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BILATERAL CAPITAL FLOWS: GRAVITY, PUSH, AND PULL

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Abstract

Using bilateral capital flows data from 10 advanced reporting economies—with over 186 bilateral country pairs—for 2000 to 2016, this paper provides strong evidence on the significance of gravity factors, including distance and bilateral trade ties, in explaining cross-border financial asset flows. This finding is new to the capital flows literature that consider push and pull factors. In addition, this study offers new evidence of regional contagion as bilateral capital flows decrease more for country pairs with closer geographic proximity (or with less information frictions) than those that are farther apart when global risk aversion rises. These findings have policy implications on the importance of information frictions, bilateral trade ties, and regional cooperation on bilateral financial asset flows.

Keywords: Bilateral Capital Flows, Gravity Factors, Global and Domestic Factors

JEL Classification: F21, F36, G10

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BILATERAL CAPITAL FLOWS: GRAVITY, PUSH, AND PULL

By

Rogelio V. Mercado, Jr.

1. Introduction

The asset trade literature informs us that information frictions and economic ties are highly relevant in explaining cross-border capital flows and asset holdings. The seminal works of Portes, Rey and Oh (2001), and Portes and Rey (2005) on bilateral portfolio flows; and Aviat and Coeurdacier (2007), Buch (2005), and Lane and Milesi-Ferretti (2005a and 2005b) on bilateral portfolio and bank holdings provide both theoretical and empirical support on the significance of information frictions and economies ties on cross-border investments. Specifically, Portes, Rey and Oh (2001) and Portes and Rey (2005) suggested that distance is a proxy for information frictions or asymmetries. They argue that countries close to one another transact more through direct interaction such as business ties, frequent travels, media coverage, and language familiarity; than those farther apart. In contrast, Coeurdacier (2009), Lane and Milesi-Ferretti (2005a), Rose and Spiegel (2002) and Rose (2005) provided theoretical justification on why economies with stronger economic ties, proxied by bilateral trade, have greater bilateral asset transactions and holdings. Consequently, voluminous papers show empirical support on the role of information frictions and trade ties on bilateral capital flows.[1]

But standard capital flows literature points to the relevance of global (push) and domestic (pull) factors as the key determinants of capital flows size, volatilities, and occurrence of extreme episodes. To some extent, contagion factors are considered like geographic location, trade ties and financial openness (Forbes and Warnock, 2012; and Ghosh et al., 2014). Yet none of the empirical papers consider the role of information frictions and economic ties, alongside push and pull factors, due to lack of bilateral capital flows data that reflect aggregate bilateral flows as opposed to those who used specific types. This, then, raises the question: *if asset trade literature provides support on the importance of gravity factors on specific types of bilateral flows, are capital flows also driven by gravity factors aside from push and pull factors*?[2] Providing robust evidence is the principal task of this paper.

[1] Refer to Section 2 for detailed empirical literature review on the role of gravity factors on bilateral *capital flows*.

[2] In this paper, economic ties (proxied by bilateral imports) are considered as gravity factors as they reflect weaker "multilateral resistance", in line with Okawa and van Wincoop (2012). On the contrary, greater distance strengthens "multilateral resistance" due to stronger information frictions or asymmetries.

But considering gravity factors, alongside push and pull factors, warrants justification. First, using bilateral capital flows data will extract partner domestic factors from global factors, more so if data is available for large advanced economies whose domestic policies affect global financial markets. This ensures that global factors are capturing *truly* global factors and not domestic conditions of large partner economies. Second, more importantly, bilateral capital flows allow us to examine the importance of information frictions, financial centres, and economic ties which segments financial markets. This has profound policy implications as it adds another layer on the extent of domestic policy levers. Consider a case of an emerging economy pursuing a more open economic policy. Existing capital flows literature using push and pull framework will point to the importance of economic fundamentals and structural reforms that will promote good governance, capital openness, and financial depth. But if information frictions segment international financial markets, policy design will leave out the importance of encouraging information flows which could counter information frictions. Moreover, if bilateral capital flows are responsive to bilateral economic ties, then stronger trade ties should be considered as another means of attracting larger bilateral capital flows. For these reasons, examining the importance of gravity factors with the usual push and pull factors is warranted.

By using bilateral capital flows data, this paper complements existing literature in several ways. First, it extends our understanding of the determinants of size or magnitude of capital flows by considering gravity factors; whereas previous papers consider only push and pull factors. Second, it also contributes to the asset trade literature by providing evidence of financial market segmentation at the aggregated bilateral level; in contrast to other papers which offer strong evidence using specific types of flows. Furthermore, although existing studies using one type of bilateral flows can offer granular analysis, they leave out investor portfolio reallocation across asset types and so we might miss the overall aggregate bilateral trends which are very important for economic outcomes such as exchange rate fluctuations.[3] Third, it provides new insight on how capital flows behave when global uncertainty rises at given levels of distance (or information frictions). This offers another view on regional contagion; in contrast to other papers which used dummy variables on regional groupings to capture contagion effects. By interacting bilateral distance and a measure of global risk aversion, we can assess whether the decline of bilateral capital flows given an increase in global risk uncertainty, varies across distance. *Do bilateral flows decrease more when global uncertainty rises the farther country pairs are?* Put differently, *do gravity factors, such as information frictions, exacerbate the negative impact of an increase in global risk on bilateral capital flows*? This is the second question this paper asks.

[3] Consider a sudden move from bank borrowing to bond issuance (or vice versa), an increase in one and a decrease in the other are captured in bank and securities level data. But this scenario might cancel out in an aggregate bilateral level, and so a bilateral surge at a granular level does not inform us of the overall pattern in capital flows.

To address these questions, we proceed as follows. We use bilateral capital flows data from Balance of Payments Statistics of 10 reporting advanced economies, including Austria, Canada, Denmark, Germany, Japan, Korea, Netherlands, New Zealand, Spain and United States. The data set covers 2000-2016 and includes 186 bilateral country pairs composing of advanced reporter and advanced partner; and advanced reporter and emerging partner economies.[4] We exclude a large financial centre (United Kingdom) and offshore financial centres (Bermuda, British Virgin Islands, Cayman Islands, Channel Islands, Cook Islands, Cyprus, and Netherlands Antilles) from the data set as bilateral capital flows to these partner economies might be determined by other factors that have nothing to do with gravity, push or pull factors. We assemble data for bilateral financial asset flows along with its component flows including direct, portfolio, other assets, financial derivatives and reserve assets. Although we also compile data on bilateral financial liabilities, our focus is on bilateral financial asset flows to examine bilateral asset flows of advanced economies. The bilateral capital flows data pertains to domestic resident financial asset flows with its partner economy, whose value can be positive and negative depending on whether domestic resident of reporting economy made net purchases or sale of financial assets. We scale the bilateral flows data by reporting economy nominal GDP to contextual flows in terms of size or magnitude.

Next, we use the standard gravity equation in the asset trade literature to assess the importance of gravity factors. However, unlike Galstyan and Lane (2013), Galstyan, Lane, Mehigan, and Mercado (2016), Hellmanzik and Schmitz (2017), Lane and Milesi-Ferretti (2005a and 2005b), and Mercado (2018b), we exogenize push and pull factors by including global and reporter and partner domestic factors; and relying on time-invariant reporter and partner fixed effects to capture other unobserved heterogeneity.[5] Moreover, we use lagged values for some domestic reporter and partner variables to address reverse causality, but we assume that global factors are exogenous, and hence included in contemporaneous values in our regression specification. We run a battery of sensitivity tests including sample and period splits; decomposing bilateral asset flows into direct, portfolio, and other asset flows; and using various specifications and global, domestic, and gravity variables. Lastly, we add distance and VIX interaction term in our regression specification and assess the partial and marginal effects of an increase in global risk uncertainty on bilateral capital flows, at given levels of distance.

The results show that global factors such as global interest rate, global commodity price level, and global risk aversion are consistently significant with expected signs. Moreover, reporter and partner domestic governance and capital account openness are, likewise, significant. What is new is that gravity factors including distance, common legal origins, common language, and bilateral trade are statistically significant across various tests. But the sensitivity tests involving period splits and annual cross-sectional bilateral regressions indicate that some of the gravity factors are relevant only in certain periods or years, particularly for

[4] Refer to Appendix Table A1 for country classification of advanced and emerging partner economies.
[5] In contrast, Galstyan, Lane, Mehigan, and Mercado (2016) and Mercado (2018b) used reporter plus time fixed effects and partner plus time fixed effects to capture time-varying reporter and partner effects.

distance. In addition, by extending the analysis in the context of contagion, the findings offer evidence showing that an increase in global risk aversion has a uniform negative impact on bilateral capital flows, at different levels of distance. But the negative impact of an increase in global risk aversion on bilateral capital flows decreases with distance. This means bilateral capital flows decrease more between economies of closer geographic proximity and weaker information frictions, than those that are farther apart or with greater information asymmetries when global uncertainty rises. This new finding is highly intuitive as bilateral capital flows tend to be smaller for partner economies at greater distance, and so the negative impact of an increase in global risk is lesser.

The contribution of this paper is thus threefold. First, this paper demonstrates an application of the importance of using bilateral capital flows data. Bilateral flows data can, likewise, be applied in the context of policy, risks, and crisis transmissions and spillovers. This will enrich our understanding of the patterns and risks associated with cross-border investments. Second, the results provide strong evidence on the importance of gravity factors in determining cross-border capital flows, which has not been considered in previous studies. The relevance of gravity factors calls for policy initiatives that will improve information flows; encourage similar rules or institutional frameworks; and promote bilateral trade to attract more bilateral capital flows. These policy implications based on the empirical results in this paper have not been considered in the existing capital flows literature. Third, the findings provide new evidence showing that the negative impact of an increase in VIX on bilateral capital flows decreases with distance, suggesting that the conventional thought of expecting risk uncertainty to have more adverse effects the farther two economies are may not necessary be true in all contexts. On the contrary, the results offer additional evidence on the mechanics of regional contagion, which could be basis for greater regional cooperation and resiliency at the policy level.

This paper proceeds as follows. Section 2 provides literature review on push and pull framework and gravity factors in the context on the determinants of the magnitude of capital flows. Section 3 discusses the bilateral capital flows and presents stylized facts; while Section 4 provides the empirical specifications and data sources. The baseline results and sensitivity tests are presented in Section 5, while the last section provides concluding remarks.

2. Related Literature and Conceptual Framework

Capital flows are driven by push and pull factors.[6] Push factors are global factors which are beyond the control of domestic policy makers, while pull factors are domestic factors within the influence of policy makers. Push factors pertain to supply-side factors influencing cross-border financial transactions. In contrast, pull factors represent demand-side factors that attracts capital inflows. Existing studies on capital flows have tested the relevance of these

[6] See Koepke (2015) and Yeyati and Zuñiga (2015) on literature review on capital flows in the context of push and pull factors.

two factors in determining the magnitude and volatilities of capital inflows and their component flows; occurrence of extreme episodes such as sudden stops and surges; size of capital flows during extreme episodes, and the proportion of variance attributed to each of these factors.[7] The use of push and pull framework as an analytical tool in understanding the patterns and determinants of capital flows hinges on the policy implications of their significance. If push factors are more relevant, policy makers have little control over capital flows and hence, they must ensure domestic financial resiliency to counter the adverse consequences of huge and volatile capital inflows. On the other hand, if pull factors are more relevant, policy makers have more levers to influence the size, composition, and volatility of cross-border financial inflows. Indeed, this simple framework brings about profound policy implications.

Empirical studies provide strong evidence on the relevance of push or global factors such as global or advanced economy output growth, global or U.S. interest rate, global commodity price, and more importantly, global investor risk aversion. Strong global growth improves investor optimism leading to higher cross-border investments, while lower growth in advanced economies increases capital inflows to emerging economies due to greater growth differentials between advanced and emerging economies, which signifies higher potential returns on the latter. Low global or U.S. interest rate initiates search for higher yields and improves creditworthiness of emerging and developing economies, thereby raising cross-border flows (Fernandez-Arias, 1996; and Calvo et al., 1993). Global commodity price booms tend to channel capital flows to commodity exporting economies, more so in a low global interest rate environment (Reinhart and Reinhart, 2009). Moreover, the great financial crisis (GFC) of 2008-09 illustrates the importance of global investor risk aversion as the key determinant of retrenchment of capital flows back to crisis-stricken advanced economies (Milesi-Ferretti and Tille, 2011). But the significance of these push factors varies with country income groups (either advanced or emerging economies or both), type of capital flows (direct investment, portfolio, and/or banking flows), period coverage (long sample versus specific periods such as pre-, crisis, and post-crisis periods), and capital flows types (such as magnitude or size of gross or net inflows, volatilities of capital flows, and occurrence of extreme episodes).

More recent papers on the determinants of the *size of capital inflows* show that higher global growth is significantly correlated with higher inflows to emerging economies (Li et al., 2018), while higher global or U.S. interest rate is strongly associated with lower capital inflows

[7] Refer to Ahmed and Zlate (2014), Byrne and Fiess (2016), Fratzscher (2012), Giordani et al. (2017), Mercado and Park (2011), Milesi-Ferretti and Tille (2011), Niel, Sedik, and Mondino (2014), and Wang (2018) on empirical tests of push and pull factors on the size or magnitude of capital flows; Broto et al. (2011), Eichengreen et al. (2018), Mercado and Park (2011), and Neumann et al. (2009) on volatilities of capital flows; Calderon and Kubota (2013), Cavallo and Frankel (2008), Forbes and Warnock (2012), and Reinhart and Reinhart (2009) on the occurrence of sudden stops and/or surges; Ghosh et al. (2014), Li et al. (2018) and Mercado (2018a) on the occurrence of surges and associated magnitude of capital flows conditional on surges; Calvo et al. (1993) on global factor principal component analysis; and Cerutti et al. (2015), Chuhan et al. (1998), Puy (2016), Sarno et al. (2016), and Shirota (2015) on variance decompositions of global and domestic factors.

(Byrne and Fiess, 2016; Giordani et al., 2017; Ghosh et al., 2014; Li et al., 2018; and Mercado 2018a). Higher commodity prices tend to increase capital inflows to emerging and developing economies (Byrne and Fiess, 2016, Mercado 2018a, and Reinhart and Reinhart, 2009). In addition, greater global risk aversion leads to lower or reversals of cross-border inflows, more so during periods of financial stress (Ahmed and Zlate, 2014; Fratzscher, 2012; Ghosh et al., 2014; and Giordani et al., 2017).

Yet most studies also highlight the importance of pull or domestic factors. Strong output growth, lower macroeconomic risks (such as low domestic inflation), trade and financial openness, quality of governance, and financial depth of receiving economies are associated with *larger capital inflows*. Higher domestic growth signifies the attractiveness of an economy as investment destination due to higher potential profits (Giordani et al., 2017; and Mercado and Park, 2011). Lower or stable inflation signals macroeconomic policy stability and "*discipline effect*", while higher domestic interest rate, relative to world or foreign interest rate, relates to higher expected returns (Li et al., 2018). Trade openness lowers the probability of debt default, while financial openness tends to attract more volatile capital inflows as foreign investors can easily repatriate their investments (Byrne and Fiess, 2016; Ghosh et al., 2014; Mercado and Park, 2011; and Mercado, 2018a). Better institutional quality or governance attracts more capital inflows as foreign investors have guarantee that contracts will be honoured, and they can safely repatriate their investments (Byrne and Fiess, 2016; and Mercado and Park, 2011). Financial depth in receiving economies attracts more capital inflows as it offers more opportunities for risk-sharing and consumption smoothing; and improves financial efficiency and resilience to financial shocks.

But empirical support on the relevance of pull factors, alongside push factors, tend to be weaker and more inconclusive as compared to push or global factors. The significance of domestic factors usually depends on specific periods, country coverage, and which factors are considered. For instance, Fratzscher (2012) established that common factors such as global liquidity and risk shocks were the key factors explaining the reduction in net portfolio inflows at the peak of the great financial crisis, although domestic factors like quality of institution, country risk, and strength of fundamentals were more dominant during the recovery period.[8] This illustrates that the significance of domestic factors varies across time periods. Moreover, even studies using variance decompositions of global and domestic factors find that global factors explain the largest share of variation in capital inflows, while domestic factors explain less (Chuhan et al., 1998; Puy, 2016; and Sarno et al., 2016).

Aside from push and pull factors, several papers consider contagion as a relevant factor in determining the *magnitude of capital inflows*. The literature identifies three channels in which events affecting capital inflows in one country spillovers to another country. These include trade ties, financial linkages and country similarities (including geographic location). For

[8] Ghosh et al. (2014) offered evidence on the occurrence of surges.

example, Li et al. (2018) showed regional contagion to significantly increase portfolio inflows during surges, whereas Mercado (2018a) found that regional contagion, defined as half of economies in the region experiencing a surge episode, significantly reduces the size of gross capital inflows during surges as foreign investors might have allocated more capital flows to neighbouring economies which, likewise, are experiencing surges.

But contagion variables can be viewed as "*gravity*" factors because belonging to a geographic region entails shorter distance or closer proximity. In this context, capital inflows to economies that are closer to one another might be driven by similar push factors or might have similar pull factors which attract capital inflows at a given point in time. In the asset trade literature, Portes, Rey and Oh (2001) and Portes and Rey (2005) suggested that distance is a proxy for information frictions or asymmetries. They argue that countries close to one another transact more through direct interaction such as business ties, frequent travels, media coverage, and language familiarity. Several papers provide empirical evidence on the negative relation between distance and bilateral capital flows. Choi et al. (2014), Portes, Rey and Oh (2001); and Portes and Rey (2005) found negative covariation between bilateral portfolio equity flows and distance. Brei and von Peter (2018), Herrmann and Mihaljek (2013) and Papaioannou (2009) showed the inverse relation between bilateral bank flows using the Bank for International Settlements (BIS) Locational Statistics and distance; while di Giovanni (2005) had similar results for foreign direct investment flows using Thomson Financial data on mergers and acquisitions (M&A) and distance. In contrast, Mercado (2018b) provided robust evidence on the negative covariation between distance and various types of bilateral capital inflows and outflows. His main findings point to the importance of gravity factors and transaction costs holds at the level of bilateral capital flows, which extends previous studies in the asset trade literature which uses specific type of bilateral capital flows.

Aside from distance, information frictions also include bilateral factors such as common language, common legal origins, and colonial ties. These time-invariant factors suggest the degree of similarity between countries. Common language, legal origins, and colonial ties—which increase familiarity between country pairs—reduce information frictions, thereby increasing bilateral asset holdings and transactions. Specifically, common language fosters greater information flows as it reduces translation costs and increases access to available information. Common legal origins facilitate easier settlements and improves contract enforcement; while colonial ties increase similarities between two countries due to similar institutional set-up (Head and Ries, 2008).

Moreover, strong bilateral economic ties (such as bilateral trade and finance—which are contagion channels) increase bilateral asset transactions or capital flows. Several theories are proposed in the asset trade literature linking trade ties with asset holdings. Lane and Milesi-Ferretti (2005a) extended the Obstfeld and Rogoff (2000) model to N country case. The intuition is as follows. Country A does not trade with country B. But country A imports from country C. Suppose there is a productivity shock in country C which lower its prices, country

A will suffer losses as it will import more from country C. To hedge against its losses, country A should hold portfolio assets of country C. Hence, higher trade leads to higher portfolio holdings. In contrast, Coeurdacier (2009) highlighted the role of lower trade cost, which increases bilateral trade. As trade intensifies, domestic firms face greater competition. To hedge against losses, a country must hold equity of foreign firms which directly compete with domestic firms. This explains the positive relation between trade and asset holdings. The second explanation is in line with Portes and Rey (2005). The intuition goes as follows: a shorter distance reduces information frictions and lowers transaction costs. These lead to higher bilateral trade. As information frictions decline, asset holdings also increase, more so when equity market expands (Martin and Rey 2004). Third, Rose and Spiegel (2002) and Rose (2005) offered another theoretical framework in the context of debt default. The authors argue that countries fear debt default because it cuts them off from international capital markets and leads to trade reduction, hence output drop. Consequently, creditors favour debtor countries where they have greater trade ties. Several papers provide empirical support on the positive covariation between bilateral trade and bilateral capital flows, including di Giovanni (2005) for foreign direct investment flows; Portes and Rey (2005) on bilateral equity flows; Hermann and Mihaljek (2013) on bilateral bank flows, and Mercado (2018b) on various types of bilateral gross capital inflows and outflows.

However, there remains a gap in the literature. Although Mercado (2018b) offered empirical evidence on the relevance of gravity factors (including trade ties) on bilateral gross capital inflows and outflows (including their compositions), there is no existing study which combines it with push and pull factors. In other words, if capital flows are driven by global and domestic factors, and gravity factors are relevant in explaining bilateral capital flows, then bilateral capital flows must then be driven by gravity, push and pull factors. This is the main hypothesis in this paper. Combining these two strands of capital flows literature enriches our understanding of the drivers and patterns of capital flows in a bilateral context and provides policy implications as to what extent policy makers have control over capital inflows. Although policy makers do not have control over most gravity factors, they can certainly control information flows and economic ties with their partner economies.

3. Data on Bilateral Capital Flows and Stylized Facts

To examine the importance of gravity factors as one of the key determinants of cross-border financial flows, alongside global and domestic factors, this study utilizes bilateral Financial Accounts data from the Balance of Payments Statistics, following Mercado (2018b). Other studies on bilateral financial flows focus on one type of asset — mostly securities and bank flows — as there is a lack of comprehensive dataset covering all types of capital flows. For instance, Brei and von Peter (2018) Herrmann and Mihaljek (2013) used BIS Locational Banking Statistics to assess the importance of information frictions in the context of banking flows. Wang (2018) also utilized BIS bilateral banking data flows to assess the role of gravity factors and domestic reporter and partner factors. Di Giovanni (2005) exploited Thomson

Financials data on bilateral mergers and acquisitions to examine foreign direct investment flows. Choi et al. (2014) and Portes, Rey and Oh (2011) used U.S. Treasury International Capital data; while Portes and Rey (2015) used Cross Border Capital data to test the role of gravity factors on bilateral equity flows.

The main advantage of using bilateral capital flows data is that it provides aggregated bilateral data comprising all kinds of bilateral investments including direct, portfolio, and other investment assets, thereby offering a wider understanding of bilateral cross-border investment patterns. More importantly, as the data are mostly aligned with the Balance of Payments Manual 6 compiling standards, cross-country comparisons are feasible and so the analysis is richer. For instance, di Giovanni (2005) does not consider bilateral asset transactions involving greenfield investments; while Brei and von Peter (2018), Herrmann and Mihaljek (2013), and Wang (2018) exclude bilateral direct exposures of non-bank sectors in their analysis of bilateral banking flows, whereas all sectors are covered in *other investment* category of the bilateral Financial Account.[9] However, there are disadvantages as well. First, there are very few countries which report bilateral Balance of Payments. For those that do, most partner economies are grouped or aggregated at the regional level due to confidentiality reasons. The selection of partner economies is up to the discretion of the reporting country. Second, bilateral capital flows mostly capture cross-border transactions with financial centres as foreign counterparty are usually financial intermediaries and custodians located in financial centres such as London (Warnock and Cleaver, 2003). For this reason, bilateral capital flows data cannot be use in the context of portfolio choice or allocation.

Figure 1 illustrates a schematic diagram showing the complexities of using bilateral capital flows data. Figure 1a on bilateral asset flows demonstrate that some transactions are recorded based on the country of the ultimate owner, issuer and/or beneficiary. But most bilateral transactions are reported based on the location of transacting counterparty such as those using financial intermediaries and/or custodians. In the latter case, the country location of the ultimate owner, issuer, or beneficiary may or may not be known. For example, if a company in the reporting country acquires a company in country C through an intermediary in country B, bilateral transactions will be recorded between the reporting country and country B, even if the actual money has flown from the reporting country to country C. Figure 1b on bilateral liabilities also demonstrates the same idea. In practice, most countries report bilateral transactions based on the country location of the counterparty involved in that transaction. However, initiatives are made to report some categories of the bilateral Financial Account based on the location of the ultimate owner, issuer or beneficiary, like in the case of the Netherlands. Table 1 summarizes the bilateral capital flows data and indicates whether each functional category of the Financial Account refers to the country location of the transacting counterparty (TC) or the country location of the ultimate owner, issuer or beneficiary (UOIB).

[9] Of interest, loans made by non-bank financial corporations to non-bank sector are not captured by the BIS Banking Locational Statistics.

The table reveals that that most values of the bilateral financial flows pertain to the country location of the transacting counterparty.

The bilateral capital flows data are taken from Balance of Payments Statistics of 10 reporting central banks or statistics agencies, including Austria (Österreichische Nationalbank), Canada (Statistics Canada), Denmark (Danmarks Nationalbank), Germany (Deutsche Bundesbank), Japan (Bank of Japan), Korea (Bank of Korea), Netherlands (De Nederlandsche Bank), New Zealand (Stats NZ), Spain (Banco de España) and United States (Bureau of Economic Analysis).[10] Values are mostly presented in local currency units. To standardize across countries, values are converted to US dollar using the average foreign exchange rate taken from the International Financial Statistics of the IMF.[11] The data set covers annual values from 2000 to 2016. For some countries, quarterly or monthly data in USD millions are added annually. Confidential and unavailable data are treated as missing values; whereas zeros are included as they are. Reported values follow the Balance of Payments Manual 6 (BPM6), but in cases where values are based on Balance of Payments Manual 5, e.g. Japan for 2000-2013, bilateral assets flows are multiplied by -1 in lieu of BPM6 convention of having a positive sign to indicate an *increase* in assets. We exclude a large financial center (United Kingdom) and offshore financial centers (Bermuda, British Virgin Islands, Cayman Islands, Channel Islands, Cook Islands, Cyprus, and Netherlands Antilles) from the dataset as bilateral capital flows to these partner economies might be determined by other factors. In total, our data set covers 186 bilateral pairs, as reported in Table 1.

The various types of bilateral capital asset flows include foreign direct investment assets (FDIA), portfolio assets (PORTA), and other investment assets (OIA).[12] If bilateral total assets and liabilities are given, they are used in the data set. If not, total assets are computed as the sum of direct, portfolio, financial derivative, other investment and official reserve assets whenever data are available. Total liabilities are computed as the sum of direct, portfolio,

[10] There are other countries which could have been included in the data set. For instance, France reports bilateral capital flows for direct and portfolio investments, but not for other investments which could have been supplemented by using bilateral bank flows from the BIS locational banking statistics. However, we opt to restrict our sample to those countries which report the complete functional categories of the Balance of Payments. Nonetheless, the sample size is representative of the global sample given the inclusion of the United States, Japan, and Germany. On the average, the sample accounts for about 35-40% of world total holdings of direct and portfolio investments and bank claims and liabilities.

[11] Given that we used nominal GDP of the reporting country in US dollars, we remove any exchange rate effects in our bilateral capital flows.

[12] Reporting economies also report bilateral breakdown of their financial derivates and reserve assets and financial account liabilities across various functional categories are available. However, the focus of our analysis in this paper pertains more to the three main components of capital flows. For Austria, foreign direct investment data mostly include direct investments of Special Purpose Entities (SPEs) and real estate sector. However, for some economies, reported foreign direct investment assets and liabilities exclude these items. In addition, portfolio liabilities data for Austria and the Netherlands are estimated by multiplying total portfolio liabilities with bilateral weights, computed as the share of derived portfolio liabilities of a partner country to total world liabilities of Austria and the Netherlands, respectively, sourced from the IMF's CPIS.

financial derivative, and other investment liabilities whenever data are available.[13] Following the naming convention in the capital flows literature, asset transactions are gross capital outflows, while liabilities are gross capital inflows. Hence, bilateral assets and liabilities are bilateral gross capital outflows and inflows, respectively. Bilateral asset flows are domestic resident net financial transactions; while bilateral liabilities flows are foreign resident net financial transactions. Hence, financial account assets and liabilities data are not mirror image of one another as resident financial transactions with non-resident counterparties are not equal to non-resident financial transactions with resident counterparties.

To preview the data set, Table 2 presents the values of bilateral financial asset flows of selected reporting to partner economies in 2016. The striking pattern we see is that there is huge variation of reporting country asset transactions with its partner economies. For instance, Japanese investors withdrew assets in Germany but increased their asset transactions with the United States in 2016. But Japan's reversal of asset flows to Germany was primarily directed to portfolio and financial derivative assets. This illustrates that the bilateral capital flows capture actual financial transaction flows which informs us of resident investor portfolio rebalancing across different asset types across partner economies in each period.

Table 3 provides descriptive statistics on bilateral capital flows in percent of the reporting economy nominal GDP. Several observations are noted. For the full sample period of 2000-16, the average total bilateral financial asset flows were about 0.3% of the reporting economy's nominal GDP. Bilateral asset flows were mostly in the form of direct and portfolio assets. In contrast, the relative size of average bilateral asset flows was smallest for other investments at around 0.06%. Total bilateral asset flows to advanced economies were, on average, around 0.4% of reporting economy's nominal GDP, which were more than twice the total bilateral asset flows to emerging economies. This implies that bilateral financial transactions are larger for advanced partner economies than with emerging partner economies. This pattern holds true for net financial asset flows. Across sub-periods, the average bilateral asset flows were highest in the pre-global financial crisis period of 2000-07. In fact, the average bilateral direct and portfolio investment assets flows were around 0.2% of reporting economy's nominal GDP. Compared to the pre-crisis period, both crisis and post-crisis years witnessed a significant decline in bilateral asset flows, particularly for both portfolio and other investment asset flows which include banking flows. However, the decline in bilateral asset transactions was greater for other investments, as compared to portfolio investments.

Taken together, these stylized facts show bilateral financial asset flows of advanced reporting economies: 1) exhibit significant variation across partner economies; 2) mostly

[13] Data on financial derivative assets and liabilities and reserve assets are available for a limited number of countries. Moreover, financial derivative assets are reported mostly in net terms. For these reasons, analysis involving different types of capital flows are restricted to the main functional categories. Nonetheless, data on derivatives and reserves are included in computing total financial assets and liabilities whenever they are available.

between reporter and partner advanced economies; 3) usually in the form of foreign direct investments; and 4) very large in the pre-crisis period.

4. Empirical Specifications and Data Sources

To address the first question on the significance of gravity factors, alongside push (global) and pull (domestic) factors, we use the gravity equation from the asset trade literature, following Galstyan and Lane (2013), Galstyan, Lane, Mehigan, and Mercado (2016), Hellmanzik and Schmitz (2017), Lane and Milesi-Ferretti (2005a and 2005b), and Mercado (2018b). However, unlike these papers, we exogenize time-varying common factors, which are global factors, as well as time-varying reporter and partner factors, which corresponds to domestic reporter and partner factors. Specifically, we estimate the following equation:

$$CF_{ij,t} = \alpha_i + \alpha_j + d_{ij}\theta + h_{ij,t-1}\phi + g_t\beta + r_{i,t}\delta + p_{j,t}\gamma + \varepsilon_{ij,t} \qquad \text{Equation (1)}$$

where $CF_{ij,t}$ are bilateral capital flows from reporter country *i* to partner country *j* at year *t*. α_i and α_j are time-invariant reporter and partner dummy variables, respectively. $d_{ij}\theta$ is a row vector of bilateral time-invariant gravity variables including distance, colonial relationship, common legal origins, and common language. $h_{ij,t-1}\theta$ captures time-varying bilateral factor such as bilateral trade ties. $g_t\beta$ is a row vector of global factors which are common across bilateral pairs but varies by year. $r_{i,t}\delta$ and $p_{j,t}\gamma$ are row vectors of reporter and partner country domestic factors, respectively. $\varepsilon_{ij,t}$ pertains to clustered standard errors at bilateral pair.

The inclusion of time-invariant reporter and partner fixed effects reduces endogeneity by controlling for unobserved heterogeneity in the sample. Moreover, time-varying bilateral factor and reporter and partner domestic GDP growth and interest rate are replaced by their one-year lagged values to address reverse causality. Like Ghosh et al. (2014) and Li et al. (2018), we use contemporaneous values for global factors as these are exogeneous factors. However, unlike Ghosh et al. (2014), we do not use lagged values for some of the domestic reporter and partner factors such as quality of governance, capital account openness, and financial depth as these are slow moving factors in our data set which runs from 2000-16.[14] Equation (1) is consistent with the theoretical model of Okawa and van Wincoop (2012) and the estimation approach suggested by Baldwin and Taglioni (2007). As discussed in the previous section, the time-varying bilateral factor, proxied by bilateral trade, is considered a gravity factor as stronger trade ties mean weaker multilateral resistance between bilateral pairs. Unlike Galstyan and Lane (2013), we do not use generalized least squares to account

[14] We conduct sensitivity test using lagged values of all the reporter and partner domestic factors. The baseline results hold.

for non-spherical disturbance term, given that our data set is an unbalanced panel i.e., residuals of country *j* to country *i* mostly do not exist.[15] Hence, we opt to use ordinary least squares estimation with clustered standard errors at the bilateral level.

The bilateral capital flows data are expressed in percent of reporting country nominal GDP, following Aviat and Coeurdacier (2007) and Mercado (2018b). Scaling bilateral flows in terms of nominal GDP allows us to interpret the coefficients in terms of relative size instead of elasticities as widely used in the asset trade literature. An advantage of using relative magnitude is that it addresses the issue of having zeros and negative values in the data set due to reversals of capital flows. The time-invariant gravity factors are measures of information frictions. We expect distance will reduce bilateral flows, while common language, common legal origins, and colonial ties increase bilateral transactions as they proxy for familiarity or similarity between country pairs. The time-varying gravity factor captures economic ties between country pairs. We expect that as economic ties between two economies increase so will their financial transactions. For time-varying global factors, we consider global GDP growth, global interest rate, global commodity price, and global risk aversion. As discussed in Section 2, we expect bilateral capital flows to increase when global growth is high; when global interest rate is low; when global commodity price levels drop; and when global investor risk aversion is low. For reporter and partner domestic factors, we consider GDP growth and interest rate to capture growth and interest rate differentials between reporter and partner economies as well as between report and global factors. In addition, we also consider governance, capital account openness, and financial depth. We expect that bilateral capital flows to partner countries to increase on better governance, less capital account restrictions, and well-developed financial market.

Data on bilateral capital flows pertain to financial assets flows (*FINA*) sourced from central banks or statistics agencies of advanced reporting economies. This data captures the advanced economy domestic resident financial asset flows to the partner economy (not bilateral net financial asset flows)[16]. Values are scaled by the nominal GDP of the reporting country, taken from the World Economic Outlook Database. Distance (*distance*) is in log value of the population-weighted distance between country pairs. Colonial relationship (*colony_relation*) is also a dummy variable with a value of 1 if country pair has a common colonizer post-1945; in a colonial relationship post 1945; ever in a colonial relationship; currently in a colonial relationship; ever in a sibling relationship; or currently in a sibling relationship; and 0 otherwise.[17] Common legal origins (*legal_origin*) is a dummy variable with a value of 1 if a country pair has a common legal origin; and 0 otherwise. Common language (*common_language*) is dummy variable with a value of 1 if a country pair has a common official

[15] Except when the reporting countries have available data on their bilateral capital flows with other reporting countries e.g. United States and Germany; and Germany and United States.
[16] We focus on bilateral asset flows and not bilateral *net* asset flows as the latter will account for bilateral liabilities flows. The interest in this paper is primary on advanced reporting economy cross-border asset transactions, which is more informative in the perspective of partner economies.
[17] We use a wider definition of colonial relationship to capture all aspect of country pair relations.

or primary language; and 0 otherwise. These gravity variables are sourced from the CEPII Database. Data on bilateral trade (*bilateral_trade*) is the lagged natural log value of bilateral imports between reporter and partner countries sourced from IMF's Direction of Trade Statistics.

Global GDP growth (*global_growth*) is the year-on-year percent change of real global GDP, sourced from IMF's World Economic Outlook Database. Global interest rate (*global_interest_rate*) refers to the weighted average of long-term interest rate across countries using GDP in constant prices as weights. Data is sourced from Oxford Economics. Global commodity price index (*commodity_price*) pertains to the All Commodity Price Index, which includes both fuel and non-fuel price indices, with base year set in 2005 (2005 = 100). The annual index is average value of monthly price index, taken from IMF's Commodity Price Database. Global risk aversion (*VIX*) is the annual average value of CBOE VIX accessed through Datastream. Domestic reporter and partner GDP growth rates (*o_d_growth* and *p_d_growth*) are year-on-year percent change of real GDP, sourced from IMF's World Economic Outlook Database. Domestic reporter and partner interest rates (*o_d_interest_rate* and *p_d_interest_rate*) are mostly annual long-term government bond yields of reporter and partner economies sourced from the IMF's International Financial Statistics. If data are unavailable, domestic interest rate refers to lending rate, also taken from the International Financial Statistics. Domestic reporter and partner governance indicators (*o_d_governance* and *p_d_governance*) are the unweighted average of percentile ranking of control of corruption, government effectiveness, political stability and absence of violence, regulatory quality, rule of law, and voice and accountability. Reporter and partner capital account openness indices (*o_d_kaopen* and *p_d_kaopen*) are the standardized Chinn-Ito Capital Account Index (Chinn and Ito, 2006) scaled to 100. Domestic reporter and partner financial depth indicators (*o_d_financial_depth* and *p_d_financial_depth*) refer to domestic credit provided by the financial sector in percent of nominal GDP. Data are taken from the World Bank's World Development Indicators. Table 4 presents summary statistics of the gravity, push and pull factors.

To address the second question on whether the negative impact of global risk aversion on bilateral financial asset flows varies with distance, we re-estimate Equation (1) without pull factors which are now subsumed in the country fixed effects and add an interaction term for *distance* and *VIX*. Specifically, we estimate:

$$CF_{ij,t} = \alpha_i + \alpha_j + d_{ij}\theta + h_{ij,t-1}\phi + g_t\beta + \varphi VIX_t \times dist_{ij} + \varepsilon_{ij,t} \qquad \text{Equation (2)}$$

where $VIX_t \times dist_{ij}$ captures the interaction between global risk aversion and distance. $d_{ij}\theta$ and $g_t\beta$ still include both distance and global risk aversion, respectively. However, unlike standard interaction terms involving continuous and dummy variables, both distance and VIX are continuous variables in Equation (2). This complicates the interpretation of the estimated

coefficient of the interaction term φ. Consequently, we refer to the partial and marginal effects of the estimated continuous interaction term to estimate the amount of change in bilateral financial asset flows with one-unit change in global risk aversion (VIX) while holding bilateral distance at different values. As in the previous specification, we estimate Equation (2) using ordinary least squares with clustered standard errors at the bilateral pair level.

5. Results and Analysis

5.1 Baseline Regressions: Determinants of Bilateral Capital Flows

Baseline Results. Table 5 presents the baseline regressions on the determinants of bilateral financial asset flows. Various specifications are presented, including gravity factors with reporter, partner, and year fixed effects (Column 1); gravity and push factors with reporter and partner fixed effects (Column 2); gravity, push, and reporter pull factors with partner fixed effect (Column 3); gravity, push and partner pull factors with reporter fixed effect (Column 4); gravity, push, and pull factors with reporter and partner fixed effects (Column 5); and gravity, push, and pull factors without fixed effects (Column 6). For each specification, we report marginal R^2 to assess the incremental improvement in the explanatory power of the regression model with the inclusion of gravity factors.[18] The reported values for the marginal R^2 indicate that gravity factors account for around 20% to 40% of the models' explanatory power, suggesting the importance of including gravity factors in explaining bilateral capital flows.

The baseline results show that resident investor-driven bilateral capital flows are highly responsive to information frictions, proxied by bilateral distance. This is consistent with existing findings using bilateral transactions data from Brei and von Peter (2018), Choi, Rhee and Oh, 2014, di Giovanni (2005), Herrmann and Mihaljek (2013), Mercado (2018b), Portes and Rey (2005), and Portes, Rey and Oh (2001). Specifically, doubling the distance between two economies reduces financial asset flows, on the average, by about 0.03% of the reporting country's GDP. For other familiarity variables, the estimates indicate that common legal origins significantly increase bilateral financial asset flows, while colonial relation is insignificant. Common language shows up significant but with negative sign, which is in contrast with previous findings. The negative coefficients might capture portfolio diversification motive, consistent with Mercado (2018b). Moreover, the results offer strong evidence on the significance of bilateral trade ties, such that doubling bilateral imports of reporting to partner economy raises bilateral asset transactions by around 0.16% of reporting country nominal GDP, which is half of the estimated coefficient of Aviat and Coeurdacier (2007) using different sample set.

[18] Marginal R^2 (adding gravity factors) is computed as 1-RSS/RSS^c where RSS is the residual sum of squares in a regression specification with gravity factors, while RSS^c is the residual sum of squares in a regression specification without gravity factors.

In terms of global factors, the estimates show that higher global interest rate significantly increases bilateral asset flows due to the search for higher yields. As expected, higher global investor risk aversion significantly reduces bilateral financial asset transactions of advanced economies, which is consistent with results using aggregated capital flows data. For instance, a unit increase in VIX reduces bilateral transactions by around 0.02% of reporting economy's nominal GDP. For global commodity price, the estimate is significant but with negative sign. This implies that as global commodity price levels increase, bilateral capital flows decrease, perhaps because bilateral asset flows to commodity exporting economies increase in line Reinhart and Reinhart (2009). For domestic factors, the results indicate that better governance and more financially open reporting and partner economies tend to have higher bilateral financial asset flows. Moreover, there is evidence that higher partner domestic interest rate increases cross-border financial asset transactions, in line with search for higher yields.

The relevance of gravity factors, particularly distance, common legal origins, common language and bilateral trade, holds across various specifications and sensitivity tests. First, we test whether the baseline results hold when we decompose bilateral financial account asset flows into its component flows. The standard capital flows literature highlights the importance of considering the composition of capital flows as they are driven by varying determinants. The findings, shown in Table 6, suggest that information frictions remain significant across different types of flows including direct, portfolio, and other asset flows. However, bilateral trade is insignificant for portfolio asset flows, although it is relevant for both direct and other asset flows. Second, we also test whether gravity factors will remain significant when we split the partner economies into advanced and emerging economies. It is possible for information frictions, proxied by distance and other time-invariant bilateral factors, to be more relevant for emerging partner economies, possibly due to more informational flows between advanced reporting and partner economies. But Table 7 indicates that both distance and bilateral trade are significant for advanced and emerging partner economies. However, we find that common legal origins with partner emerging economy significantly increases bilateral asset transactions, suggesting similar laws between advanced reporting and emerging partner economies matter. We also run a test removing United States, Japan, and Germany which are the three largest advanced economies that are also financial centres in the sample. The results stay the same.

Next, we split the sample into pre-crisis (2000-07), crisis (2008-09), and post-crisis (2010-16) periods to determine whether gravity factors hold across periods. Table 8 indicates that information frictions are more relevant during the pre-crisis and crisis periods; whereas trade ties remain significant across periods. Colonial ties, common legal origins, and common language are highly relevant in the pre-crisis period. To validate this finding, we run annual regressions in a cross-sectional set-up from 2003 to 2016, where we abstract from common global factors.[19] The regressions indicate that distance is significant mostly in the pre-crisis

[19] We estimate Equation (1) without the global factors but with gravity and reporter and partner pull factors. Results are available upon request.

years, although there are some years in the post-crisis period where it remains significant. We take this as evidence that the significance of information frictions, proxied by bilateral distance, might have declined in the post-crisis years based on our sample of advanced reporting economies with developed financial markets. One possible explanation is the rising importance of bilateral information flows which substantially improved information gathering and analysis in the post-crisis period.[20] Another interpretation is that information frictions might be relevant conditional on global factors which we have abstracted from in our bilateral annual regressions. For instance, the pre-crisis years are characterized with loose monetary policy and high-risk appetite but, based on our annual regressions, these are in fact years where distance is mostly significant. This implies that information frictions might have time-varying relevance. Nonetheless, we find distance, common legal origins, and bilateral trade ties to be relevant for some (but not all) years in pre-crisis, crisis, and post-crisis periods, suggesting the importance of gravity factors.

In summary, the baseline results show that gravity factors, such as distance, common legal origins, common language and trade ties, are significant determinants of bilateral financial asset flows, alongside push and pull factors like global interest rate, global risk aversion, reporter and partner governance and capital account openness. However, we find evidence that the relevance of information frictions, proxied by bilateral distance, has become less significant in the post-crisis years at least for our sample of advanced reporting economies with developed financial markets.

Additional Sensitivity Tests. We run several more tests to validate the baseline results. First, instead of clustering standard errors at the bilateral country pair, we use robust standard errors. Second, in the baseline specification, we lagged reporter and partner domestic growth and interest rate. To further reduce endogeneity due to reverse causality, we use lag values of all domestic regressors including reporter and partner governance, capital account openness, and financial depth. In both tests, the results hold. Third, when we lagged global factors, gravity factors stayed significant but global interest rate and global risk aversion became insignificant. This implies that global factors are indeed exogeneous with respect to bilateral capital flows, and hence, our baseline specification is correct. Fourth, we correct for sample outliers by winsorizing bilateral financial asset flows at the bottom and top 10% of the bilateral country sample. In all these tests, both gravity factors, including distance, common legal origins, common language, and bilateral trade are significant with the same sign.

Gravity factors remain significant, alongside global and domestic factors, under alternative measures on bilateral, global, and domestic factors. Dropping colonial relations, common legal origins, and common language show that both distance and bilateral trade stayed significant with the same signs. Adding the dummy variable on bilateral fixed exchange rate system between country pair also does not alter the results. But, in addition, we do not

[20] Choi et al. (2014) and Hellmanzik and Schmitz (2017) provided robust evidence on the impact of bilateral hyperlinks on portfolio asset holdings.

find evidence that bilateral fixed exchange rate significantly increases bilateral financial asset flows given our sample. Replacing bilateral imports with bilateral portfolio asset holdings from the IMF's Coordinated Portfolio Investment Survey and bilateral cross-border outstanding bank claims from BIS Locational Banking Statistics as a measure of economic ties in regressions involving bilateral portfolio asset flows and bilateral other investment asset flows yield marginally significant estimates. Using advanced economy GDP growth taken from the IMF's World Economic Outlook Database, instead of global GDP growth, produce similar findings. The same is true when we replace global interest rate with global liquidity measure from the Bank for International Settlements. Using global commodity price inflation, instead of price level, show the same results. However, global commodity price inflation is insignificant, implying that bilateral flows are responsive to commodity price levels rather than price changes. The main results hold when we change governance with political stability and absence of violence, taken from World Bank's World Governance Indicators. The same is true when we use domestic real interest rate, by taking the difference between nominal interest rate and domestic consumer price inflation sourced from the IMF's World Economic Outlook Database. Using stock market capitalization as a percent of nominal GDP, from World Bank's World Development Indicators, as a measure of financial depth, likewise, yield consistent results.

The findings also hold when we split the partner economies between those with high or low governance, capital account openness, and financial depth. We estimate bilateral capital asset flows on gravity and global factors conditional on partner economy having high or low quality of governance, capital account openness and financial depth. Cut-off values of economies belonging to high and low structural factor groups depend on average and median values of the data sample and full sample of economies. For governance and capital account openness, economies with values of 75 and above are classified to have high governance and capital account openness, while those below has low governance and capital openness, respectively. For financial depth, economies with values 129 and above have high financial depth while those below has low financial depth.[21] The threshold average values are consistent with sample data statistics presented in Table 4. As in Equation (1), reporter and partner domestic factors are captured by the country fixed effects. Likewise, we estimate the equation using ordinary least squares with clustered standard errors at the bilateral pair. The results indicate that for partner economies with high governance, less capital account restrictions, and more developed financial market, both gravity and global factors are relevant. However, for partner economies with low governance, more capital account restrictions and less developed financial market, only gravity factors are significant. These provide evidence

[21] The cut-off values are sample data average. We conduct sensitivity tests by altering the threshold values for partner country classification. For governance, we use 83 as cut-off for sample data median; and 50 for average and median values for the full set of countries with available data from World Bank's World Governance Indicators. For capital account openness, we use 79 as cut-off point for sample data median; and 55 and 45 as cut-off points for average and median values of the full set of countries with available data from the Chinn-Ito Index. For financial depth, 130 is the threshold point for sample data median value; and 62 and 46 for average and median values of the full sample economies with available data from the World Bank's World Governance Indicators.

that for emerging and developing economies, bilateral flows with advanced economies are highly responsive to information frictions and economic ties than global factors.

Finally, we test whether gravity factors are significant when we run country regressions for United States, Denmark, Germany, Netherlands, Japan, and New Zealand. For the United States and Japan, bilateral distance is significant. In the case of Japan, the greater the distance, the larger its bilateral asset transactions, suggesting that Japan invest more in other regions than in East Asia. In contrast, bilateral trade is highly significant for Denmark, Germany, and Netherlands.

5.2 Extension: Interaction Between Distance and VIX

Baseline Results. The results in the preceding section offer strong evidence that bilateral financial asset transactions of advanced economies are driven by gravity factors, alongside push and pull factors. Given that bilateral distance and global risk aversion are both significant in the baseline results, we extend the analysis by looking into the interaction term of both factors and estimate Equation (2). Table 9 presents the results. We find evidence that bilateral distance and trade are both significant across various specifications, including; 1) using clustered standard errors at bilateral level; 2) using robust standard errors; and 3) replacing VIX with a binary variable which takes a value of 1 if VIX is equal and above 20, and 0 otherwise. To a lesser extent, there is also evidence on the relevance of bilateral distance and trade ties when we split the sample into advanced and emerging partner economies, and into different compositions of financial asset flows. However, VIX is significant only when we replace it with a binary variable (Column 3) and specification involving other investment asset flows (Column 4). Moreover, none of the interaction terms between distance and VIX is significant in explaining the variation in bilateral financial asset flows.

As discussed in Section 4, both variables in the interaction term are continuous variables which makes the interpretation of the interaction effects indirect. Hence, we must consider partial and marginal effects of the interaction term to examine the impact of VIX on bilateral capital flows at a given distance. Table 10 presents the results on the partial and marginal effects for the full sample estimation shown in Column 2 of Table 9. For the partial effects, the impact of VIX on bilateral capital flows is consistently negative across varying levels of distance, particularly for a log distance of 7 to 9, where the estimates are statistically significant. This means that VIX has a negative impact on bilateral flows across different levels of distance. In other words, VIX has a uniform negative effect on bilateral capital flows at a given distance. But to assess whether the negative impact of an increase in VIX on bilateral capital flows intensifies or diminishes at different levels of distance, we look at the marginal effects. The estimates in Table 9 indicate that the negative impact of an increase in VIX on bilateral capital flows decreases as distance increases. Figure 2 presents the margin plots on the negative impact of VIX on bilateral financial asset flows of advanced economies at varying levels of log distance.

Taken together, the results suggest that although VIX has uniform negative effect on bilateral flows (partial effects), its impact decreases as distance increases (marginal effects), which is in line with the fact that bilateral transaction decreases with distance. This implies that bilateral capital flows decrease more for economies that are of close geographic proximity and with less information frictions than those that are farther apart and with more information frictions when global investor risk aversion rises. This provides evidence of regional contagion but using bilateral flows data.

Sensitivity Tests. We conduct some more tests to validate the extension results. First, we split the sample into advanced and emerging partner economies as investors might be differentiating between these two types of economies. The findings hold strongly for advanced economies. Next, we consider the different components of financial asset flows as different types of bilateral capital flows might respond to an increase in VIX at different levels of distance differently. For both bilateral direct and portfolio flows, the results for marginal effects hold, but not for partial effects. However, for bilateral other investment flows, which include bilateral bank loans and deposits, the negative impact of an increase in VIX on bilateral flows disappears at greater distance based on the partial effects. As for marginal effects, there is evidence of reversal of impact at higher VIX across increasing distance. This means that when VIX index reaches around 30, bilateral other asset flows (including banking flows) would increase at greater distance, possibly due to contagion effects within economies with close geographic proximity.

6. Concluding Remarks

This paper extends the capital flows literature by considering the importance of gravity factors, alongside the traditional push and pull factors, in determining the size of bilateral capital flows. The asset trade literature offers empirical and theoretical support on the importance of gravity forces, such as distance (which proxies for information frictions) as well as economic ties, on bilateral asset transactions and holdings. But since transactions or flows data are technically part of capital flows, it comes naturally to expect that bilateral capital flows are driven by gravity, push and pull factors. Unfortunately, evidence on this conjecture is constrained by lack of bilateral capital flows data. This paper fills the gap in this literature by using bilateral Balance of Payments Statistics of 10 advanced reporting economies for the period of 2000 to 2016.

The results are conclusive. Global factors such as global interest rate, global commodity price level, and global risk aversion are consistently significant with expected signs. Moreover, reporter and partner domestic governance and capital account openness are, likewise, significant. What is new is that gravity factors like distance, common legal origins, common language, and bilateral trade ties are statistically significant across a battery of sensitivity tests. Extending the analysis in the context of contagion, the results offer evidence that an increase

in global risk aversion has a uniform negative impact on bilateral capital flows, at given levels of distance. But its negative impact on bilateral capital flows decreases more between economies of closer geographic proximity or lesser information frictions, than those that are farther apart or with greater information asymmetries. These findings warrant considering the importance of information frictions and links between economies in understanding the patterns and behaviour of capital flows at academic and policy circles.

Nonetheless, the results leave room for future studies. For instance, the estimates show that gravity factors appear relevant in certain periods. This raises the question on what conditions do information frictions influence capital flows. When do they become more relevant? Does their significance vary with global factors? Are information frictions diminishing as bilateral information flows grow? The evidence provided in this paper leads to these questions.

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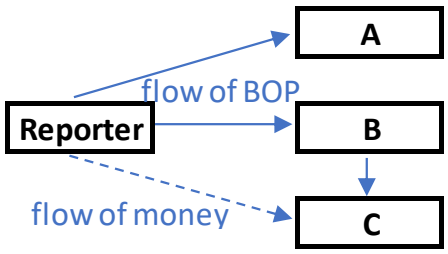
Figures and Tables

Figure 1: Schematic Diagram of Reporting

a) Bilateral Financial Assets Flows



b) Bilateral Financial Liabilities Flows

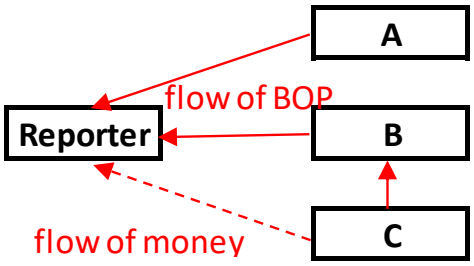


Table 1: Summary of Bilateral Financial Flows

	United States	Canada	Austria	Denmark	Germany	Netherlands	Spain	Japan	Korea	New Zealand
Foreign Direct Investments										
Assets (FDIA)	TC	TC	TC	TC	TC	UOIB	TC	TC	TC	TC
Liabilities (FDIL)	TC	TC	UOIB	TC	TC	TC	TC	TC	TC	TC
Portfolio Investments										
Assets (PORTA)	UOIB	TC	TC	UOIB	TC	UOIB	TC	TC	TC	TC
Liabilities (PORTL)	TC	TC	(est)	TC	TC	(est)	TC	TC	TC	TC
Financial Derivatives										
Assets (DERA)	×	×	×	TC	TC	TC	×	TC	TC	×
Liabilities (DERL)	×	×	×	TC	TC	×	×	TC	TC	×
Other Investment										
Assets (OIA)	TC	TC	TC	TC	TC	UOIB	TC	TC	TC	TC
Liabilities (OIL)	TC	TC	TC	TC	TC	TC	TC	TC	TC	TC
Reserve Assets (RESA)	TC	TC	×	TC	TC	×	×	×	×	×
Frequency	Q	Q	Q	M	Q	A	A	Q	A	A
Start Year	2003	2000	2001	2005	2000	2004	2013	2000	2006	2000
End Year	2016	2016	2016	2016	2016	2016	2016	2016	2016	2016
No. of Counterparty	20	2	13	34	32	22	6	31	3	23

Notes: TC = country location of the transacting counterparty. UOIB = country location of ultimate owner, issuer, and beneficiary. Estimates (est) for Austria and the Netherlands are based on aggregate portfolio liabilities weighted using derived values from the IMF's Coordinated Portfolio Investment Survey. Data classification for Korea are assumed to be based on the country location of the transacting counterparty as no confirmation was given. A = annual, Q = quarterly, and M = monthly. Bilateral financial account flows are sourced from reporting central banks or statistics agencies.

Table 2: Bilateral Financial Asset Flows, 2016
(in USD billion)

Reporter	Partner	FINA	FDIA	PORTA	DERA	OIA	RESA
United States	Germany	-4.36	5.92	-16.56	…	6.28	…
United States	Japan	71.81	2.27	35.11	…	34.43	-0.01
Germany	United States	57.31	13.35	33.70	0.80	9.46	…
Germany	Japan	2.89	1.02	-3.92	-0.60	6.38	…
Japan	United States	176.41	52.21	163.70	-97.54	58.03	…
Japan	Germany	-1.56	2.33	-5.68	-9.97	11.77	…

Notes: … = data unavailable. Values were converted to USD using average foreign exchange rate from the International Financial Statistics of the IMF. Bilateral financial account flows data are sourced from reporting central banks or statistics agencies.

Table 3: Bilateral Financial Asset Flows - Descriptive Statistics
(% of reporting economy nominal GDP)

Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
	Full Sample Bilateral Pairs					Advanced Partner Economies					Emerging Partner Economies				
Total Financial Account Assets (FINA)	2,713	0.31	1.36	-12.49	30.62	1,867	0.39	1.59	-12.49	30.62	846	0.13	0.51	-1.64	5.60
Foreign Direct Investment Assets (FDIA)	2,566	0.16	1.06	-18.81	28.60	1,773	0.18	1.24	-18.81	28.60	793	0.10	0.44	-1.76	5.25
Portfolio Investment Assets (PORTA)	2,660	0.12	0.51	-3.87	4.60	1,844	0.16	0.60	-3.87	4.60	816	0.02	0.09	-0.51	1.39
Financial Derivative Assets (DERA)	1,718	-0.03	0.32	-4.13	6.50	1,188	-0.04	0.39	-4.13	6.50	530	0.00	0.02	-0.14	0.18
Other Investment Assets (OIA)	2,647	0.06	0.50	-5.29	6.82	1,812	0.08	0.60	-5.29	6.82	835	0.01	0.17	-0.96	2.28
Reserve Assets (RESA)	716	0.01	0.25	-2.01	2.41	510	0.02	0.29	-2.01	2.41	206	0.00	0.00	0.00	0.02
Total Financial Account Liabilities (FINL)	2,697	0.16	2.01	-18.03	44.47	1,853	0.22	2.41	-18.03	44.47	844	0.05	0.32	-2.43	2.88
Net Financial Account Assets (FIN)	2,730	0.15	1.84	-23.12	23.71	1,875	0.18	2.18	-23.12	23.71	855	0.08	0.55	-2.99	5.02

Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
	2000-07					2008-09					2010-16				
Total Financial Account Assets (FINA)	1,080	0.42	1.44	-4.81	30.62	358	0.21	1.36	-8.95	10.80	1275	0.25	1.28	-12.49	24.00
Foreign Direct Investment Assets (FDIA)	1,012	0.17	1.06	-2.77	28.60	338	0.12	0.75	-7.14	5.53	1216	0.16	1.13	-18.81	24.57
Portfolio Investment Assets (PORTA)	1,048	0.16	0.49	-3.70	3.83	353	0.08	0.50	-2.65	4.30	1259	0.09	0.52	-3.87	4.60
Financial Derivative Assets (DERA)	658	-0.02	0.20	-2.42	3.09	236	-0.05	0.32	-3.16	1.45	824	-0.03	0.39	-4.13	6.50
Other Investment Assets (OIA)	1,057	0.11	0.52	-5.29	6.82	347	0.02	0.61	-4.26	4.00	1243	0.03	0.45	-4.21	4.80
Reserve Assets (RESA)	215	-0.01	0.07	-0.38	0.41	112	0.10	0.36	-0.19	2.41	389	0.00	0.27	-2.01	1.63
Total Financial Account Liabilities (FINL)	1,070	0.38	2.13	-10.02	44.47	359	0.08	1.72	-12.88	8.03	1268	0.00	1.96	-18.03	16.27
Net Financial Account Assets (FIN)	1,088	0.04	1.54	-23.12	10.17	360	0.13	1.89	-8.03	13.31	1282	0.24	2.04	-11.27	23.71

Notes: All types of bilateral capital flows are expressed in percent of reporting economy nominal GDP. Bilateral financial asset flows include financial derivatives and official reserves whenever data are available. Bilateral financial liabilities flows include financial derivatives whenever data are available. Bilateral financial account flows data are sourced from reporting central banks or statistics agencies.

Table 4: Regressors Descriptive Statistics

Variables	Mean	Std. Dev.	Min	Max
$distance_{ij}$	8.144	1.221	5.483	9.847
$bilateral\_trade_{ij,t-1}$	1.012	2.072	0.001	22.123
$global\_growth_{t}$	3.856	1.387	-0.150	5.558
$global\_interest\_rate_{t}$	4.381	0.875	2.675	5.994
$commodity\_price_{t}$	121.884	46.445	58.246	192.571
VIX_{t}	20.814	6.808	11.560	40.000
$o\_d\_growth_{i,t-1}$	1.643	2.094	-5.563	11.309
$o\_d\_interest\_rate_{i,t-1}$	3.402	1.672	0.350	8.720
$o\_d\_governance_{i,t}$	91.024	5.892	70.757	98.792
$o\_d\_kaopen_{i,t}$	99.256	6.052	41.451	100.000
$o\_d\_financial\_depth_{i,t}$	194.397	65.323	70.940	345.722
$p\_d\_growth_{i,t-1}$	3.009	3.473	-14.814	25.486
$p\_d\_interest\_rate_{i,t-1}$	6.308	9.147	-0.080	183.200
$p\_d\_governance_{i,t}$	74.679	20.819	8.225	99.756
$p\_d\_kaopen_{i,t}$	78.777	30.660	0.000	100.000
$p\_d\_financial\_depth_{i,t}$	129.553	66.503	0.230	345.722

Notes: Distance is taken from CEPII Database. Bilateral trade, global growth, commodity price, domestic growth, and domestic interest rates are taken from various databases of the International Monetary Fund. VIX taken from CBOE. Global interest rate taken from Oxford Economics. Reporter and partner governance and financial depth indicators are sourced from various data sets of World Bank. Capital Openness Index taken from Chinn and Ito (2006).

Table 5: Baseline Determinants of Bilateral Financial Asset Flows

	(1)	(2)	(3)	(4)	(5)	(6)
$distance_{ij}$	-0.167***	-0.166***	-0.114**	-0.091*	-0.168***	-0.023
	(0.050)	(0.050)	(0.049)	(0.047)	(0.050)	(0.039)
$colony\_relation_{ij}$	-0.122	-0.121	-0.061	-0.079	-0.126	0.087
	(0.095)	(0.095)	(0.115)	(0.133)	(0.096)	(0.144)
$legal\_origin_{ij}$	0.168*	0.167*	0.269**	0.257**	0.170*	0.108
	(0.094)	(0.094)	(0.112)	(0.122)	(0.094)	(0.141)
$common\_languange_{ij}$	-0.167	-0.168	-0.421**	-0.370**	-0.169	-0.202
	(0.134)	(0.134)	(0.183)	(0.184)	(0.134)	(0.185)
$bilateral\_trade_{ij,t-1}$	0.133***	0.134***	0.184***	0.186***	0.133***	0.201***
	(0.046)	(0.046)	(0.063)	(0.064)	(0.046)	(0.076)
$global\_growth_t$		0.007	0.016	0.023	0.016	0.008
		(0.023)	(0.030)	(0.027)	(0.031)	(0.029)
$global\_interest\_rate_t$		0.083**	0.050	0.075**	0.077	0.107**
		(0.034)	(0.039)	(0.032)	(0.064)	(0.041)
$commodity\_price_t$		-0.001**	-0.001**	-0.001*	-0.001*	-0.001**
		(0.000)	(0.001)	(0.000)	(0.001)	(0.001)
VIX_t		-0.015**	-0.015***	-0.013**	-0.011**	-0.016***
		(0.006)	(0.006)	(0.005)	(0.006)	(0.005)
$o\_d\_growth_{i,t-1}$			-0.001		-0.006	-0.015
			(0.014)		(0.014)	(0.012)
$o\_d\_interest\_rate_{i,t-1}$			0.027		-0.008	-0.017
			(0.025)		(0.038)	(0.028)
$o\_d\_governance_{i,t}$			0.015***		0.028*	0.016***
			(0.006)		(0.016)	(0.006)
$o\_d\_kaopen_{i,t}$			0.014		0.016*	0.008
			(0.010)		(0.009)	(0.009)
$o\_d\_financial\_depth_{i,t}$			0.001		-0.002	0.000
			(0.001)		(0.002)	(0.001)
$p\_d\_growth_{i,t-1}$				0.005	0.005	0.009
				(0.007)	(0.005)	(0.006)
$p\_d\_interest\_rate_{i,t-1}$				-0.005	-0.005	0.009**
				(0.005)	(0.005)	(0.004)
$p\_d\_governance_{i,t}$				0.012*	0.015**	0.000
				(0.006)	(0.007)	(0.002)
$p\_d\_kaopen_{i,t}$				-0.000	-0.000	0.003**
				(0.002)	(0.002)	(0.001)
$p\_d\_financial\_depth_{i,t}$				0.000	0.000	0.001
				(0.001)	(0.001)	(0.001)
Observations	2,713	2,713	2,713	2,713	2,713	2,713
R-squared	0.208	0.205	0.175	0.169	0.207	0.128
Marginal R-squared	0.045	0.045	0.078	0.070	0.045	0.097
Country F.E.	Yes	Yes	No	Yes	Yes	No
Partner F.E.	Yes	Yes	Yes	No	Yes	No
Year F.E.	Yes	No	No	No	No	No

Notes: Dependent variables are total bilateral financial asset flows in % of reporting economy nominal GDP. o_d_ refers to reporting country domestic factor. p_d_ pertains to partner country domestic factor. Clustered standard errors (bilateral pairs) are in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Determinants of Different Composition of Bilateral Financial Asset Flows

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	FDIA				PORTA				OIA			
$distance_{ij}$	-0.097***	-0.047	-0.026	-0.098***	-0.068***	-0.052**	0.002	-0.069***	-0.031**	-0.029**	-0.009	-0.032**
	(0.028)	(0.029)	(0.026)	(0.028)	(0.024)	(0.024)	(0.027)	(0.023)	(0.013)	(0.012)	(0.010)	(0.013)
$colony\_relation_{ij}$	-0.145**	-0.086	-0.004	-0.147**	-0.006	0.008	0.110*	-0.007	-0.044	-0.032	-0.006	-0.047
	(0.064)	(0.073)	(0.079)	(0.065)	(0.042)	(0.047)	(0.061)	(0.041)	(0.030)	(0.024)	(0.026)	(0.029)
$legal\_origin_{ij}$	0.164*	0.253**	0.041	0.163*	-0.000	-0.001	-0.098*	0.002	0.058	0.056	0.039	0.060
	(0.084)	(0.114)	(0.098)	(0.084)	(0.045)	(0.043)	(0.056)	(0.045)	(0.040)	(0.034)	(0.046)	(0.040)
$common\_languange_{ij}$	-0.183**	-0.415***	-0.082	-0.180**	0.023	0.019	0.108	0.021	-0.077*	-0.081**	-0.048	-0.079*
	(0.079)	(0.135)	(0.059)	(0.079)	(0.071)	(0.071)	(0.096)	(0.072)	(0.045)	(0.038)	(0.044)	(0.044)
$bilateral\_trade_{ij,t-1}$	0.056***	0.086***	0.074**	0.055***	0.026	0.041	0.046	0.025	0.042***	0.047***	0.045***	0.042***
	(0.018)	(0.025)	(0.029)	(0.018)	(0.025)	(0.033)	(0.029)	(0.024)	(0.007)	(0.006)	(0.008)	(0.007)
$global\_growth_t$	0.012	0.038	0.016	0.031	-0.006	-0.024*	-0.005	-0.020*	0.004	0.010	0.009	0.013
	(0.023)	(0.035)	(0.025)	(0.035)	(0.013)	(0.012)	(0.013)	(0.012)	(0.011)	(0.012)	(0.010)	(0.012)
$global\_interest\_rate_t$	0.006	-0.013	0.002	-0.011	0.014	0.009	0.023*	0.011	0.053***	0.040**	0.043***	0.040
	(0.019)	(0.027)	(0.020)	(0.042)	(0.013)	(0.017)	(0.013)	(0.028)	(0.015)	(0.016)	(0.015)	(0.028)
$commodity\_price_t$	-0.000	-0.000	-0.000	0.000	-0.001***	-0.001***	-0.001***	-0.001***	-0.000	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
VIX_t	-0.005	-0.000	-0.004	-0.000	-0.003	-0.008***	-0.003	-0.006**	-0.008***	-0.007**	-0.007***	-0.005*
	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
$o\_d\_growth_{i,t-1}$		0.015		0.015		-0.015***		-0.018***		0.005		0.001
		(0.014)		(0.015)		(0.005)		(0.005)		(0.007)		(0.007)
$o\_d\_interest\_rate_{i,t-1}$		0.003		0.003		0.020		0.006		0.008		-0.001
		(0.015)		(0.026)		(0.015)		(0.016)		(0.010)		(0.016)
$o\_d\_governance_{i,t}$		0.008*		-0.005		0.004		0.020***		0.000		0.010*
		(0.004)		(0.011)		(0.003)		(0.006)		(0.002)		(0.006)
$o\_d\_kaopen_{i,t}$		0.006		0.003		0.002		0.005		0.003**		0.010***
		(0.006)		(0.002)		(0.004)		(0.009)		(0.001)		(0.003)
$o\_d\_financial\_depth_{i,t}$		0.000		-0.001		0.001*		-0.000		0.000		-0.001
		(0.000)		(0.001)		(0.000)		(0.001)		(0.000)		(0.001)
$p\_d\_growth_{i,t-1}$			0.003	-0.001			0.000	0.002			0.004	0.003
			(0.004)	(0.003)			(0.002)	(0.002)			(0.002)	(0.003)
$p\_d\_interest\_rate_{i,t-1}$			0.006**	-0.004			0.001*	-0.001			0.001	-0.001
			(0.003)	(0.005)			(0.001)	(0.001)			(0.000)	(0.001)
$p\_d\_governance_{i,t}$			0.001	0.003			0.000	0.006**			0.001**	0.007*
			(0.001)	(0.004)			(0.001)	(0.003)			(0.001)	(0.004)
$p\_d\_kaopen_{i,t}$			0.002*	-0.001			0.001***	0.001*			0.000	-0.000
			(0.001)	(0.002)			(0.000)	(0.000)			(0.000)	(0.001)
$p\_d\_financial\_depth_{i,t}$			0.000	0.000			0.001*	-0.000			-0.000	0.000
			(0.000)	(0.001)			(0.000)	(0.001)			(0.000)	(0.001)
Observations	2,566	2,566	2,566	2,566	2,660	2,660	2,660	2,660	2,647	2,647	2,647	2,647
R-squared	0.103	0.069	0.079	0.104	0.224	0.215	0.125	0.231	0.083	0.081	0.071	0.086
Country F.E.	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes
Partner F.E.	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes

Notes: Dependent variables are bilateral direct investment assets (FDIA), portfolio assets (PORTA) and other investment assets (OIA) flows in % of reporting economy nominal GDP. o_d_ refers to reporting country domestic factor. p_d_ pertains to partner country domestic factor. Clustered standard errors (bilateral pairs) are in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Determinants of Bilateral Financial Asset Flows - Partner and Reporter Economy Splits

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Advanced Economy Partner				Emerging Economy Partner				Excl Large Advanced Economy Reporter			
$distance_{ij}$	-0.099	-0.115**	-0.017	-0.103*	-0.243*	-0.233**	-0.054	-0.244*	-0.271***	-0.019	-0.061	-0.273***
	(0.060)	(0.056)	(0.060)	(0.060)	(0.136)	(0.109)	(0.042)	(0.136)	(0.092)	(0.068)	(0.075)	(0.093)
$colony\_relation_{ij}$	0.151	0.025	0.318*	0.141	-0.154	-0.178	-0.149	-0.154	0.099	0.457	0.186	0.099
	(0.159)	(0.166)	(0.186)	(0.158)	(0.128)	(0.108)	(0.170)	(0.129)	(0.232)	(0.371)	(0.208)	(0.233)
$legal\_origin_{ij}$	0.119	0.196	-0.031	0.129	0.599**	0.767**	0.392	0.594**	0.236	0.820***	0.127	0.242
	(0.108)	(0.127)	(0.148)	(0.108)	(0.295)	(0.333)	(0.320)	(0.296)	(0.242)	(0.228)	(0.196)	(0.248)
$common\_languange_{ij}$	-0.256	-0.483**	-0.202	-0.269	-0.232	-0.464**	-0.190	-0.224	-0.951**	-1.967***	-0.348*	-0.949**
	(0.181)	(0.229)	(0.219)	(0.183)	(0.191)	(0.227)	(0.194)	(0.191)	(0.381)	(0.430)	(0.186)	(0.387)
$bilateral\_trade_{ij,t-1}$	0.154***	0.191***	0.185***	0.153***	0.057	0.119***	0.062*	0.056	0.146***	0.220***	0.171***	0.145***
	(0.047)	(0.067)	(0.065)	(0.047)	(0.039)	(0.043)	(0.035)	(0.041)	(0.040)	(0.051)	(0.063)	(0.040)
$global\_growth_t$	0.002	0.013	0.025	0.020	0.017	0.017	0.015	0.021	0.007	0.029	0.020	0.019
	(0.033)	(0.043)	(0.039)	(0.045)	(0.015)	(0.019)	(0.016)	(0.021)	(0.048)	(0.059)	(0.053)	(0.063)
$global\_interest\_rate_t$	0.113**	0.048	0.052	0.036	0.008	0.077**	-0.000	0.115	0.144**	0.293***	0.121*	0.296*
	(0.047)	(0.054)	(0.058)	(0.099)	(0.040)	(0.038)	(0.033)	(0.080)	(0.063)	(0.098)	(0.065)	(0.159)
$commodity\_price_t$	-0.002**	-0.002**	-0.002***	-0.002**	0.000	0.000	0.000*	-0.000	-0.002**	-0.002**	-0.002***	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
VIX_t	-0.020**	-0.021***	-0.018**	-0.016**	-0.002	-0.002	-0.003	-0.000	-0.023**	-0.017	-0.021*	-0.014
	(0.008)	(0.008)	(0.008)	(0.008)	(0.003)	(0.003)	(0.004)	(0.003)	(0.011)	(0.011)	(0.011)	(0.011)
$o\_d\_growth_{i,t-1}$		-0.001		-0.014		-0.004		-0.001		0.009		-0.005
		(0.019)		(0.019)		(0.011)		(0.009)		(0.030)		(0.029)
$o\_d\_interest\_rate_{i,t-1}$		0.044		-0.003		-0.045		-0.048		-0.091*		-0.100
		(0.032)		(0.049)		(0.036)		(0.052)		(0.051)		(0.079)
$o\_d\_governance_{i,t}$		0.015**		0.025		0.011		0.029*		0.017		0.022
		(0.006)		(0.022)		(0.008)		(0.016)		(0.012)		(0.042)
$o\_d\_kaopen_{i,t}$		0.024***		0.024*		-0.005		0.001		0.021		0.019*
		(0.009)		(0.013)		(0.005)		(0.003)		(0.015)		(0.010)
$o\_d\_financial\_depth_{i,t}$		0.001		-0.005		0.000		0.002		0.002		-0.001
		(0.001)		(0.003)		(0.001)		(0.002)		(0.002)		(0.005)
$p\_d\_growth_{i,t-1}$			0.017	0.014			-0.001	0.004			0.010	0.003
			(0.011)	(0.009)			(0.006)	(0.005)			(0.011)	(0.014)
$p\_d\_interest\_rate_{i,t-1}$			0.056**	0.045			0.005*	-0.005			0.023***	-0.017
			(0.027)	(0.030)			(0.003)	(0.005)			(0.006)	(0.035)
$p\_d\_governance_{i,t}$			0.005*	0.041**			0.001	-0.002			0.005	0.032*
			(0.003)	(0.017)			(0.002)	(0.007)			(0.003)	(0.017)
$p\_d\_kaopen_{i,t}$			0.007***	0.005			-0.001	-0.002			0.006*	-0.001
			(0.002)	(0.003)			(0.001)	(0.002)			(0.003)	(0.003)
$p\_d\_financial\_depth_{i,t}$			0.001	0.002			-0.000	0.002			0.001	0.001
			(0.001)	(0.001)			(0.001)	(0.001)			(0.001)	(0.002)
Observations	1,867	1,867	1,867	1,867	846	846	846	846	1,362	1,362	1,362	1,362
R-squared	0.209	0.172	0.171	0.214	0.257	0.239	0.187	0.275	0.218	0.199	0.160	0.222
Country F.E.	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes
Partner F.E.	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes

Notes: Dependent variables are total bilateral financial asset flows in % of reporting economy nominal GDP. o_d_ refers to reporting country domestic factor. p_d_ pertains to partner country domestic factor. See country classification list for advanced and emerging economy sample. Large advanced economies include Germany, Japan, and United States. Clustered standard errors (bilateral pairs) are in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Determinants of Bilateral Financial Asset Flows - By Period

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Pre-Crisis Period				Crisis Period				Post-Crisis Period			
$distance_{ij}$	-0.252***	-0.214***	-0.094	-0.250***	-0.266*	-0.205	-0.120	-0.268*	-0.079	-0.002	-0.005	-0.079
	(0.071)	(0.058)	(0.073)	(0.071)	(0.138)	(0.136)	(0.102)	(0.140)	(0.079)	(0.079)	(0.064)	(0.079)
$colony\_relation_{ij}$	-0.449**	-0.367**	0.030	-0.444**	-0.023	0.065	0.159	-0.030	0.061	0.094	0.134	0.061
	(0.182)	(0.180)	(0.203)	(0.179)	(0.231)	(0.238)	(0.161)	(0.238)	(0.142)	(0.153)	(0.139)	(0.143)
$legal\_origin_{ij}$	0.502**	0.668**	0.095	0.505**	0.129	0.160	-0.004	0.131	-0.039	0.110	-0.108	-0.038
	(0.239)	(0.276)	(0.278)	(0.238)	(0.256)	(0.253)	(0.207)	(0.261)	(0.179)	(0.178)	(0.162)	(0.180)
$common\_languange_{ij}$	-0.396*	-0.780***	-0.146	-0.410*	-0.359	-0.457	-0.302	-0.360	0.036	-0.237	0.105	0.036
	(0.218)	(0.296)	(0.244)	(0.221)	(0.252)	(0.286)	(0.201)	(0.256)	(0.150)	(0.206)	(0.136)	(0.151)
$bilateral\_trade_{ij,t-1}$	0.168***	0.206***	0.212***	0.171***	0.074	0.125	0.149*	0.075	0.119*	0.180*	0.136**	0.119*
	(0.032)	(0.029)	(0.063)	(0.032)	(0.098)	(0.119)	(0.087)	(0.099)	(0.068)	(0.101)	(0.069)	(0.068)
$global\_growth_t$	-0.002	0.081**	-0.007	0.003	0.068	0.132	0.059	-0.016	0.014	-0.210	0.026	-0.187
	(0.039)	(0.041)	(0.038)	(0.043)	(0.055)	(0.110)	(0.057)	(0.242)	(0.286)	(0.379)	(0.298)	(0.382)
$global\_interest\_rate_t$	0.278*	0.138	0.304*	0.368**	…	…	…	…	0.057	0.337	0.036	0.452
	(0.161)	(0.139)	(0.161)	(0.176)	…	…	…	…	(0.524)	(0.650)	(0.537)	(0.698)
$commodity\_price_t$	0.008	0.004	0.008	0.007	…	…	…	…	-0.002	-0.004	-0.002	-0.004
	(0.006)	(0.005)	(0.006)	(0.005)	…	…	…	…	(0.005)	(0.005)	(0.005)	(0.005)
VIX_t	0.012	0.003	0.012	0.013	…	…	…	…	-0.009	-0.006	-0.012	0.004
	(0.016)	(0.012)	(0.015)	(0.012)	…	…	…	…	(0.021)	(0.024)	(0.021)	(0.027)
$o\_d\_growth_{i,t-1}$		0.063**		0.073		-0.078		0.057		-0.034*		-0.033**
		(0.031)		(0.056)		(0.099)		(0.229)		(0.019)		(0.016)
$o\_d\_interest\_rate_{i,t-1}$		-0.002		-0.197**		-0.024		-0.974***		0.007		-0.110
		(0.049)		(0.081)		(0.106)		(0.321)		(0.045)		(0.082)
$o\_d\_governance_{i,t}$		-0.011		-0.044		0.020		0.123		0.012		0.005
		(0.011)		(0.041)		(0.021)		(0.113)		(0.008)		(0.029)
$o\_d\_kaopen_{i,t}$		0.022*		0.022*		0.013		0.094		0.006		0.051
		(0.013)		(0.013)		(0.014)		(0.077)		(0.013)		(0.031)
$o\_d\_financial\_depth_{i,t}$		-0.002		0.001		-0.000		-0.016		0.001		0.001
		(0.001)		(0.006)		(0.002)		(0.020)		(0.001)		(0.004)
$p\_d\_growth_{i,t-1}$			-0.007	-0.017			0.008	0.025			0.003	0.004
			(0.010)	(0.014)			(0.020)	(0.036)			(0.007)	(0.010)
$p\_d\_interest\_rate_{i,t-1}$			0.003	0.001			0.006	0.008			0.022	0.010
			(0.002)	(0.001)			(0.004)	(0.053)			(0.013)	(0.010)
$p\_d\_governance_{i,t}$			-0.004	0.024*			0.010**	0.164			0.005**	-0.012
			(0.003)	(0.012)			(0.004)	(0.151)			(0.002)	(0.014)
$p\_d\_kaopen_{i,t}$			0.007***	-0.000			-0.001	-0.013			0.002	0.001
			(0.002)	(0.004)			(0.002)	(0.013)			(0.001)	(0.003)
$p\_d\_financial\_depth_{i,t}$			0.002	0.008***			-0.002	-0.011			0.000	-0.002
			(0.001)	(0.003)			(0.001)	(0.014)			(0.001)	(0.002)
Observations	1,080	1,080	1,080	1,080	358	358	358	358	1,275	1,275	1,275	1,275
R-squared	0.332	0.291	0.244	0.347	0.176	0.157	0.115	0.204	0.183	0.140	0.142	0.187
Country F.E.	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes
Partner F.E.	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes

Notes: Dependent variables are total bilateral financial asset flows in % of reporting economy nominal GDP. o_d_ refers to reporting country domestic factor. p_d_ pertains to partner country domestic factor. Pre-crisis include 2000-07; crisis include 2008-09; and post-crisis refer to 2010-16. Clustered standard errors (bilateral pairs) are in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

Table 9: Determinants of Bilateral Financial Asset Flows - Interaction Between Distance and VIX

VARIABLES	(1)	(2)	(3) FINA	(4)	(5)	(6) FDIA	(7) PORTA	(8) OIA
$distance_{ij}$	-0.209**	-0.209***	-0.166***	-0.108	-0.335**	-0.078	-0.048	-0.124***
	(0.104)	(0.080)	(0.049)	(0.136)	(0.140)	(0.048)	(0.042)	(0.043)
$colony\_relation_{ij}$	-0.121	-0.121	-0.121	0.151	-0.154	-0.145**	-0.007	-0.042
	(0.095)	(0.084)	(0.095)	(0.159)	(0.128)	(0.064)	(0.042)	(0.029)
$legal\_origin_{ij}$	0.166*	0.166	0.167*	0.119	0.601**	0.165**	0.000	0.055
	(0.094)	(0.113)	(0.094)	(0.107)	(0.295)	(0.083)	(0.045)	(0.040)
$common\_languange_{ij}$	-0.166	-0.166*	-0.168	-0.255	-0.232	-0.184**	0.022	-0.073*
	(0.134)	(0.093)	(0.134)	(0.181)	(0.191)	(0.080)	(0.072)	(0.044)
$bilateral\_trade_{ij,t-1}$	0.134***	0.134***	0.134***	0.154***	0.058	0.056***	0.026	0.043***
	(0.046)	(0.032)	(0.046)	(0.047)	(0.039)	(0.018)	(0.024)	(0.007)
$global\_growth_t$	0.007	0.007	0.009	0.002	0.017	0.012	-0.006	0.003
	(0.023)	(0.024)	(0.025)	(0.034)	(0.015)	(0.023)	(0.013)	(0.011)
$global\_interest\_rate_t$	0.083**	0.083**	0.085**	0.113**	0.008	0.006	0.014	0.053***
	(0.034)	(0.039)	(0.035)	(0.047)	(0.040)	(0.019)	(0.013)	(0.015)
$commodity\_price_t$	-0.001**	-0.001*	-0.001**	-0.002**	0.000	-0.000	-0.001***	-0.000
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
VIX_t	-0.032	-0.032	-0.013*	-0.024	-0.040	0.003	0.006	-0.045***
	(0.038)	(0.031)	(0.008)	(0.047)	(0.026)	(0.019)	(0.016)	(0.016)
$VIX_t\#distance_{ij}$	0.002	0.002	-0.002	0.000	0.004	-0.001	-0.001	0.005**
	(0.004)	(0.004)	(008)	(0.005)	(0.003)	(0.002)	(0.002)	(0.002)
Observations	2,713	2,713	2,713	1,867	846	2,566	2,660	2,647
R-squared	0.205	0.205	0.205	0.209	0.260	0.103	0.224	0.088
Country F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Partner F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Note	Clustered S.E.	Robust S.E.	Dummy High VIX	Partner ADV	Partner EME	FDIA	PORTA	OIA

Notes: Dependent variables are bilateral financial asset flows (FINA), foreign direct assets (FDIA), portfolio assets (PORTA) and other investment assets (OIA) in % of reporting economy nominal GDP, respectively. Dummy High VIX takes a value of 1 if VIX is equal or above 20, and 0 otherwise. Clustered standard errors (bilateral pairs) are in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

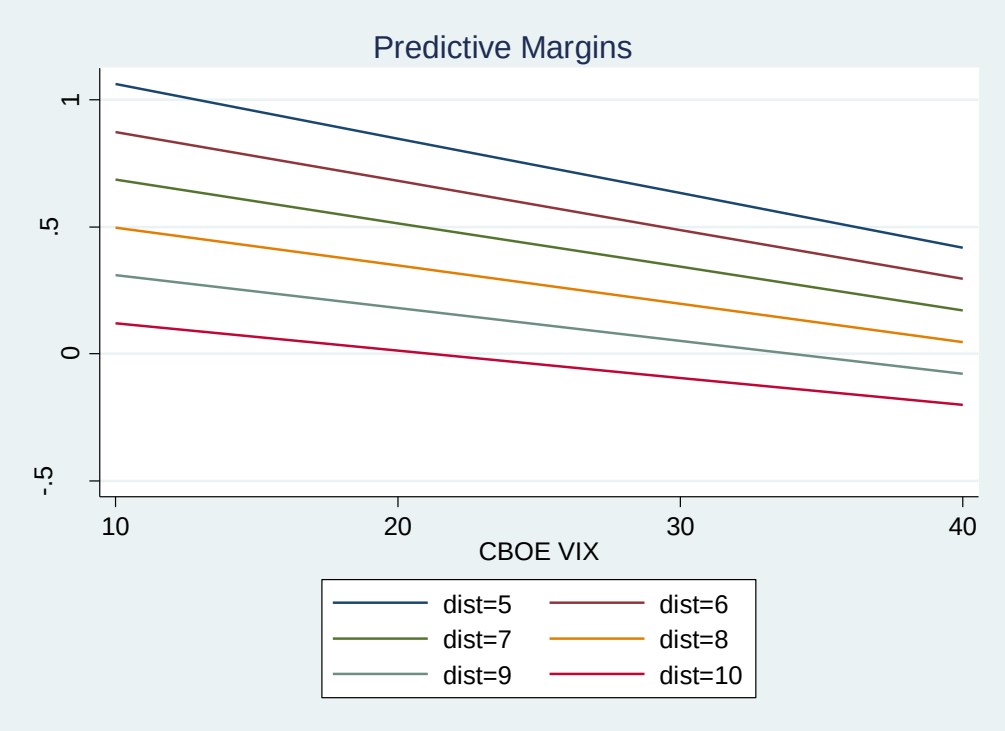
Table 10: Partial and Marginal Effects of Distance and VIX Interaction - Full Sample

Average Marginal Effects	dy/dx	std. err.	t	P>|t|	[95% Conf.	Interval]
dist = 5	-0.021	0.017	-1.270	0.207	-0.055	0.012
dist = 6	-0.019	0.013	-1.500	0.136	-0.045	0.006
dist = 7	-0.017	0.009	-1.880	0.061	-0.035	0.001
dist = 8	-0.015	0.006	-2.470	0.015	-0.027	-0.003
dist = 9	-0.013	0.005	-2.400	0.017	-0.023	-0.002
dist = 10	-0.011	0.008	-1.410	0.159	-0.026	0.004

Predictive Margins	dy/dx	std. err.	t	P>|t|	[95% Conf.	Interval]
at dist = 5, VIX = 10	1.062	0.245	4.330	0.000	0.579	1.546
at dist = 5, VIX = 20	0.848	0.163	5.210	0.000	0.527	1.169
at dist = 5, VIX = 30	0.634	0.224	2.820	0.005	0.191	1.076
at dist = 5, VIX = 40	0.419	0.363	1.160	0.250	-0.297	1.135
at dist = 6, VIX = 10	0.874	0.179	4.880	0.000	0.521	1.228
at dist = 6, VIX = 20	0.681	0.114	5.990	0.000	0.457	0.905
at dist = 6, VIX = 30	0.488	0.164	2.970	0.003	0.164	0.812
at dist = 6, VIX = 40	0.295	0.273	1.080	0.281	-0.243	0.833
at dist = 7, VIX = 10	0.686	0.117	5.850	0.000	0.454	0.918
at dist = 7, VIX = 20	0.514	0.066	7.800	0.000	0.384	0.644
at dist = 7, VIX = 30	0.343	0.107	3.190	0.002	0.131	0.554
at dist = 7, VIX = 40	0.171	0.188	0.910	0.364	-0.200	0.542
at dist = 8, VIX = 10	0.498	0.071	7.020	0.000	0.358	0.638
at dist = 8, VIX = 20	0.348	0.028	12.250	0.000	0.292	0.403
at dist = 8, VIX = 30	0.197	0.063	3.110	0.002	0.072	0.322
at dist = 8, VIX = 40	0.047	0.121	0.390	0.699	-0.192	0.286
at dist = 9, VIX = 10	0.310	0.077	4.030	0.000	0.158	0.461
at dist = 9, VIX = 20	0.181	0.048	3.780	0.000	0.087	0.275
at dist = 9, VIX = 30	0.052	0.066	0.780	0.438	-0.079	0.183
at dist = 9, VIX = 40	-0.077	0.111	-0.700	0.487	-0.296	0.142
at dist = 10, VIX = 10	0.122	0.128	0.950	0.343	-0.131	0.374
at dist = 10, VIX = 20	0.014	0.094	0.150	0.882	-0.171	0.199
at dist = 10, VIX = 30	-0.094	0.113	-0.830	0.408	-0.317	0.129
at dist = 10, VIX = 40	-0.201	0.168	-1.200	0.233	-0.534	0.131

Notes: Average marginal effects are partial effects of bilateral financial asset flows with respect to changes in VIX at given levels of distance (dist). Predictive margins pertain to marginal effects of bilateral financial asset flows with respect to changes in VIX at different levels of distance (dist).

Figures 2: Predictive Margins Plot of Bilateral Financial Asset Flows on Change in VIX at Given Levels of Distance



Note: Distance (dist) are expressed in log values.

Table A1: Bilateral Pairs and Partner Economy Classification

Advanced Economy Partner		Emerging Economy Partner	
Australia	5	Argentina	3
Austria*	4	Brazil	5
Belgium	6	Bulgaria	1
Canada*	6	Chile	1
Czech Republic	3	China	7
Denmark*	1	Croatia	1
Estonia	1	Hungary	3
Finland	2	India	4
France	8	Indonesia	2
Germany*	7	Iran	1
Greece	2	Malaysia	2
Hong Kong, China	5	Mexico	4
Ireland	3	Papua New Guinea	1
Italy	7	Philippines	2
Japan*	7	Poland	3
Korea*	5	Romania	2
Latvia	1	Russia	4
Lithuania	1	Saudi Arabia	1
Luxembourg	5	South Africa	3
Malta	1	Thailand	2
Netherlands*	7	Turkey	1
New Zealand*	1	United Arab Emirates	2
Norway	2	Venezuela	1
Portugal	3	Vietnam	1
Singapore	5	**Bilateral Pairs**	**57**
Slovakia	2		
Slovenia	3		
Spain*	5		
Sweden	3		
Switzerland	6		
Taipei, China	4		
United States*	8		
Bilateral Pairs	**129**		

Notes: Economy classification based on WEO country classification. * denotes reporting economy.