Ecuador, Egypt, El Salvador, Georgia, Ghana, Guatemala, Hungary, India, Indonesia, Iran, Iraq, Jordan, Kazakhstan, Kenya, Kuwait, Lebanon, Liberia, Madagascar, Malawi, Malaysia, Mauritius, Mexico, Mongolia, Morocco, Mozambique, Myanmar, Namibia, Nepal, Nigeria, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Qatar, Romania, Russia, Rwanda, Saudi Arabia, South Africa, Sri Lanka, Swaziland, Tanzania, Thailand, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, United Arab Emirates, Uruguay, Venezuela, Vietnam, Zambia, Zimbabwe.

Bond

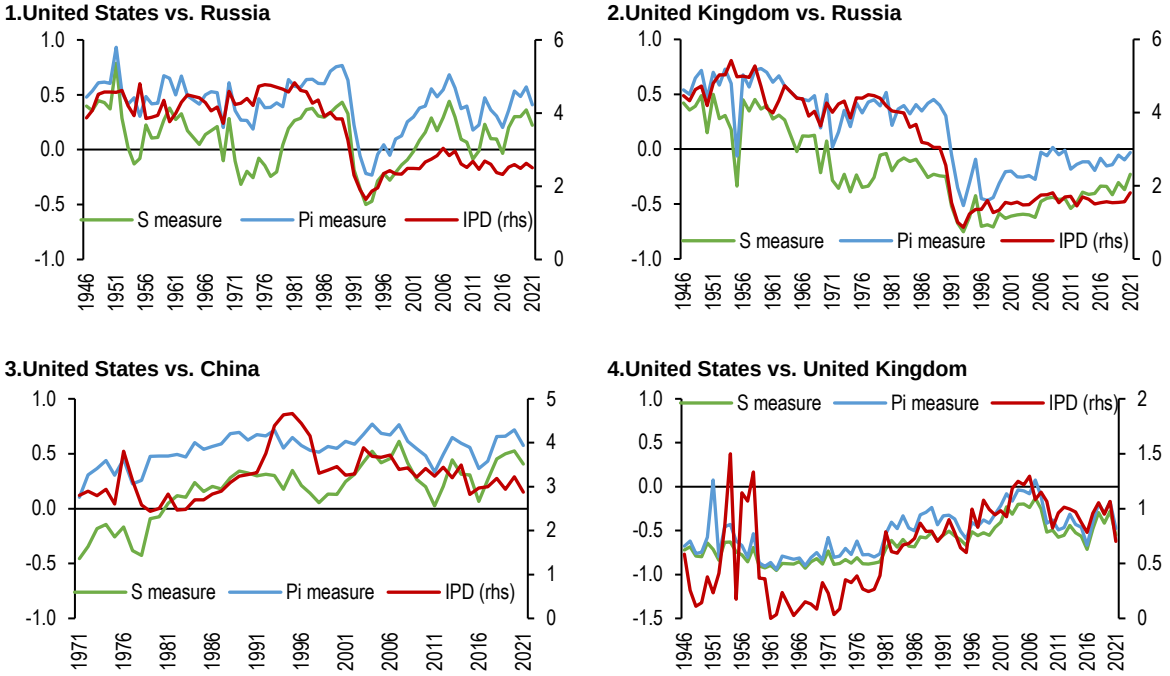
Source countries. **AE (29)**: Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States. **EMDE (14)**: Bahamas, Brazil, Bulgaria, Chile, Hungary, India, Malaysia, Mauritius, Poland, Romania, Russia, South Africa, Thailand, Turkey.

Recipient countries. **AE (31)**: Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States. **EMDE (86)**: Albania, Algeria, Angola, Argentina, Armenia, Azerbaijan, Bahrain, Bangladesh, Belarus, Bolivia, Bosnia Herzegovina, Botswana, Brazil, Bulgaria, Cambodia, Chile, China, Colombia, Costa Rica, Croatia, Côte d'Ivoire, Republic of the Congo, Dominican Republic, Ecuador, Egypt, El Salvador, Eswatini, Ethiopia, Gabon, Georgia, Ghana, Guatemala, Honduras, Hungary, India, Indonesia, Iran, Iraq, Jamaica, Jordan, Kazakhstan, Kenya, Kuwait, Lebanon, Liberia, Malaysia, Mauritius, Mexico, Moldova, Mongolia, Morocco, Mozambique, Namibia, Nicaragua, Nigeria, North Macedonia, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Qatar, Romania, Russia, Rwanda, Saudi Arabia, South Africa, Sri Lanka, Suriname, Tajikistan, Tanzania, Thailand, Trinidad and Tobago, Tunisia, Turkey, Uganda, Ukraine, United Arab Emirates, Uruguay, Uzbekistan, Venezuela, Vietnam, Zambia.

International financial centers

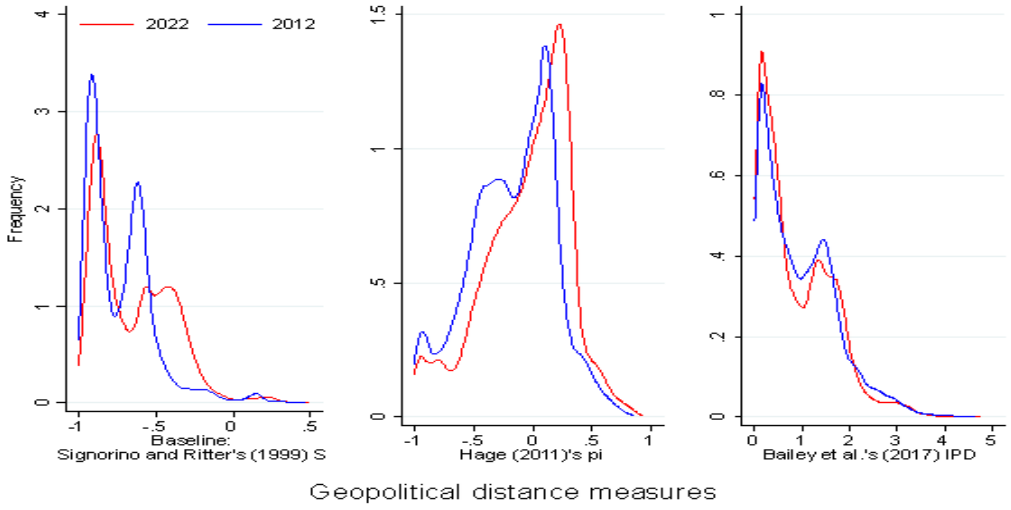
These include Ireland, Luxembourg, Netherlands, and Singapore. Note that other known international financial centers, such as Bermuda, British Virgin Islands, Cayman Islands, and Hong Kong SAR are not included as source countries in the regressions.

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).

Figure A2. Distribution of Geopolitical Distance Measures across Countries (Years 2012 and 2022)



Appendix 2. Additional Regression Results

Table A1. Baseline Regressions with Annual Frequency Data based on Control Function and Instrumental Variable Methods (second stage)

Dependent variable:	Cross-border equity allocation: $X_{c,c',t}$ (second stage)		Cross-border bond allocation: $X_{c,c',t}$ (second stage)	
Specification:	Control function	Instrumental variable	Control Function	Instrumental variable
	(1)	(2)	(3)	(4)
Geopolitical distance$_{c,c',t}$	-2.204**	-2.415**	-2.907**	-2.895**
	(0.940)	(1.046)	(1.277)	(1.388)
Distance$_{c,c'}$	-0.231***	-0.217**	-0.227**	-0.240**
	(0.085)	(0.086)	(0.095)	(0.101)
Common language$_{c,c'}$	0.209***	0.228***	0.256**	0.263**
	(0.078)	(0.080)	(0.101)	(0.103)
Common colonial history$_{c,c'}$	1.072**	1.198**	0.340	0.381
	(0.454)	(0.540)	(0.679)	(0.748)
Common religion$_{c,c'}$	0.098	0.112	0.333*	0.338**
	(0.180)	(0.182)	(0.171)	(0.172)
Contiguity$_{c,c'}$	-0.229*	-0.211	-0.174	-0.178
	(0.133)	(0.140)	(0.135)	(0.134)
$\hat{\varepsilon}_{c,c',t}$	1.294		2.215*	
	(1.019)		(1.310)	
Source country x month FE	Yes	Yes	Yes	Yes
Recipient country x month FE	Yes	Yes	Yes	Yes
Observations	28,295	28,295	25,339	25,339

Notes. Columns (1) to (2) and (3) to (4) show regression results for cross-border equity and bond portfolio allocation of investment funds, respectively. The dependent variable is the share of recipient country c in the total cross-border portfolio allocation of investment funds domiciled in source country c' at time t. The model is estimated by Poisson Pseudo Maximum Likelihood. Columns (1) and (3) are based on control function methods, while column (2) and (4) are based on two-stages least squared methods, both of which uses democracy score as instrumental variable. The geopolitical distance is the Signorino and Ritter's (1999) S measure. $\hat{\varepsilon}_{c,c',t}$ represents the residual of the first stage regression in the control function method. "FE" denotes fixed effects and "Yes" indicates that they are included in the specification. Bootstrap standard errors are shown in parentheses; significance at the 1, 5, and 10 percent levels is denoted by ***,**, and *, respectively.

Table A2. Baseline Regressions with an Alternative Instrument: Bilateral Arms Trade

Dependent Variable:	Cross-border equity allocation: $X_{c,c';t}$				Cross-border bond allocation: $X_{c,c';t}$		
Specification:	Baseline	Häge's (2011) π	Bailey et al.'s (2017) IPD	1st Stage	Baseline	Häge's (2011) π	Bailey et al.'s (2017) IPD
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Geopolitical distance (instrumented)$_{c,c';t}$	-7.710*	-4.324**	-3.173†		-6.630†	-3.115*	-2.464
	(4.418)	(1.882)	(2.169)		(4.572)	(1.859)	(2.182)
Bilateral Arms Trade$_{c,c';t}$				-0.007***			
				(0.002)			
Distance$_{c,c'}$	0.004	0.067	0.033	0.038***	0.064	0.040	0.150
	(0.206)	(1.172)	(0.246)	(0.008)	(0.219)	(0.174)	(0.257)
Common language$_{c,c'}$	0.192	0.055	0.091	0.009	0.268†	0.191†	0.237
	(0.166)	(0.121)	(0.210)	(0.016)	(0.174)	(0.122)	(0.208)
Common colonial history$_{c,c'}$	0.187	0.075	-0.372	-0.183	0.395	0.298	-0.044
	(1.506)	(1.352)	(1.950)	(0.136)	(1.709)	(1.462)	(2.197)
Common religion$_{c,c'}$	0.076	0.151	0.097	0.002	-0.018	-0.077	-0.057
	(0.235)	(0.214)	(0.250)	(0.013)	(0.219)	(0.195)	(0.243)
Contiguity$_{c,c'}$	0.083	0.166	0.140	0.007	0.106	0.127	0.198
	(0.209)	(0.236)	(0.236)	(0.015)	(0.178)	(0.155)	(0.209)
Source country x month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recipient country x month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	142,871	142,871	142,687	161,921	322,641	322,641	322,052
R-squared				0.868			

Notes. Columns (1) to (3) and (5) to (7) show baseline regression results for cross-border equity and bond portfolio allocation of investment funds, respectively, estimated with Poisson Pseudo Maximum Likelihood, where the instrument is bilateral arms trade (the total volume of bilateral arms trade normalized by the geometric mean of the GDP of the source and recipient countries). Columns (4) and (8) show the first stage regressions based on the baseline geopolitical distance measure (S measure), and the results are similar for other geopolitical distance measures (the instrument continues to be relevant/significant if one uses alternative geopolitical distance measures). "FE" denotes fixed effects and "Yes" indicates that they are included in the specification. Bootstrap standard errors are shown in parentheses; significance at the 15,10, 5, and 1 percent levels is denoted by †, ***,**, and *, respectively.

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