

## CHAPTER TWO

# **DOLLAR DOMINANCE IN TRADE AND FINANCE**

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According to the major paradigm in international macroeconomics, namely the Mundell-Fleming paradigm (Mundell 1963; Fleming 1962), the importance of a country's currency in international trade is tied closely to its share in world trade. This is because each country is assumed to export its goods in its own currency. That is, if we consider trade among the United States, India, and Japan, the assumption is that all exports from the United States are invoiced in dollars, all exports from Japan are invoiced in yen, and all exports from India are invoiced in rupees. Further, because the paradigm assumes that prices are sticky in the exporter's currency, exchange rate fluctuations across countries affect their bilateral terms of trade, defined as the ratio of the at-the-dock price of imports to that of exports. Specifically, a depreciation of the nominal exchange rate is associated with a depreciation of the terms of trade that is an increase in relative price of imports relative to exports. These exchange rate-driven fluctuations in the terms of trade are a central mechanism of Milton Friedman's argument for the optimality of flexible exchange rates—and for the perennial complaint among countries that their trading partners manipulate their exchange rates and engage in “currency wars” to raise their competitiveness in international markets.

Besides these assumptions on trade, modern New Keynesian incarnations of the Mundell-Fleming and other major paradigms typically assume that international financial markets are complete

in that a full set of Arrow-Debreu securities are traded and there are no financial frictions.<sup>1</sup> With this assumption, made mostly for modeling convenience (unlike those for trade), the currency of denomination of financial assets has no meaningful role.

In the following sections I describe briefly how reality is very different from these assumptions with regards to international trade and finance and how the dollar dominates both spaces with important real consequences. Further, summarizing Gopinath and Stein (2018a), I explain how the world can end up with a single dominant currency (the dollar) despite the existence of other potential dominant currencies (the euro). The argument in Gopinath and Stein (2018a) emphasizes the complementarity that exists between a currency's role as a unit of account for invoicing decisions and its role as a safe store of value.

## SOME FACTS ON DOLLAR DOMINANCE

### Trade

As stated previously, the Mundell-Fleming paradigm assumes that every country invoices its exports in its own currency, the so-called producer currency pricing paradigm. A second alternative paradigm as spelled out in Betts and Devereux (2000) and Devereux and Engel (2003) assumes instead that every country invoices its exports in the destination currency, the so-called local currency pricing paradigm. Both these assumptions do not pass the smell test, as studies of trade invoicing reveal the overwhelming preponderance of dollar invoicing in international trade. In my Jackson Hole Symposium paper (Gopinath 2015), I report statistics on trade invoicing for a sample of forty-three countries. These countries represent 55 percent of world imports and 57 percent of world

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1. An alternative to a full set of Arrow-Debreu securities is to parameterize a model such that terms of trade changes alone provide full insurance.

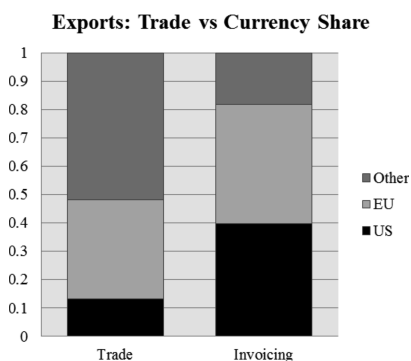


FIGURE 2.1.1. Dollar Dominance in World Trade: Aggregate

Source: Gopinath 2015

exports. I document that the dollar's share as an invoicing currency is 4.7 times its share in world imports and 3.1 times its share in world exports, as depicted in figure 2.1.1. Consequently, there is neither producer currency pricing nor local currency pricing, but mainly dollar pricing. To highlight how special the role of the dollar is, it is useful to contrast this with the share of the other major global currency, the euro, in trade. The euro's share as an invoicing currency in world exports is 1.2 times the share of euro country exports. In other words, while some non-euro countries invoice exports in euros, this is of a much smaller magnitude than the use of dollars.

Figure 2.1.2 provides a more detailed breakdown by plotting for each country the share of its imports invoiced in dollars (black bar) next to the share of its imports from the United States (gray bar). Under the Mundell-Fleming paradigm, these two bars should have the same height. On the contrary, the dollar's share in invoicing outstrips its share in the country's imports. In the case of India, 86 percent of its imports are invoiced in dollars while only 5 percent of India's imports originate in the United States. Similarly, 86 percent of India's exports are invoiced in dollars while only 15 percent of India's exports are to the United States. It is interesting to

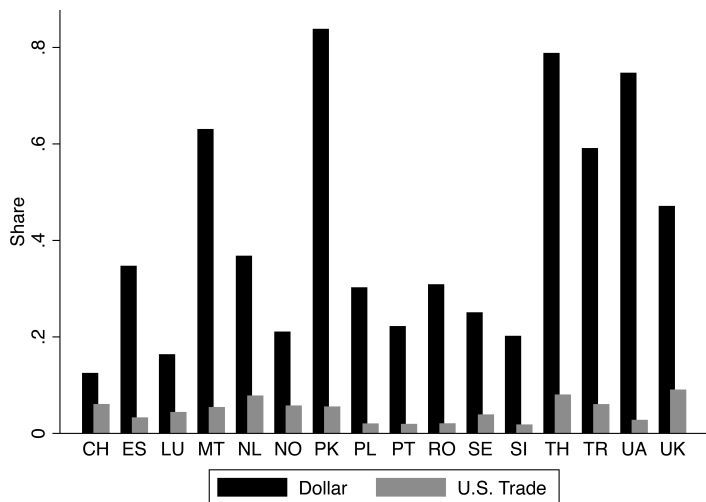
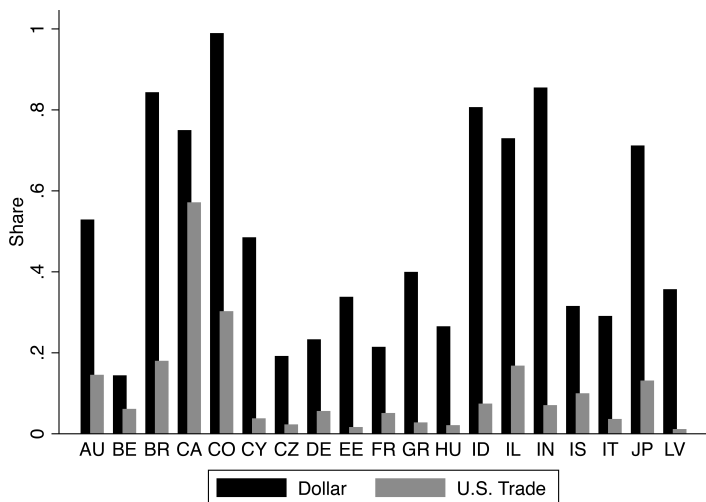


FIGURE 2.1.2. Dollar Dominance in World Trade: By Country  
Source: Gopinath 2015

note that even in the case of Japan and the United Kingdom, whose currencies are reserve currencies, only 40 percent of exports in the case of Japan and 51 percent in the case of the United Kingdom are invoiced in their own currency. The real exception here is the United States, with 93 percent of its imports and 97 percent of its exports invoiced in its own currency. I also emphasize that this heavy dollar invoicing is not just about commodity prices like oil prices or copper prices that are denominated in dollars, but applies to a much wider set of goods.

Just because exporters quote a price in dollars does not by itself imply that these dollar prices are sticky. In a series of papers with coauthors, I document that dollar stickiness in the short run is indeed a feature of non-commodity prices in international trade (Gopinath and Rigobon 2008; Gopinath, Itskhoki, and Rigobon 2010; Casas et al. 2017; Boz, Gopinath, and Plagborg-Møller 2017a). These findings are summarized in my definition of an international price system characterized by two key features. First, the overwhelming share of world trade is priced/invoiced in a small set of currencies, with the dollar the dominant currency. Second, international prices *in their currency of invoicing* are not very sensitive to exchange rates at horizons of up to two years.

Consistent with the evidence of sticky dollar pricing, Boz, Gopinath, and Plagborg-Møller (2017b) find no evidence of the comovement between nominal exchange rates and the terms of trade that is a central piece of the Mundell-Fleming paradigm. Using a newly constructed data set of harmonized (non-commodity) annual bilateral import and export unit value and volume indices for fifty-five countries covering 91 percent of world trade for the period 1989–2015, Boz, Gopinath, and Plagborg-Møller (2017b) estimate that a 1 percent depreciation of the bilateral exchange rate is associated with only a 0.8 percent depreciation of the bilateral terms of trade (in the year of the depreciation), with a confidence interval of 0.04, 0.13. As a reference, the producer currency pricing

paradigms would predict a value close to 1, while the local currency pricing paradigms would predict a value close to  $-1$ . This finding is consistent with the fact that prices in international trade are sticky in a dominant currency, which is overwhelmingly the dollar.

### Dominance in Asset Markets

Contrary to the complete markets assumption in standard New Keynesian models, it is well recognized that markets are incomplete and the dollar is heavily used in international financial transactions. In the case of emerging markets, it has been long recognized that they rely heavily on foreign currency borrowing and that, too, in dollars, a phenomenon referred to as “original sin” (Eichengreen and Hausmann 2005). Figure 2.1.3 from Bräuning and Ivashina (2017) reports statistics on syndicated cross-border loans from 1990 Q1 through 2016 Q3. As the currency breakdown of loans reveals, the dollar is overwhelmingly the currency of choice. The euro, on the other hand, has a significant share mainly for emerging Europe and developed countries. Indeed, the dollar liabilities of non-US banks, which are on the order of \$10 trillion,

FIGURE 2.1.3. Dollar Dominance in World Finance

Geographic Region	# Borrowers	# Loans	Currency Breakdown of Loans		
			USD	EUR	Other
Emerging Africa (incl. Middle East)	944	1,902	92%	5%	3%
Emerging Asia and Pacific	3,955	7,618	87%	1%	12%
Emerging Europe	1,259	3,379	76%	20%	4%
Emerging Americas	1,431	2,661	97%	0%	3%
Developed Countries	26,118	59,887	61%	24%	14%

(Source: Bräuning and Ivashina, 2017)

Note: The statistics are based on syndicated cross-border loans from 1990:Q1 through 2016:Q3. Country groups are based on the BIS classification. Offshore centers are excluded from the sample.

are roughly comparable in magnitude to those of US banks (Shin 2012; Ivashina, Scharfstein, and Stein 2015). According to Bank for International Settlements (BIS) locational banking statistics, 62 percent of the foreign currency local liabilities of banks are denominated in dollars.

A consequence of dollarization of world finance is that firms outside of the United States often suffer a balance sheet (currency) mismatch problem. This is because dollar borrowing in many cases is done by firms that do not have corresponding dollar revenues, so that these firms end up with a currency mismatch and can be harmed by dollar appreciation as established by Aguiar (2005), Du and Schreger (2014), and Kalemli-Ozcan, Kamil, and Villegas-Sanchez (2016).

#### Dominance in Central Bank Reserves

According to the IMF's COFER (Currency Composition of Official Foreign Exchange Reserves) data base, out of \$10 trillion of reserves (2017 Q4), for which it has data on currency composition, the share in dollars is 63 percent, followed by the euro at 20 percent. As argued in Obstfeld, Shambaugh, and Taylor (2010), these high levels of reserves reflect not only trade considerations but also the desire of central banks to be the lender of last resort to their banking systems.

#### Dollar "Exorbitant Privilege"

Last, it is often noted that the dollar enjoys an "exorbitant privilege" in world markets in that US dollar risk-free assets generally pay lower expected returns (net of exchange rate movements) than the risk-free assets of most other currencies. That is, there is a violation of uncovered interest parity (UIP) that favors the dollar as a cheap funding currency (Gilmore and Hayashi 2011; Hassan 2013).

These facts on dollar dominance in the spaces of trade, finance, and central bank reserves lead to a natural question of what gives rise to such dominance, which I turn to in the next section.

### WHAT MAKES A CURRENCY DOMINANT?

There exist several explanations for why a single currency may dominate in trade invoicing (Engel 2006; Gopinath, Itskhoki, and Rigobon 2010) and separately for why it may dominate in safe assets (Hassan 2013; Gourinchas and Rey 2010; He, Krishnamurthy, and Milbradt 2016; Farhi and Maggiori 2018). However, there exists no unifying explanation for dominance in both trade and finance. It cannot be just sheer coincidence that the dollar dominates in multiple spaces. It is precisely this joint dominance that we explore in Gopinath and Stein (2018a). We are motivated here by the historical evidence on the emergence of dominant currencies best summarized in a quote by Eichengreen (2010): “Experience suggests that the logical sequencing of steps in internationalizing a currency is: first, encouraging its use in invoicing and settling trade; second, encouraging its use in private financial transactions; third, encouraging its use by central banks and governments as a form in which to hold private reserves.”

The mechanism in Gopinath and Stein (2018a) can be explained using the heuristic of figure 2.1.4. Start from the top-left box in

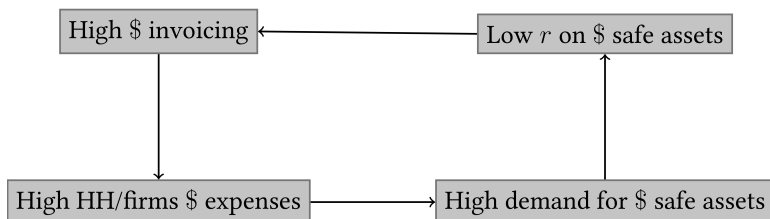


FIGURE 2.1.4. Making of a Dominant Currency

Source: Author.



figure 2.1.4. Suppose there is high dollar invoicing in trade so that importing households and firms in emerging markets have predictable spending in dollar terms (a predictability that arises from the stability of dollar prices), in addition to predictable spending on local goods invoiced in local currency (bottom-left box). Given the volatility in exchange rates, this gives rise to a demand for dollar safe assets in addition to local currency safe assets. This safety has to do not just with getting rid of nominal (default) risk but importantly of getting rid of real consumption risk. That is, by holding a safe dollar deposit, emerging market importers can guarantee themselves a predictable level of consumption of imported goods. The demand for these dollar safe assets is then increasing in the share of expenditure devoted to imported goods invoiced in dollars. The preference for safe assets in dollars and in local currency makes these assets more expensive (that is, they have a higher price) relative to risky assets. In addition, there is the possibility of a violation in uncovered interest parity across safe dollar and safe local currency assets. The particular form of this violation depends also on the supply of safe assets.

Among the suppliers of dollar safe assets are the US Treasury and US banks and firms that can “tranche” their dollar earnings to produce safe claims. These sources of supply are what one would describe as natural sources of dollar safe assets. However, if the demand for dollar safe assets exceeds this supply, emerging market (EM) banks and firms need to be drawn in to create safe assets. These emerging banks and firms have a comparative disadvantage in producing such safe assets, given that their projects pay out in local currency. That is, to produce safe assets the bank needs to ensure that, even in the worst-case realization of the projects, the bank has sufficient funds to repay. In the case of local currency safe assets, this would require that, even in the worst-case scenario for payoffs of the local currency projects, banks can repay their liabilities. However, to create dollar safe assets it must be that in

addition the bank is able to repay in the worst-case realization of the exchange rate, that is, in the event of a currency crisis. This makes it costlier for EM banks to produce dollar safe claims as opposed to local currency safe claims. So in this case the only reason they will do so is if it is cheaper for the bank to borrow in dollars. Consequently, in equilibrium when the marginal supplier of the dollar safe asset is an EM bank or firm with a currency mismatch it must be that uncovered interest parity is violated and dollar safe assets pay a lower interest rate as compared to local currency safe assets (box in the upper right-hand corner).

Now suppose that some emerging market projects produce goods that are for export to other emerging markets and a decision needs to be made whether to invoice exports in dollars or in the producer's currency. The upside to invoicing in dollars is that it generates the collateral needed to be able to borrow cheaply in dollars. This benefit has to be weighed against the cost of earning revenues in dollars when the ultimate shareholders are domestic EM households whose consumption basket is tilted toward local currency goods. Given this trade-off, if the interest rate on dollar borrowing is sufficiently low, exporters will choose to invoice in dollars. Unlike previous explanations for why firms invoice exports in dollars that have to do with the curvature of the demand they face and the particulars of their cost function, our (complementary) explanation has everything to do with finance. Exports are invoiced in dollars because doing so makes it cheaper to finance projects given the lower interest rates on dollar borrowing.

A possible alternative to invoicing in dollars might be to invoice in home currency and swap that for a dollar payout using a financial hedging instrument. Presumably, this should provide the equivalent collateral to be able to borrow cheaply in dollars. Our argument for why invoicing is chosen over financial hedging is because of the evidence that the latter is more expensive. As explained in the paper, the agency risks associated with trade are smaller than those

associated with financial hedging and consequently it is less costly for the exporter to invoice in dollars. This is supported by empirical evidence that hedging is indeed costly and has negative spillovers to investment (Rampini and Viswanathan 2010; Rampini, Viswanathan, and Vuillemeys 2017, among others).

Finally, the loop is closed by recognizing that the choice of EM exporters to invoice in dollars affects the consumption share of EM households and firms that is invoiced in dollars. This then amplifies the safe asset demand in dollars which reinforces the initial demand for dollar safe assets, lowers interest rates on such assets, and in turn rationalizes the decision of exporters to invoice in dollars. The argument therefore goes as follows: Why do exporters invoice in dollars? Because it is cheaper to finance in dollars. Why is it cheaper to finance in dollars? Because exporters invoice in dollars. This two-way feedback can entrench the dollar as the global currency of choice, even when other countries are roughly similar to the United States in terms of economic fundamentals.

Size matters in becoming a global currency. That is, for the two-way feedback mechanism to work it must be that the country is significant in world imports alongside exporting in its own currency. The United States exports in dollars and it is a significant fraction of world trade. As to why the dollar and not the euro, Gopinath and Stein (2018a) appeal to history selecting the dollar as the dominant currency, as it was dominant well before the birth of the euro in 1999. Even if the combined GDP of countries that use the euro is a close second to the United States, the historical dominance of the dollar preserves its position.

Given that central banks play the role of lenders of last resort, the dollarization of banking in emerging markets leads to the dollarization of central banks' reserves as explained in Gopinath and Stein (2018b). In the event of a banking crisis, the central bank is expected to step in to bail out holders of safe deposits. It can do this either by saving *ex ante* in the form of dollar reserves or by taxing

*ex post*. Because crises are associated with large currency devaluations, there is a benefit to accumulating dollar reserves *ex ante* so as to minimize the cost of taxation *ex post*. This is why, despite the fact that dollar reserve accumulation is associated with a negative “carry” in that the central bank borrows at a higher interest rate in local currency as compared to what it earns in dollar safe assets, it is optimal to hold dollar reserves, and this is increasing in the share of the country’s banking that is dollarized.

I conclude by briefly discussing the Chinese renminbi and crypto-currencies. China in recent years is following closely the recipe of internationalization outlined in the Eichengreen quote. Through a concerted policy push, the renminbi’s share as a settlement currency in China’s trade has grown from 0 percent in 2010 to 25 percent in 2015. These are still early days and the global adoption of the renminbi will require full convertibility of the renminbi, capital account liberalization, and stability of and trust in Chinese financial institutions and central bank policy, all of which can take time. As our model highlights, a country like the United States can retain its dominant position for much longer after it has lost the lead in global trade, but it is important to keep in mind that when the switch begins the process can be quite rapid because of the complementarity between trade invoicing and safe asset demand. As for the potential of crypto-currencies such as bitcoin to acquire dominance, my view is that given that such currencies in their current form serve neither as a unit of account nor as a cheap transaction technology, but primarily as a highly risky store of value, the prospect that they will dominate seems remote.

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## DISCUSSANT REMARKS

*Adrien Auclert*

This paper begins with a set of five apparently disconnected facts about the global role of the dollar.

The first fact is the importance of the dollar in global trade invoicing. Consider the paper's figure 2.1.2, reproduced from Gita's 2015 Jackson Hole paper (Gopinath 2015). The figure plots, for a set of countries, the share of imports invoiced in dollars, relative to the share of imports that actually come from the United States. As is apparent, virtually every country invoices a lot more of its imports in dollars than it actually buys from the United States—a sharp contrast to the Mundell-Fleming paradigm in which the imports from any given country are always invoiced in that country's currency. This and other related facts from Gopinath (2015) have prompted an important conversation in the international finance community on the causes and the consequences of this large role of the dollar in trade invoicing and, more broadly, about the role of the dollar as this dominant currency. This paper provides answers to some of these questions.

It turns out that trade invoicing is not the only place where the dollar plays an outsize role. Fact 2 is that it also plays an important role in denominating the deposits of non-US banks. Fact 3 is that it also plays an outsize role in denominating the liabilities of non-US corporations.

The dollar's importance in international finance does not stop there. Fact 4 is that US dollar borrowing is typically cheaper, in the sense that there are systematic uncovered interest rate parity (UIP) violations that favor the dollar as a borrowing currency. Fact 5 is that corporate balance sheets are also currency-mismatched, in the sense that their assets are not as heavily skewed toward the dollar as their liabilities.

This paper proposes, for the first time, a unified and elegant theory connecting these five sets of facts. It then derives potential implications for the euro or the renminbi going forward. How likely is it that these currencies will replace the dollar as a dominant currency one day, in the sense of these five facts?

The model has two key ingredients. By far the most important ingredient is the assumption that the US dollar is a unit of account for assets and liabilities, *including* trade payables and trade receivables—the former is a liability for importers, the latter an asset for exporters. When prices are sticky in the invoicing currency, the liabilities of importers and the assets of exporters are not indexed to the exchange rate. This creates a motive for asset-liability management: firms want to match the currency denomination of their assets to that of their liabilities. Banks intermediate this desire. This explains facts 1–3.

The model’s second key ingredient is that the US dollar is a safe store of value. As a result, in-equilibrium dollar funding is cheap (fact 4), creating an incentive for currency mismatch in balance sheets (fact 5).

The argument is summarized in figure 2.2.1. Consider any country other than the United States—say an emerging market country. Imagine that that country’s importers are invoiced in dollars. Their

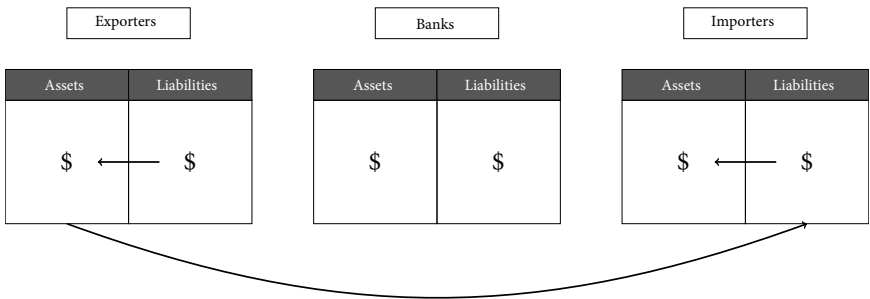


FIGURE 2.2.1. The Model’s Causal Chain from Dollar Invoicing of Imports to Dollar Invoicing of Exports.  
Source: Author.



trade payables are therefore dollar liabilities, generating an incentive for them to hold dollar deposits so as to match the denomination of their liabilities and their assets. This demand for dollar deposits puts pressure on dollar interest rates, leading local banks to issue such deposits. Moreover, low interest rates on dollar loans lead *exporters* to want to borrow in dollars, so that bank assets are also in dollars. Next, given that exporters have dollar liabilities, they also want to match these to their assets, encouraging them to invoice in dollars (in the model, they maintain some currency mismatch, but this is not essential). These non-US exporters now have *their* exports invoiced in dollars, in turn affecting other countries in a self-reinforcing loop. This idea is at the heart of the paper's model.<sup>1</sup> In fact, the mechanism is so strong that it can lead to a situation of multiple equilibria, in which the dollar's role in trade and banking becomes self-reinforcing.

The paper raises one key question: why doesn't the world just dollarize? The paper does not explicitly model the benefits of flexible exchange rates. If indeed there is such a strong incentive to match the currency of assets, liabilities, and trade invoices, there is a case for dollarizing everywhere.

Interestingly, a large literature in the sixties and seventies, the optimal currency area literature (Mundell 1961; McKinnon 1963; Kenen 1969), took the opposite approach: it was mostly modeling the *costs* of having the same currency, while leaving the benefits unmodeled. To me, Gita's paper provides a crisp example of the benefit side of the currency union—it allows importers, exporters, and banks to reduce the exchange rate risk on their balance sheets. One interesting avenue for research would be to explore these costs and these benefits jointly inside the same paper.

As I mentioned earlier, the paper generates multiple equilibria because of these large complementarities between the dollar

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1. See Doepke and Schneider (2017) for a similar formulation.

denomination of imports and exports. Interpreting history along these lines, the paper argues that we can think of the US dollar's replacement of the pound as the dominant currency as a switch from one equilibrium to another. In principle, going forward, we might see the equilibrium switch again, with the euro or the renminbi becoming the new dominant currency. But what this static model misses is that existing assets and liabilities have long maturities. So in a sense, the anchor of history is likely extremely strong—it would take a really long time for all assets and liabilities to be redenominated in any new currency, and the staggered nature of contracts makes such a coordination very large to imagine.

As I have argued, the main assumption of the paper is that the US dollar plays a role as a unit of account. But there's also this role as a store of value, which in the model generates UIP violations. Consider a simplified model where savers are valuing dollars directly in their utility and can choose to consume either today or tomorrow. In this model, these savers are risk-neutral and they can save in the form of either domestic deposits or dollar deposits. To do the latter, they swap their current domestic deposits for dollars today and then have to bring them back tomorrow at tomorrow's exchange rate. This model generates a UIP violation (or an exorbitant privilege), because there is a direct benefit from holding the dollar over holding the swap, which depresses dollar interest rates in equilibrium.

This explanation for UIP is complementary to typical risk-based explanations, in which investors are worried about the exchange rate risk and the dollar commands lower equilibrium rates of return because it appreciates in bad times and so provides a good hedge. In this typical view, UIP violations emerge naturally, while covered interest rate parity (CIP) holds as a result of no arbitrage conditions—something that appears to be true in the data, except in the recent period since the financial crisis. The argument in the

paper is that CIP should still hold when dollars are valued in the consumer's utility. This relies on the assumption that consumers who swap a dollar forward aren't just as happy holding the dollar directly, which is a fairly extreme assumption. If the paper made the alternative assumption in which investors do get the dollar benefits from having swapped dollars ahead of time, the model could be used to explain the cross-currency basis that we've seen open up since 2008.

My final point is on testing the theory. The paper tests one particular cross-country prediction, which is that countries that have larger invoicing shares in dollars to begin with also tend to have larger dollar deposits as a share of total denomination of deposits issued by their banks. But the theory provides many micro-level predictions beyond this important cross-country prediction. As an example, importers in the model that have large invoicing in dollars should also hold many more deposits in dollars. And banks whose clients are importers with larger exposures (those who have more invoices) should also issue more dollar loans. Exporters who choose to invoice in dollars will also tend to borrow in US dollars, and so on. I think it would be really nice to test these many predictions directly in matched bank-firm data.

To conclude, this is a novel and coherent framework that links the prominent role of the dollar in both trade invoicing and banking. The main assumption of the paper is that dollar invoicing creates an asset-liability management motive for firms, which triggers a causal chain from import invoicing to export invoicing via cheap funding. My view is that, in this story, the role of the dollar as a unit of account is much more important than its role as a safe store of value. More broadly, I am certain that there will be many more papers on this fascinating topic, so that it would be nice to flesh out the particular testable implications of this model of dollar dominance relative to explanations already in the literature.

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## GENERAL DISCUSSION

GITA GOPINATH: The question was, why doesn't the whole world dollarize? In our setup, we have assumed exogenous. Like you said, there's a whole bunch of goods that you buy domestically, that have a price in local currency, and have a local sticky currency price. So if we introduced a monetary authority into this model, then given this assumption that we live in a world where there's a whole bunch of goods that are priced in your own local currency, you would have reasons why you would not want to fully dollarize, because then you'd give up independent monetary policy. And independent monetary policy would be valuable, because you would get still the right relative price adjustment in terms of your traded and your non-traded goods. So you're fully aware of all of this.

And so, since there is an existing literature on what the costs are of giving up monetary policy flexibility, we focused here on just the other part of it. But clearly, I think the next step if we want to tie this into the bigger question of monetary policy, I think we need to do more on it.

The CIP violation is a bit of a quaint thing, and it shows up once in a while in the middle of a financial crisis. I think the phenomenon you're talking about is more general and shows up all the time. It's why we didn't focus on it.

So the theory of testing at the micro level, I think that's a very good idea. But I think the first-order thinking about being a dominant currency is that, unfortunately, this is like one observation for a country. So if you think of Argentina, all firms would export in dollars, all firms would import in dollars, the banking sector is dollarized. And so, there's not interesting within-firm variation. But that said, I think you could think of other countries, Switzerland, for instance, where you have a mix of three

currencies—the euro, the dollar, and the Swiss franc—and see whether you have interesting variation over there.

MICHAEL BORDO: If I look at the history of the international monetary system, there's a reason why the pound emerged as the dominant currency in the nineteenth century and the dollar in the twentieth century. It is based on the deep fundamentals of the rule of law and property rights, etc., which led to the development of deep financial markets and sound institutions, as well as another factor, which is global economic and political power. I am not discounting the invoicing story but I believe that these deeper fundamentals are a very important part of an explanation of how a dominant currency evolved. And it seems to me very questionable whether China could acquire this position until they satisfy these preconditions.

GITA GOPINATH: I completely agree that the rule of law and property rights are important, which is why in the model, when we talk about the emergence of a dominant currency, we compare the US dollar and the euro, where we think there's similarities there between the institutions and central bank credibility and all of that. In fact, one of the very crucial variables there that's in the model is the extent to which the renminbi would depreciate if things go terribly wrong. And if you feel that this is a central banking environment where you can't have that much credibility associated with it, then it's going to take a much longer time for the renminbi to come in there. You need full convertibility. You need stronger financial institutions, and all of those matter. But what I find quite interesting is the fact that the recipe book, the way that they're going about internationalizing the renminbi, is very much in the style of the way it happened previously with the dollar and then previously with the pound.

JUHI DHAWAN: If I could offer a couple of comments from what we're seeing in the marketplace. One, earlier this year, China launched a futures oil contract priced in yuan. This seems to signal a move

away from dollars toward renminbi. While, obviously, current share of such contracts in the energy market is low, it will be interesting to follow to see how it gains traction over time. Two, while I completely agree with comments made earlier, that the rule of law and the importance of sound institutions is critical in determining which currency dominates as a reserve currency, it is also important to consider the money flows under way in financial markets. Sticking with China, the country has stated that its foreign exchange reserves have peaked and, further, the central bank has adopted a basket of currencies to stabilize its exchange rate against, rather than just the dollar. Again, this may be indicative of the possibility of a break from prior recent history on the dominance of the US dollar. Monitoring real asset purchases and financial flows at a time of transition of monetary policy in multiple large countries of the world seems to be more important than ever.

GITA GOPINATH: I agree with you. So this other paper that I mentioned, that I have with Jeremy Stein on central bank reserves, there's another argument for why there might be gains to coordination, which Raghu didn't bring up. But in this environment, where central banks are trying to kind of recognize the fact that they have a dollarized banking system, and that helps with having dollar reserves, because in case of a crisis you can come in and bail out your banks as opposed to taxing heavily, that gives rise to this externality, which is that this huge demand for dollar reserves is driving down interest rates in dollars. And those lower interest rates in dollars are then further encouraging the domestic banking sector to dollarize. So we certainly have an argument for why there's excess reserve accumulation by central banks, which is then feeding into the problem.

ROBERT HALL: You should extend this very interesting line of research to other standards. First of all, we have one worldwide standard for keeping time. This standard is used everywhere. For weights

and measures, all the rest of the world uses the metric system, except the US. But the US has had to accede to the metric system. For example, you need to have metric wrenches to work on any car today. But America's adherence to English weights and measures puts the US at a disadvantage. The Carter administration decreed under Article I of the Constitution that we had to use the metric system, but the Reagan administration, recognizing how unpopular it was, changed it back. So we're still suffering from becoming a minority in the world in the case of standards for weights and measures. England, of course, doesn't use English weights and measures anymore, but the US does. So a similar line of analysis would apply to these issues, in addition to the standards for quoting prices considered in the paper.

MICHAEL MELVIN: I was struck by the bar chart on the fraction of trade from the US and the fraction of imports denominated in dollars, and certain commodities are dollar-based globally, right? So to what extent can you explain that wedge by oil imports? There wasn't enough time to sort out the different bars, but it may not be so much freedom of choice by the importer as it's just given.

GITA GOPINATH: So to the simple question of how much of this is basically a bunch of countries importing commodities that have a dollar price traded on an exchange, is a flexible price . . . For the countries where we are able to make the distinction, where we take out commodities and keep the rest, these pictures look very similar. So it's not the case. Now we don't have data for every single country in the world that can do that breakdown, but for all countries that I've looked at, where we could actually tell those two apart, it's still overwhelmingly the dollar.

ROBERT HELLER: Certainly in Silicon Valley, we talk all day long about network effects. Isn't the dollar's dominance similar to network effects? The dollar almost took over the world, and it's very difficult for a second competitor to come up and to compete with



the currency once it's dominant, just simply because of network effects.

GITA GOPINATH: Yes, I think you're right. This is going into the details of how the network gets kind of an argument. There's no network specifically here, but this is an argument of why you would want everybody to end up holding the dollar, even though they're doing this in a very decentralized way. And this is coming from the low interest rates and the trade invoicing, which are just feeding on one another. Now there could be other kinds of explanations, which are based on kind of global supply chains, that I have my liabilities that I owe to another seller to me, and if that's going to be a dollar liability, I'd like to receive payment in dollars, so those other channels are also in there, which we haven't fleshed out, but that also can kind of enhance this argument that you inferred.

JIM DORN: I think it's true that the renminbi is being internationalized as you pointed out, but it's not yet a safe-haven currency, as Eswar Prasad pointed out in his recent book [*Gaining Currency: The Rise of the Renminbi*]. I also think that one of the main things going on in China right now with Xi Jinping is the huge crackdown on the free flow of information. China needs a free market in ideas to have an international global currency that's widely accepted.

GITA GOPINATH: To some extent, I can agree, yes.

JOHN SMYTH: Thank you for your research. It's very useful and applicable at my job at JP Morgan. I wanted to see if you've seen any flow-through in terms of lowering the cost to borrow, because if you've got dollar deposits, and you're transacting mostly in dollars, your cost to borrow is less. Given that the European Central Bank has been on a bond-buying spree, and it costs less for a junk bond issuer in Europe, in Italy, to borrow, than it does our US government, have you seen any flow-through to the euro as

a currency gaining traction because it's cheaper now to borrow in Europe than it is here?

GITA GOPINATH: That's a good point. What we've taken as completely neutral in the model is monetary policy. So the way I think of what's happening in the euro area relative to the US right now is we have these differential monetary policy stances which show up in these different borrowing rates. We're going to have to see how this plays out. It's too early to tell. The simple answer is I haven't seen anything about it since the divergence in interest rates has happened in terms of invoicing and other things from the euro area. But what I do know, and this is what we're just seeing kind of very casually in terms of correlations, is the fact that there was the US crisis, and then post the crisis in the euro area, where there was a real concern about whether the euro would actually exist as a currency, and you actually saw a decline in euros in the banking system, in euro liabilities, and you see a decline in euro trade invoicing, in both.

I feel our paper is about saying, okay, 80 percent of our trade is in dollars, and then there are movements and movements around it. I worry about 80 percent less about the movement, but there seems to be some co-movement between the two.

JOHN COCHRANE: This question may end with more humor than substance. Here in the Silicon Valley, right now, everybody is abuzz over blockchain. That's just about every new venture capital project. There is a vision that a global electronic currency, if it could be made to have a stable value and many other problems fixed, would allow exactly Bob's weights and measures, a stable price standard immune from everything we talked about in the first session—governments deciding they need currency controls, capital controls, and, if we run into debt crises, inflations and expropriations. In the chaos, there is a vision afoot of a nongovernment currency potentially taking over as the

international standard. You likely have a “blockchain comment” ready, and it would be good to hear it.

GITA GOPINATH: At the time I presented this paper, it was not blockchain. It was, “Do you think bitcoin could be the next dollar?” And my answer to that is, *no*. It’s terrible for transaction purposes, and it doesn’t serve that purpose at all. And the bottom line is I don’t think this is not going to be an unregulated enterprise. If it turns out that there is another currency out there that’s basically taking over the power of the US central bank, I just don’t think that that will exist. And here you and I might differ. I actually do think monetary policy has some positive effects, and so the idea that there’s a finite supply of these coins, that brings me back to the old problems of the gold standard, and I do like the idea of someone having control over the amount of this that’s floating around, and so again, this is all new technology. I don’t want to say that there’s no space in which it might exist. But it’s not something I’m going to start writing a paper about.

ANDREW LEVIN: I’d like to flag a connection to the previous session, where Raghu Rajan talked about international responsibility and Paul Tucker highlighted political realities. And this paper shows that there are clear political and economic benefits to having a reserve currency, i.e., the US has an “exorbitant privilege.” Those benefits provide a motive for the Congress and the Treasury and the Federal Reserve to take responsibility for assuring the continuing role of the US dollar as a reserve currency, and that could provide an impetus for addressing the international political issues.

PAUL TUCKER: I wanted to add to that question, please. So when you were talking about the transition from sterling-based invoicing to dollar-based invoicing, I wondered to what extent you thought about how the world coordinated on that switch happening, and to what extent it required acquiescence by the UK.

This strikes me as tremendously important in terms of framing the issues around any future change. It seems to me obvious that the US one day acquiescing in renminbi invoicing becoming a dominant thing isn't quite the same thing at all as London acquiescing in the switch to dollars, as the security relationship is profoundly different.

The other suggestion I wanted to make about the next phase of this work, when you introduce monetary policy, is not to think about monetary policy in the normal way we do (in terms of stabilizing the path of aggregate demand and so on). Rather, think about it as providing liquidity on demand in your own currency. A few years ago I suggested to Janet Yellen and some others that far from being rather restrictive about providing swap lines against other currencies, instead, as international use of the renminbi grows, it's plausible that we will see the US authorities and the Chinese authorities positively marketing swap lines as a way of underpinning invoicing in their currency and assets denominated in their currency being regarded as the safe asset. That strikes me as kind of an important part of the monetary politics we potentially face in the coming decades, which has nothing to do with stabilizing nominal demand at home.

GITA GOPINATH: I agree with everything you said.

GEORGE SHULTZ: Here's the problem. Right now, we have gigantic debt, huge deficits, and rising interest rates, so there is a compounding process: the burden of the debt rises, the deficit rises, the debt rises, the burden rises, and so on. It is totally out of control, but no one is paying the slightest attention to it. Meanwhile, people are buying things from the US with US dollars, but they're beginning to wonder if the dollar is going to be worth anything. My great friend Sam Nunn, who was a senator and legendary chairman of the Senate Military Affairs Committee, is good at telling jokes. I saw him the other day and said, "Sam, tell me a joke." He said, "Washington, DC."

Things are out of hand. What's going to happen?

GITA GOPINATH: I can't agree more. I think you're right. The US already has a debt problem. If it's going to blow that up even more, it's going to flag concerns. The question is whether there is a viable alternative there. Initially, at some point, the euro seemed viable, and then you had the euro crises, and now there's going to be another period of wait and watch. In the case of the renminbi, I think the Chinese government is pushing very hard to internationalize it, but at the same time they're worried about the volatility of their exchange rates. So if anything, for now they've actually put more controls on capital flows. So in the absence of a very easy alternative, I don't know how long this process will take, but clearly none of what's going on right now helps.