International Transmission under 'Measured' Market Integration

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Introduction

One of the key developments in international macroeconomics research over the last two decades has been the realization that the extent of international integration is lower in the data relative to theoretical benchmarks (Cole and Obstfeld (1991); Obstfeld (2001)). This is still true today in spite of the tremendous increase in trade and financial globalization since late 1990s. International markets are incomplete and segmented. Put it differently, there is no international asset that will allow investors to insure against every state of the world, and not enough investment into the ones that will insure against most of the states. Households of one country cannot access savings of another country without a financial intermediary. These phenomena are known as home bias and imperfect international risk sharing, that is, investors do not invest that much in other countries' assets, in any form (equity, bond, cross-border loan) and hence a perfectly diversified global portfolio is a mirage. Less than full international integration also implies that all the benefits of globalization in terms of higher growth and welfare are not yet materialized.

Although the literature had tremendous success in writing down models with incomplete and/or segmented international financial markets (see Itskhoki and Mukhin (2021) and Gabaix and Maggiori (2015) for recent state-of-the art models), it is extremely difficult to quantify the degree of incompleteness and nature of segmentation in the data. How much financial integration is there, how is this related to the extent of trade integration and what type of foreign investors segment the markets, are some of the key unanswered questions in the field of international macroeconomics and finance. Using micro data from global investors and domestic borrowers, buyers and sellers, on trade and financial transactions, my research aims to quantify the extent of market integration and the nature of segmentation together with the associated international asset pricing implications. Such quantification is first order in measuring the growth and welfare effects of international shock and policy transmission. A key focus of my quantification is on the exact form of frictions (financial, information or policy) that affect investors' expectations and hence lead to deviations in the data from the full integration theory benchmark. Theoretical formulations of frictions, to-date, remains to be mostly ad-hoc and reduced form given the lack of micro evidence.

The earlier empirical literature chose a reduced form approach. This approach was well grounded in theory but suffers in terms of identification due to use of macro-time series data: it can neither show

causality, nor can identify the relevant micro foundation that the macro models are built upon. Papers such as Feldstein and Horioka (1980), showed high savings and investment correlations among OECD countries, where full integration implies zero correlation. Consistently, a large empirical literature documented the so-called quantity puzzles on capital flows that go side by side with international asset pricing puzzles and exchange rate puzzles, such as high consumption correlations across countries and weak relation to exchange rates (Backus and Smith (1993)), low capital flows from rich to poor countries (Lucas (1990)). From the finance side, same quantity puzzles are shown by French and Poterba (1991) and Coval and Moskowitz (1999) as home bias in equities and bonds. The exchange rate disconnect puzzle is a summary of this disconnect between prices and quantities as there is no relation between exchange rates and macro variables, in the data, including capital flows (Obstfeld and Rogoff (2000)).

This earlier seminal work cast doubt on standard open economy macro models, established the puzzles of international macro and unleash an extensive theoretical research on these topics in the last two decades. However, theoreticians were working under the dark, in terms of micro foundations, since the early empirical work did not answer the question of why capital flows and exchange rates behave differently in the data compared to the predictions of standard full integration benchmarks. Reduced form empirical work based on macro data also falls short of quantification of the degree of international market integration. For example, the recent influential theory work by Itskhoki and Mukhin (2021) that can explain all exchange rate puzzles need to assume home bias combined with financial shocks, such as those move the Uncovered Interest Parity (UIP) wedge. They assume a high degree of home bias given the empirical estimates from the aforementioned reduced form macro empirical literature. Financial market equilibrium determines expected exchange rates, whereas response of exchange rates to shocks is pinned by goods market equilibrium, and interplay between both connects macro variables to exchange rates. Nevertheless, without shocks to UIP, home bias and incomplete markets are not enough to explain the pricing puzzles. And to be able to explain all the exchange rate puzzles, the UIP shock must be endogenous to monetary policy. As a result, to connect this type of normative work to optimal policy analysis and to understand joint behavior of capital flows and exchange rates (quantities and prices) one not only needs better micro data based estimates of home bias, but also need to understand where the financial shock is coming from and what determines the movements in the UIP wedge in the data.

My research agenda aims to provide systematic evidence on these issues. I do this by connecting quantity of foreign investment to its price at the investor-borrower level, taking investor expectations and frictions faced by the borrowers seriously. To provide precise measurement of these frictions and

how they affect investors' expectations and pricing behavior, I exploit heterogeneity at the micro level. The use of micro data helps me to observe foreign bank lending to a domestic firm at bank-firm level, a domestic firm issuing a bond in another country at issuance level, or an international investor buying the bonds of another sovereign or investing in equity of companies in other countries at the bond and equity portfolio (transaction) level. The state-of-the-art form of such micro data will also tell us the currency and maturity of these transactions together with foreign investors' identity. Thus, this approach helps me to uncover both borrower and investor frictions and evaluate how borrowers' frictions affect investors' expectations and pricing.

Why such granular measurement of international financial integration is necessary? The common explanation of better econometric identification by holding macro fundamentals/shocks constant is not the main reason, even if this is an important contributing factor. The main reason is because we learn from heterogeneity. Akin to heterogeneous agents revolution in macro (see RED survey by Moll), if certain type of borrowers or investors drive the macro patterns we observe in the data in terms of capital flows and exchange rates, then without a proper understanding of this heterogeneity, we cannot analyze the macro effects of integration and evaluate the international transmission of shocks and policies. Understanding international shock transmission in the data goes together with figuring out why in reality we operate under incomplete and segmented financial markets? Is it due to financial and/or information frictions? Or less than full integration is policy driven? Who segments the market, international or domestic intermediaries? Without the precise measurement of these frictions and barriers, we cannot formulate the right theoretical models, which will lead to designing wrong policies. Micro granular evidence will help us to formulate better models that are micro-founded with the correct frictions identified in micro data. As models with different micro foundations can match the same macro data, this is imperative.

A case in point is the prediction of standard models for higher growth and welfare as a result of more integration (Obstfeld and Rogoff (1995)). When a country moves from autarky to trade and financial openness, it benefits on several dimensions such as smoothing of shocks via higher risk sharing, higher consumption and investment growth due to better allocation of global capital (Obstfeld (1994)). However, the reality is different with frequent financial crises linked to volatile capital flows and low growth. It might be that even if countries receive capital flows, since they have not developed their domestic financial markets, they cannot use the foreign investment in the most efficient way to increase growth (Alfaro, Chanda, Kalemli-Özcan and Sayek (2004)). Similarly, the positive correlation between growth and current account, which says that foreign investors either invest in low growth countries or

foreign investment leads to low growth (Gourinchas and Jeanne (2013)), has been shown to be a product of public flows (government borrowing from other governments) rather than private flows (private sector borrowing from foreign private investors) (e.g. Aguiar and Amador (2011); Alfaro, Kalemli-Özcan and Volosovych (2014)). This means that growing countries' governments send their savings abroad but these countries receive private investment. So they might be growing due to private foreign investment. It is also possible that low growth countries' governments borrow internationally and this sovereign debt leads to low growth. All of these narratives are possible interpretations of the positive correlation between growth and current account in the data.

Unfortunately, this reduced form macro evidence cannot answer why foreign private investors invest in the first place outside their domestic assets in other countries at all, if there is no return to be made? It can be that return is low if countries are not capital scarce (Gourinchas and Jeanne (2006)). At the same time it is shown that countries suffer from lack of good institutions that hinders capital inflows (Alfaro, Kalemli-Özcan and Volosovych (2008)). If there is little capital flows for whatever reason this means there is little international investment, low risk sharing and high home bias. But why there is even little if there is no return? Why home bias is not full in the data? Why there is any international investment at all? My research shows that there is a high return from international investment due to risk premium inherent in such investment, but there are also factors hindering foreign investment since international investors are risk averse. Let me first explain how micro data can solve the causality issue in terms of growth and capital flows, as I started making this case above, and then I will describe the identification of the risk channel using micro data. These two issues are related as described in detail below.

Identification in Micro Data: Capital Flows, Misallocation and Growth

By focusing on the natural experiment of European integration, our research tries to shed light on these issues. The European union experiment constitutes the single real life example that comes closest to textbook definition of trade and financial integration culminating into a single market in the last 40 years. As of 1999, countries with high currency risk and default risk (Italy and Greece) suddenly became riskless under a single currency and were able to borrow at the same rates as Germany, a safe country. Using micro data on foreign investment and firm balance sheets for European countries, we show that declining productivity growth in Southern European countries like Spain during the first decade of the integration starting in 1999, and the simultaneous increase in productivity growth in Northern European countries like Germany during the same decade can be explained by misallocation

of capital flows from North to South Europe within the countries that suffer from financial frictions such as Spain (Gopinath, Kalemli-Özcan, Karabarbounis and Villegas-Sanchez (2017)). Germany invested in Spain as part of the European integration process not because Spain was growing faster than Germany as of 1999. Of course as of 1999, Spain offered a higher return to German investors, as they had less capital than Germany, the return to capital investment was higher, and the higher interest rates were also including risk premium for credit risk. Even country borrowing rates converged overnight, micro firm and household rates did not. This type of domestic financial friction lead to misallocation. Once capital went to Spain from Germany it was misallocated within Spain leading to declining productivity growth in Spain.

As a result, this paper shows that the aforementioned patterns in macro data can be driven by reverse causality. To show this we use firm level data from 3 countries in the South Europe and 3 in the North including Spain and Germany. We demonstrate that a decline in real interest rates can trigger a huge influx of capital between countries as predicted by the textbook model but this capital then goes to the largest, but not necessarily the most productive companies. This created an increasing misallocation of resources which led to a decline in aggregate productivity growth. The financial friction identified thanks to the use of micro data. We show that large but unproductive firms received more investment and they are more leveraged. Such a size dependent financial constraint—that is small firms cannot borrow due to low net worth—is an important mechanism to generate macro patterns of declining productivity observed with increased capital inflows and widening current account deficits.

It is a well known fact that European financial integration is less than full given the lack of capital market integration. Hence, above results might be simply due to the fact that, investment in terms of investing in government and corporate bonds or bank loans is subject to financial frictions but equity investment will be not. As integration may take many forms, such as bank lending, portfolio investment, and foreign direct investment, we also study equity investment among European firms. We show that foreign equity investment among firms increase both firm level and aggregate macro volatility, consistent with the above macro reduced form literature (Kalemli-Özcan, Sorensen and Volosovych (2014)). We ask why? We examine if foreign investors are relatively more willing to invest in risky firms and projects by testing if there is a positive relationship between firm-level foreign investment and firm-level volatility. We find this to be the case. The positive relation can be a result of foreigners investing in highly volatile firms or of foreigners tilting investment towards risky, high return, projects once they invest in a firm. In any case, each channel requires foreign investors to be willing to accept more volatility of output. We show that this is the case since more diversified foreign investors invest in equity of domestic firms.

So they are willing to tolerate higher output volatility since they are diversified internationally. As a further test of the diversification story, we investigate if domestic owners with international assets also hold relatively more volatile domestic firms, and we find that they do.

Foreign Currency Debt as a Financial Friction

Under financial frictions, foreign investment can be associated with low growth. This should not necessarily imply restrictions on foreign investment, but rather the fact that the first order policy action needs to resolve domestic financial frictions. A similar argument can be made for the short term vulnerabilities created by foreign investment, especially in emerging markets, due to the fact that most emerging markets borrow in foreign currency. Dubbed as original sin (Eichengreen, Hausmann and Panizza (2005)), where emerging market sovereigns cannot borrow from foreigners in their own currency, this phenomenon has migrated to firms, where most of the corporate debt in emerging markets are in foreign currency, especially in dollars (Aguiar (2005); Kalemli-Özcan, Kamil and Villegas-Sanchez (2016)). Du and Schreger (2016) showed that emerging markets governments increasingly borrowing in local currency. Foreign currency debt both in the corporate sector and by governments will act as a financial friction since foreign currency debt combined with local currency assets creates weak balance sheets. As shown in theory (Céspedes, Chang and Velasco (2004)) and in data (Aguiar (2005); Kalemli-Özcan, Kamil and Villegas-Sanchez (2016)), weak balance sheets regardless it is the sovereign or corporate, leads to low output growth and investment especially after financial shocks. Let us turn to the question of the implications of currency based frictions for international transmission of shocks and the identification of frictions in micro data.

Implications for International Transmission

The question remains that why borrowers in emerging markets cannot borrow in their own currency or why investors prefer to lend in dollars mostly? To get at the answer we need to understand foreign investors' pricing and how that pricing relates to domestic frictions. Micro data can help to identify these frictions. Maggiori, Neiman and Schreger (2020) shows that even among advanced countries investors prefer to lend in their own currency or in dollars. Rey (2013) shows that both the US dollar and its monetary policy are key factors driving the global financial cycle, that is co-movement of risky asset prices, financial intermediary leverage and capital flows (see also Bruno and Shin (2015); and Obstfeld and Zhou (2023)). Since capital flows and risky asset prices move together, financial frictions are at the heart of this phenomenon. One can quantify the transmission of global financial cycle

to domestic financial markets in emerging markets by using administrative micro data covering the universe of corporate debt (domestic and external), both bonds and loans, matched to firm and bank balance sheets. Such state-of-the-art data can also identify the relevant frictions and investors that are segmenting the market.

Using such a datasets from Turkey for 2003–2013, the median emerging market during that period, we provide evidence on four facts that are critical in the transmission of the US specific shocks (monetary policy, risk aversion measured by VIX and the US dollar) to emerging markets (Di Giovanni, Kalemli-Özcan, Ulu and Baskaya (2022)): (1) uncovered interest parity (UIP) is violated domestically at the firm-bank level – firms pay a lower interest rate when borrowing in foreign currency from their domestic banks; (2) the UIP risk premium, both at the firm-bank level and at the country level, strongly co-moves with the VIX over time; (3) when VIX is low, the UIP risk premium falls and capital flows into domestic financial market, lowering domestic borrowing costs both in local currency and foreign currency borrowing and leads to side by side expansion of local and foreign currency credit for domestic firms; given the fall in UIP the share of local currency credit expands more; (4) firm-bank level data on pledged collateral on new loan issuances show that collateral constraints do not relax with low VIX, especially because capital does not flow in equity markets or real estate, instead banking sector borrows externally the most. So domestic firms are able to borrow more due to lower borrowing costs on average, which increases their ability to pay back their loans. This is the borrowing constraint (higher cost of borrowing) that relaxes with lower risk premium.

We also investigated direct external bond issuances but these are very small part of the universe of corporate debt in emerging markets, differently than advanced countries, and hence cannot explain macro effects in terms of corporate credit growth and investment. As the universe of transactions data (credit registry) is dominated with small firms who borrow from domestic banks, we also show that domestic banks are the main financial intermediary intermediating foreign capital and segmenting the market leading to domestic micro UIP deviations. An important measurement issue here is that UIP is measured with investors' expectations of Turkish Lira/ USD and Turkish Lira/Euro exchange rate as shown by the model of Itskhoki and Mukhin (2021), available from a quarterly survey done by Turkish central bank on investors' own forecasts. Hence international investors do not bear the currency risk as they lend to domestic bank in dollars (as we show), and domestic banks also do not bear the currency risk since they are required to hedge by the law and so purchase derivatives. Domestic firms are un-hedged and bear the currency risk. They still prefer to borrow in foreign currency given the UIP deviations since even domestically it is cheaper to borrow in foreign currency. Our results showing the fact that

domestic banks segment the market have very different policy implications: if we are worried about the harmful effects of capital flows, instead of regulating global lenders and financial intermediaries, we might be better of regulating domestic lenders from the countries own perspective. For global systemic risk issues things will be different.

These new facts on international transmission fits well with the new view of exchange rate determination in Itskhoki and Mukhin (2021). As these authors have the UIP deviations endogenous to policy, we have investigated the determinants of UIP deviations in Kalemli-Özcan and Varela (2021), documenting five novel facts. 1) Measuring UIP violations with survey-based exchange rate expectations shows positive expected excess currency returns for emerging markets, on average and over time. So, UIP never holds in emerging markets. For advanced country currencies, expected currency returns are state dependent as they change sign over time, meaning UIP holds on average. UIP violations based on realized exchange rates are state dependent for all currencies. 2) UIP violations, both based on expected and realized exchange rates, correlate negatively with capital flows for emerging market currencies but not for advanced country currencies. 3) UIP violations based on expected exchange rates co-moves strongly with global risk premia measured by VIX for all currencies, whereas UIP violations based on realized exchange rates co-moves with global risk premia to a lesser extent. This means that investors' risk sentiments can be measured directly with expectations of exchange rate, instead of realized exchange rates, as in Itskhoki and Mukhin (2021). 4) The dynamics of the UIP violations mostly explained by the changes in the interest rate differentials in emerging markets, whereas most of the variation for advanced country UIP violations is explained by the expected changes in the exchange rate. 5) Local risk premia, measured by economic policy uncertainty, explains most of the cross-sectional and time-series variation in UIP violations of emerging markets, accounting for both expected and actual excess currency returns.

These results are important in terms of optimal policy making. As argued by Itskhoki and Mukhin (2021), for optimal policy the most important measurement is the frictional component of UIP and not the fundamental currency risk linked to bad fundamentals. Hence our focus on the volatility of policies and not what fundamentals/policies are, is perfectly fitting. And since both UIP based on realized exchange rates and expected exchange rates based on survey expectations are correlated negatively with capital flows, we are confident that we are measuring the frictional component of UIP that links to risk premium charged by investors based on their expectations.

These results are consistent with Kalemli-Özcan (2019) and shows the important impact of the U.S. monetary policy on global investors' risk sentiments. I show that monetary policy divergence vis-a-

vis the U.S. has larger spillover effects in emerging markets than advanced economies. The monetary policy of the U.S. affects domestic credit costs in other countries through its effect on global investors' risk perceptions. Capital flows in and out of emerging market economies are particularly sensitive to fluctuations in such risk perceptions and have a direct effect on local credit spreads. Domestic monetary policy is ineffective in mitigating this effect as the pass-through of policy rate changes into short-term interest rates is imperfect. This disconnect between short rates and monetary policy rates is explained by changes in risk perceptions. A key policy implication of my findings is that emerging markets' monetary policy actions designed to limit exchange rate volatility by using monetary policy can be counterproductive (instead of other tools like FX interventions). In fact, as we show in Kalemli-Özcan and Unsal (2023) the recent FED hikes during 2022–2023, did not lead to a crisis in emerging markets due to stronger balance sheets both in corporate sector and in public sector as a result of decreased dollar debt and increased monetary policy credibility of central banks. Due to lower level of dollar debt, central banks did not intervene as much when FED hiked in 2022-2023, when their currencies depreciated against the dollar. As a result, reputation and limited commitment issues that were shown to be important in sovereign default literature also matters in terms of short-run monetary policy making by central banks and can be priced in as risk premia in short rates and UIP deviations.

Role of Collateral vs External Financing Costs

It is interesting that this body of evidence does not mention collateral/asset values. There are several theory papers that are motivated with sudden stop episodes in Latin American countries and write down models with collateral constraints (Mendoza (2010); Bianchi (2011)). This line of theory research have one-to-one mapping with capital flowing out and collateral constraints getting tighter. In the data though, we see that external financing costs go down during booms when capital is flowing in and these borrowing costs go up during busts when capital flows out. This is why, during booms, when capital flows in, even exchange rate appreciates and collateral values go up, UIP deviations based on realized exchange rates do not go up with appreciations but go down due to lower interest rate differentials and have a bigger impact in terms of domestic macro variables, as we show in the papers described above both with micro and macro data, since UIP deviations pass one-to-one external borrowing costs into domestic borrowing costs.

Does this mean fluctuations in collateral (asset) values are not important in data in terms of relaxing and tightening financial constraints? Of course not. They are important, and in fact borrowing costs are going to be endogenous to collateral values; if countries' assets' value goes down, its external financing

costs go up. The findings from emerging markets just show the importance of deep integrated asset markets with lots of physical and financial assets (land, real estate, bonds) to be used as collateral. Emerging markets do not have that. Part of the reserve accumulation by emerging market governments in the past two decades is exactly to increase such collateral as piling up U.S. treasuries. In a country like U.S. of course this is different. In fact, in Caglio, Darst and Kalemli-Özcan (2021), we study the role of heterogeneous financial frictions in investment and credit channels of monetary policy, using firm-bank matched administrative data for the U.S. We find equally important roles for asset based collateral and earnings based collateral in borrowing and lending, since both are available and are used in deep financial markets of the US. There is an interesting asymmetry though that maps one-to-one to firm size. We find that firms with high default risk are the most responsive to monetary shocks only if they are small. Large firms with high default risk are less responsive. These different responses are due to collateral heterogeneity in loan contracts since such heterogeneity explains relaxation/tightening of financial constraints as a response to monetary shocks. Risky small firms rely on their earnings and intangibles as collateral, which means their leverage is backed by procyclical earnings. Monetary expansions lower the marginal cost of funds for these firms and expand their borrowing capacity. For large firms, the cost of funds is not sensitive to collateral. Monetary policy can be highly effective in economies dominated by small firms with earnings-based borrowing constraints, even though these firms have high default risk.

These results from the U.S. are consistent with size dependent constraints where large firms are more leveraged, small firms less, as we showed for European firms as aforementioned before. We learn from U.S. credit registry data that leveraged is backed up mostly by earnings-based collateral, especially for small firms even though they also use asset based collateral. This is important since this type of financial friction, that is small firms having less access to funds and using their earnings and cash flow to access those funds, imply that there is a severe procyclicality in the aggregate economy, due to financial frictions connecting real economy to financial markets, even for agents who do not participate in financial markets and do not own assets, that we do not have models for. For example, recovery in investment can be very sluggish after a shock if leveraged small firms cannot de-lever fast enough and cannot borrow with a slow recovery in earnings. Using the micro European data, Kalemli-Özcan, Laeven and Moreno (2022) showed that a significant part of the decline in firm-level investment in the aftermath of the crisis can be linked to higher pre-crisis leverage and the associated increase in the debt service, even after conditioning on aggregate demand shocks, and match to weak banks, explaining 60 % of the actual decline in aggregate corporate investment and sluggish recovery that lasted a decade.

Takeaways

Overall, micro data is important to identify frictions behind less than full international financial integration and market segmentation and how these lead to pricing of risk, both in terms of credit and currency, and how pricing of risk determines firm and country debt in terms of its currency and maturity composition. To understand international macro implications of this phenomena, such as transmission of shocks and policies, we need to use micro data both for prices and quantities and bring them together at investor-borrower level. Identifying exact form of financial constraints in micro data is central to macro effects. My research shows the importance of time varying risk premia. There are important open questions such as what determines this risk premium?. Factors such as financial frictions, policy uncertainty, limited commitment, monetary policy credibility and interactions among them are likely to be first order and more work is needed to sort this out.

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