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Essential hybridity: A money view of FX ☆

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ABSTRACT

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Economics and finance typically analyze the exchange rate as the relative price of goods and assets, respectively. By contrast, this paper explores a "money view" which understands the exchange rate as the relative price of money, a price that is determined in dealer markets by the order flow facing profit-seeking dealers. The economics of the FX dealer are analyzed using an extension of Treynor's model of security dealers; central banks are analyzed as FX dealers of last resort. *Journal of Comparative Economics* **41** (2) (2013) 355–363. Barnard College, Columbia University, 3009 Broadway, New York, NY 10027, United States.

1. Introduction

What kind of a thing is an exchange rate? On the one hand, it is clearly a price set in a market; on the other hand it is clearly a policy instrument of the state. The exchange rate is where one national financial system confronts another, but it is also where one nation state confronts another. Traditionally, economics and finance have focused attention on the former dimension, while political science and law have focused attention on the latter dimension, with the consequence that the two traditions have wound up largely talking past one another. A more important consequence, from the perspective of this paper, is that neither tradition has adequately engaged with the essentially hybrid character of the object under study.

In the present paper, by contrast, we propose a framework that encompasses both market and state dimensions. The key is to conceptualize the exchange rate as the price of one money in terms of another money, money itself being essentially a hybrid entity, part market and part state. Just so, base money, or currency, is typically issued by the state and privileged as legal tender, whereas bank money (and even more so non-bank "shadow" money) is a creation of private profit-seeking entities. In practice, this essentially hybrid character of money is also typically obscured by the fact that, inside the boundaries of a given currency area, par exchange between base money and bank money maintains a quantitative equivalence between these two qualitatively disparate types of money.

How is this par exchange achieved? Central banks, hybrid entities themselves as both government bank and bankers' bank, are key to the process (Mehrling, 2010). In the event that banks are called upon to convert bank money into base money, central banks stand ready to help (in their role as bankers' banks) by taking the opposite side of the trade, accepting

☆ This paper seeks to extend to the case of foreign exchange earlier work of mine that develops a "money view" centered on the operations of the dollar money market (Mehrling, 2011). The first draft was produced for a Workshop of the Global Law and Finance Initiative held at Columbia Law School, September 21–22, 2012, sponsored by a grant from the Institute for New Economic Thinking. Anush Kapadia provided capable research assistance and stimulating discussion.

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bank money and paying out base money. A limiting case in point is the so-called Bagehot Rule for stemming financial crisis—lend freely at a high rate against good collateral.

Viewing the exchange rate through this money lens, it is clear that the exchange rate similarly maintains quantitative equivalence between what are in fact qualitatively disparate types of money, and here as well the role of the central bank is key. Various institutional/legal forms are conceivable. At one extreme, central banks may act as agents of the state, setting the exchange rate as a matter of policy by quoting buy and sell prices in terms of the international reserve currency, and absorbing the resulting order flow on their own balance sheet. At the other extreme, central banks may adopt a hands-off policy and allow the exchange rate to be determined by private profit-maximizing dealers who quote their own buy and sell prices. In between these two extremes is the hybrid (and more general) case where private dealers do most of the day-to-day trading, while the central bank plays a supporting role as "dealer of last resort". In the hybrid case, the key to understanding exchange rate determination is to understand the relationship between the FX dealer and the central bank. One way to do this is to understand the central bank as a particular kind of FX dealer, seeking stability or some other goal rather than profit.[1]

As a first step toward that end, in this paper extensive use will be made of the analytical framework laid out in Jack Treynor's "Economics of the Dealer Function" (Treynor, 1987).[2] Treynor was thinking mainly about security dealers who make equity markets by quoting buy and sell prices (the "inside spread"), shifting their quotes up or down as inventories are drawn down or built up, respectively. In setting prices, Treynor emphasized, the dealer has no need to assess the fundamental value of the security. Rather, he is mainly concerned with the ultimate support price at which deep pockets—Treynor called them value investors—will be willing to take excess inventory off his hands, whether short inventory positions (the maximum price) or long inventory positions (the minimum price). In Treynor's framework, these support prices establish the "outside spread", which is to say liquidity of last resort. These support prices are reached when dealers hit their maximum risk exposure, short or long, as determined by their balance sheet capacity. In what follows, we adapt Treynor's framework to think about determination of the exchange rate, and about the relationship between profit-seeking private dealers and stability-seeking central banks.

2. Economics and finance on FX

What we may call the "economics view" tends to see the exchange rate as the price of goods, specifically the relative price of tradable goods in two countries. Case in point is the Economist's Big Mac index which converts the local price of a Big Mac into dollars, using current exchange rates, and interprets the result as an indication of whether the exchange rate is overvalued (Big Mac costs more) or undervalued (Big Mac costs less) relative to the dollar.[3] More generally, economists appeal to the theory of "Purchasing Power Parity" which asserts a tendency for tradable goods to trade at the same price all over the world:

$$P = sP^*, \tag{1}$$

where P and P^* are respectively the dollar and foreign price of tradables, each expressed in local currency, and s is the exchange rate expressed as the dollar price of a unit of foreign currency (American quoting convention). Viewed through this frame, the perennial question of whether it is better to have fixed or floating exchange rates seems to revolve around one's view about the forces underlying the tendency to Purchasing Power Parity. If price levels are flexible and adjust rapidly, then fixed exchange rates can work. If price levels do not adjust rapidly, then maybe flexible exchange rates are better.[4]

What we may call the "finance view", by contrast, tends to see the exchange rate as the price of assets, specifically the relative price of tradable financial assets in two countries. As such, the exchange rate reflects the present value of expectations about future developments in the two countries. Since new information about the future arrives randomly, asset prices should fluctuate randomly as well, and so too should exchange rates. Perhaps the simplest expression of this finance point of view is the arbitrage relationship known as Forward Interest Parity, which asserts equivalence between the return on a dollar invested at home, and a dollar that is converted into foreign currency, invested in foreign assets, and then converted back into dollars:

$$f = s(1 + R)/(1 + R^*), \tag{2}$$

where R and R^* are respectively the dollar and foreign interest rate for a given term T, s is the spot exchange rate (as in (1)) and f is the forward exchange rate for date T.

Viewed through this finance frame, fixed exchange rates (i.e. $f = s$) seem ill-advised prima facie. Exchange rates should fluctuate randomly, so attempts to fix exchange rates simply create arbitrage opportunities that investors inevitably find ways to exploit. One example is the so-called "carry trade" which involves borrowing in a low interest currency and lending

[1] There is an enormous literature on the microstructure approach to exchange rates (Lyons, 2001; Evans, 2009; Rime, 2009) but it is largely empirical, seeking statistical regularities in the relationship between order flow and prices.

[2] Other more formal models are surveyed in Madhavan (2000); the range of practical applications of these models is explored in Harris (2003).

[3] www.economist.com/node/21542808.

[4] There are other points of view as well that are consistent with what I am calling the economics view, points of view that concern themselves not with final long run Purchasing Power Parity equilibrium, but rather with short run income stabilization, for example Mundell (1963). Some urge fixed exchange as a nominal anchor to tie the hands of irresponsible domestic monetary authorities, while others urge flexible exchange as empowerment of responsible domestic monetary authorities.

Surplus Country		FX Dealers		Deficit Country	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
$10 due from					$10 due to
-$10 due from +$10 spot		+$10/s FX spot	+$10 spot	-$10/s FX spot	-$10 due to
		+$10 term	+$10/s FX term		
		+$10/s FX term	+$10 term		

Fig. 1. Private settlement.

in a high interest currency, harvesting the interest differential for as long as the fixed exchange rate holds. The consequence is a buildup of pressure that inevitably causes explosion (exchange crisis), an explosion that could have been avoided by allowing exchange rate fluctuation to dissipate pressures over time (DeRosa, 2001, Ch. 3).

For the purposes of the present paper, it is important to emphasize that both economics and finance approaches to understanding the exchange rate, in their separate attempts to reveal more fundamental forces purportedly at work underneath the surface, resolutely abstract from money. When economics and finance look at trade between nations, economics sees trade in goods (including services) while finance sees trade in financial assets (including physical capital and land), but neither sees trade in money. Conceptually, it is as though trade were organized as a kind of sophisticated barter, in which one set of goods and assets is swapped for another set of goods and assets; the concrete mechanism of trade, and in particular the role of money, is nowhere to be seen.

Further, in standard statistical renderings, these two different kinds of trade are captured by the current account and the capital account respectively, and in standard theoretical renderings the sum of these two accounts is set to zero on the view that, in "equilibrium", purchases must be paid for by sales. Conceptually, it is as though trade were organized such that gross sales are always exactly equal to gross expenditures. The concrete mechanism through which temporary imbalances are absorbed, in particular through fluctuation in money balances, is nowhere to be seen.

In this paper, by contrast to both the economics and finance views, we pursue instead the idea that the exchange rate is the price of money, specifically the relative price of currencies. Instead of abstracting from the mechanism of trade, we abstract from the concrete items being traded (whether goods or assets) and focus attention on the money flows involved. And instead of imposing an assumption of equilibrium, we investigate the concrete mechanism of (potentially disequilibrium) trade. Our focus is neither on the current account nor the capital account but rather on the balance of payments, and even more on the gross flow of payments, in and out, that gives rise to a given measured net balance of payments over a given time period. In short, our starting point is the international payments system.

3. A "money view"

We start with what Minsky (1957) called the "survival constraint", which for our purposes might better be called the "reserve constraint" since we focus attention on the end-of-day clearing in a multilateral payments system. Every day payments go in and out, but at the end of the day net payments must be settled. If a country has sold more than it has bought, it is a surplus country; if a country has bought more than it has sold, it is a deficit country. The survival constraint is the requirement that deficit countries find a way to settle with surplus countries in money.

In present conditions, the world reserve currency is the dollar so, without loss of generality, we can say that the deficit country needs to acquire dollars. Possibly it has a small reserve holding but more generally it will need to acquire dollars in world foreign exchange markets. Either way, the point to emphasize is how this need to acquire dollars disciplines the behavior of the deficit country. If it cannot acquire the necessary dollars, it will be unable to complete its purchases, and some of its transactions will have to be reversed.

Fig. 1 shows a stylized example of how a deficit country might acquire dollars by relying entirely on the private FX dealing system. (This is only the starting point; the role of central banks will be introduced later.) The first row shows the net positions of the two countries before settlement. The second row shows how the FX dealer system facilitates settlement by creating credit, specifically a spot dollar liability which we may suppose the deficit country buys from the dealer at the spot exchange rate using local currency, and then transfers to the surplus country so cancelling its debt. Observe that the mechanism of settlement involves expansion of the dealer's balance sheet on both sides, and that this expansion exposes the dealer to exchange risk, namely the risk that the dollar price of its new FX asset might fall.

As a hedge against this price risk, the third line shows the dealer entering into an offsetting forward exchange contract, taking its cue from the Forward Interest Parity condition by borrowing term FX and lending term dollars. (Taking our own cue from Forward Interest Parity, throughout this paper we adopt the convention of booking forward transactions as a pair of term credits, lending in one currency and borrowing in another.) In this way, our FX dealer achieves "matched book"—if the dollar value of its new FX spot asset falls, then so also will the dollar value of its new FX term liability. It does however still face liquidity risk since maintaining its hedge requires rolling over its spot dollar liability position until maturity of its term dollar asset position.

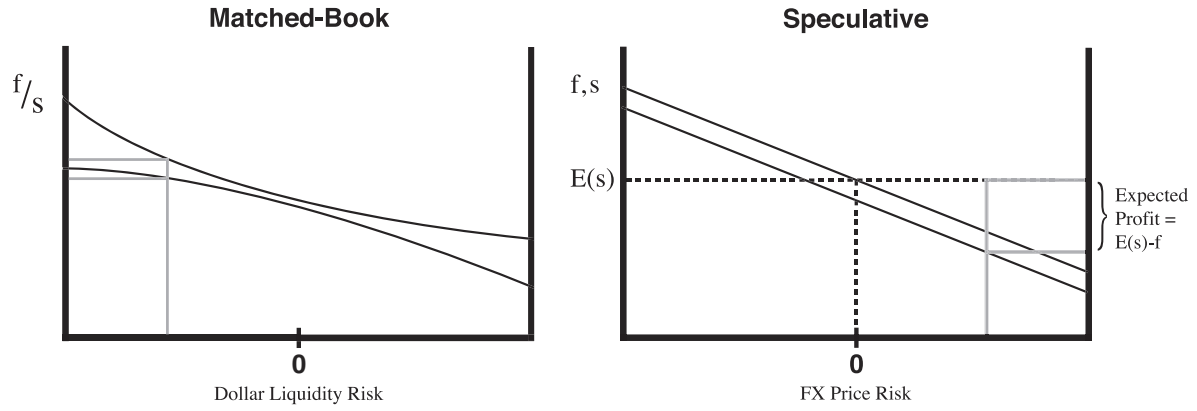

Fig. 2. Profit-seeking dealers.

The fourth row shows the position of a second "speculative" trader, possibly a dealer, who provides the forward hedge to the first dealer. Crucially, this second dealer does not have matched book and so faces exposure to exchange risk, but in the forward market not the spot market. (In practice he might hedge with a futures position, or an FX options position, but that doesn't eliminate the risk, only shift it to someone else.) In effect this second speculative dealer is engaged in a carry trade, paying the dollar interest rate and receiving the FX interest rate. If the realized spot rate at maturity is different from the forward rate at inception, this speculation will make a profit or a loss.

Fig. 2, below, depicts the economics of these two kinds of dealers, the first matched-book and the second speculative, using a version of the Treynor (1987) diagram that shows dealer quotes as a function of dealer positions. Risk exposure is measured on the horizontal axis, and price on the vertical axis. Position limits are shown as hard constraints on risk exposure, both short and long. Inside the position limits, dealers quote both buy and sell prices, the "inside spread". When dealer exposures hit position limits, prices are set instead by the value investors who quote the "outside spread". As we shall see, the central bank can be conceptualized as just such a value investor.

The matched-book dealer is shown in the left hand panel with a short dollar liquidity position, which position causes the dealer to widen the bid-ask spread and to push up the forward spread over spot, relative to a neutral position.[5] Both of these price effects should be understood as compensation for bearing liquidity risk. Specifically, although forward interest parity says that the forward spot ratio (f/s) is set by the ratio of interest rates in the two countries, as a practical matter buy and sell prices are not identical, indeed cannot be identical if market-making is left to profit-seeking dealers. As liquidity exposure increases, profit-seeking dealers require greater incentive, on the margin, to increase exposure even more; one such incentive is the spread between bid and ask.

Another incentive is the forward spread over spot. The matched-book dealer faces dollar liquidity risk, and the larger his book the larger the risk. He is buying FX spot and selling FX forward. He is willing to enlarge his book, and hence his exposure, but will insist on buying spot relatively more cheaply than he sells forward. Thus the size of dealer exposure tends to push around the forward spread over spot, or equivalently the interest rate differential between the two countries, since we assume that forward interest parity is maintained. (To avoid possible confusion, recall that the interest rates in question are term rates, not overnight rates that are pegged by central banks.) The point to hold onto is that the credit expansion on dealer balance sheets that arises from the need to settle FX payment imbalances (as shown in Fig. 1, line 2) can push term interest rates around independent of central bank policy on short-term interest rates.

The speculative dealer is shown in the right hand panel with a long forward FX position, which tends to push forward rates below expected spot. (As the forward rate moves, so too does the current spot rate so that forward interest parity is maintained.) This price effect should also be thought of as compensation for bearing risk, in this case exchange rate risk. The forward rate is pushed below the expected future spot rate in order to compensate profit-seeking dealers who absorb mismatched order flow by allowing their inventories to swell.

Taking both dealers together, a picture emerges of the private dealer system as a business that makes profit by absorbing imbalances in payment patterns across countries that use different currencies. Instead of payment failures and transaction reversals, payments go through, but at a cost. The standard practice, in both economics and finance, of abstracting from money abstracts also from this dealer business. Indeed, the standard practice of focusing attention on the "equilibrium" or "fundamental" exchange rate amounts to focusing on a special limiting case that would prevail if matched-book and speculative dealers were willing to do their work for free. From the standard point of view, the cost of relying on a private dealer system to supply market liquidity is distortion of prices away from the "equilibrium" or "fundamental" ideal. But from a money view perspective, this distortion is merely a figment of analytical imagination. In actual markets liquidity is supplied

[5] This diagram is inspired by the empirical account of Baba et al. (2008).

	Surplus Country		Deficit Country	
	Assets	Liabilities	Assets	Liabilities
Central Bank	Treasury bills	Reserves, (O/N)	Treasury Bills	Reserves (O/N)*
Private Banking System	Reserves Private Credit	Deposits Term Funding, R	Reserves Private Credit	Deposits Term Funding, R*

$(O/N) \rightarrow R$ in $[R_{lo}, R_{hi}]$ $(O/N)^* \rightarrow R^*$ in $[R^*_{lo}, R^*_{hi}]$

(O/N) and $(O/N)^* \rightarrow f/s$ in $[f/s_{lo}, f/s_{hi}]$

Fig. 3. Central banks and private banks.

by profit-seeking dealers, and as a consequence liquidity can never be a free good. The "equilibrium" or "fundamental" ideal is a world without market-makers, and hence also a world without markets.

By placing money and liquidity at the center of analysis, the money view offers not only a more realistic view of markets, but also a way to understand patterns in asset pricing that otherwise appear as puzzling "anomalies". For example, the standard Expectations Hypothesis of the term structure of interest rates suggests that term rates should be equal to the expected return from rolling over a series of shorter term investments, whereas the empirical fact is that term rates are usually higher. Why so? The profit-seeking behavior of matched book dealers provides a way of understanding this anomaly as a liquidity premium, as the price of bearing the risk that one of the anticipated rollovers may fail.[6] This is the significance of our emphasis above on how the liquidity risk exposure of matched-book dealers pushes term rates around, independent of central bank policy on short term interest rates.

Similarly, the hypothesis of Uncovered Interest Parity says that forward rates should be equal to expected future spot rates or, equivalently, the spread between forward and current spot should forecast the movement of future spot rates; but the empirical fact is that rates more usually move the opposite way. The profit-seeking behavior of speculative dealers provides a way of understanding this anomaly also as a kind of liquidity premium, as the price of bearing the risk that arises from supplying market liquidity by absorbing an unbalanced order flow (Mehrling and Grad, 2011). If forward rates were actually equal to expected future spot rates, there would be no expected profit to compensate dealers for bearing exchange rate risk, and they would cease to supply market liquidity.

Of course in some cases, the standard "free liquidity" abstraction of economics and finance makes sense. So long as payment imbalances are small, and quickly reversed, price distortions may be small, maybe even negligible. Dealers still make money, by buying low and selling high, but they don't take much risk. However, if imbalances persist then risk inventories build up, and price distortions get larger. The dealer models suggest that we understand these price movements not as distortions but rather simply as the price of liquidity. Dealers supply liquidity by absorbing temporary imbalances on their own balance sheets, and they charge for the service.

In extremis, the ability of dealers to supply liquidity is limited, no matter the price. If order flow imbalance persists then eventually both kinds of dealers, matched book dealers and speculative dealers both, hit position limits beyond which they are not prepared to expand their exposure further. If the flow imbalance pushes beyond those limits, then dealers simply stop making markets and the payments system threatens to break down. Here (if not before) is where the central bank enters the picture.

4. Central banking

Fig. 3 shows a stylized picture of how central banks connect up with the private FX dealer system. To fix ideas, we posit a sharp distinction between central banks on the one hand, holding government securities and issuing reserves, and private banks on the other hand, holding private credit instruments and issuing deposits and term funding instruments. Further, we imagine that central banks manage their balance sheets in order to target some official short term interest rate, say an overnight rate (O/N) on reserves, whereas private banks fund themselves on the margin in local term funding markets, say a 3-month rate (R). In both countries we suppose that there is a speculative relationship between the O/N rate and the 3 month rate, insofar as there are speculative dealers who are prepared to go long one and short the other, or vice versa, in search of profit.

[6] See Mehrling and Neilson (forthcoming), and more generally the intellectual tradition of Hicks Value and Capital (1939) and Keynes Treatise on Money (1930).

	Surplus Country		Deficit Country	
	Assets	Liabilities	Assets	Liabilities
Private Citizen 1	$10 due from			$10 due to
PC2			-10/s^g FX spot +$10 spot	
PC3	-$10 due from +$10 spot		-$10 spot	-$10 due to
Central Bank 1	+$10 term, R^g	+$10 spot	+$10 spot	+$10 term, R^g
CB2		-$10 spot, CB +$10 spot, PC	-$10 spot +10/$s^g$ FX spot	
CB3	-$10 Treasury bill	-$10 spot	+10/s^g FX term	+10/s^g FX spot

Fig. 4. Central bank as FX dealer of last resort.

The existence of such speculative dealers does not however imply the Expectations Hypothesis of the term structure. Indeed quite the reverse, since speculative dealers will take risky positions only if they expect profit. This means that, even assuming central banks are able to hit their O/N targets exactly, there is a range of possible 3-month rates, and private trading determines where each country is within that range. Since those 3-month rates nail down the forward/spot ratio (by Forward Interest Parity), it follows that there is also a range of possible *f*/*s* ratios consistent with central bank policy; here too private trading determines where the f/s ratio is within the range at any point in time.

The important point to emphasize is the way that central banks' commitment to target overnight rates implies FX intervention whenever the *f*/*s* ratio moves to the extreme end of the possible range. Simply put, central banks that target overnight interest rates are inevitably drawn into serving as FX dealers of last resort. But, notwithstanding the symmetry of the Forward Interest Parity condition, the two central banks are not in equivalent positions. It is the deficit country that faces the survival constraint at the clearing, and it is therefore the central bank of the deficit country that faces the obligation to intervene in support of its currency, once the private dealer system is unwilling/unable to support it any longer.

The first thing the deficit country central bank can do is to use any dollar reserves it may have on hand to buy back its own currency, thus taking onto its own balance sheet some of the inventory that is weighing down private dealers, so allowing prices to move away from extremes. More generally, the deficit country central bank may be able to acquire additional reserves by borrowing from other central banks (so-called liquidity pools), from the IMF, or ultimately perhaps even from the Fed which is able to produce dollar reserves as its own liability.

To see how this works, Fig. 4 depicts the limiting case where the deficit central bank borrows term reserves from the surplus central bank, paying interest rate R^g (line CB1). The deficit central bank then sells those reserves to its own private citizen at the spot rate s^g (CB2, PC2), which uses the reserves to settle accounts with the surplus country citizen (PC3). Meanwhile, the surplus central bank (which we will assume is the Fed) lends term reserves by creating a spot dollar deposit (CB1).[7] To keep attention strictly on the payments problem, we assume that the surplus central bank sterilizes the consequent domestic monetary expansion by selling a domestic Treasury bill (CB3), while the deficit central bank sterilizes the consequent domestic monetary contraction by buying a domestic Treasury bill (CB3). (For simplicity, we do not show explicitly the private citizen counterpart to either of the sterilization operations.)

The first point to emphasize is that, at the end of the day, the deficit country central bank is borrowing dollars term and lending FX term, which amounts to a naked forward position. Note that this is exactly the position our speculative private dealer was induced to take by the expectation of private profit (compare Fig. 1). In effect, the deficit country central bank is operating as speculative dealer of last resort, but with the difference that the central bank need not, and probably does not, expect to profit from its speculation. For one, the interest rate at which it borrows from the surplus central bank need not, and probably does not, match the term funding rate in private credit markets. And the spot rate at which it sells dollars to its own citizen need not, and probably does not, match the spot rate in private FX markets. These are both, at least potentially,

[7] This could alternatively be viewed as one leg of a liquidity swap, if we view the second leg merely as collateral that secures the loan.

policy rates and as such can be expected to reflect the non-commercial relationship between one central bank and another internationally, and the non-commercial relationship between the central bank and the needy private citizen domestically.

The second point to emphasize is that, at the end of the day, the surplus country central bank has reallocated its portfolio, now lending dollars term to a foreign central bank instead of to its own government. Since this is very unlikely to be a move about which the surplus country government is neutral, it is important to appreciate that other official counterparties for the deficit country would also work. Examples include regional liquidity pooling arrangements and the International Monetary Fund. Unlike the Fed, these sources cannot create dollars by expanding their own balance sheet, but since Fig. 4 assumes that dollar creation is sterilized, the economics of these other cases are exactly the same. The key thing is the willingness of the deficit country central bank to shoulder FX price risk that no private speculator is willing to take on.

Indeed, going even further, it is clear that the whole operation need not involve an official counterparty at all. The deficit country central bank could, if it so chose, instead facilitate private matched-book dealing by serving as the speculative dealer to enable forward hedging of spot exposures (as Fig. 1, line 4). Or it could go further still, facilitating direct term dollar borrowing by its own private citizens by offering them forward hedges directly, so taking their exchange risk onto its own balance sheet. Again, the important thing is the willingness of the central bank to shoulder FX risk as speculative dealer of last resort.

The limiting case along these lines comes when the deficit central bank offers forward cover to all comers at the current spot exchange rate, in effect fixing the exchange rate as a matter of policy. The danger, of course, whenever you offer to trade with all comers at non-commercial prices, is that in doing so you offer arbitrage opportunities for speculators.[8] The positive case for doing so must therefore rest on an argument that commercial prices are in some sense wrong. We have seen (in section II) that order flow can push prices around for reasons that are not fundamental, and this raises the possibility that private agents, who take these distorted prices as parametric for their economic decisions, make distorted decisions. There is thus potentially an argument for central bank intervention, certainly in extremis to prevent breakdown of the payments system, but also in less extreme situations where, for one reason or another, private markets are not making markets at all, or doing so only reluctantly at the cost of substantial price distortion. But this is an argument that applies only under specific conditions, not universally. The exchange rate is not a market price that always fully reflects fundamental valuation, but neither is it a free variable that is available as a policy instrument. The exchange rate is essentially hybrid.

5. The hierarchy of international money

So far, we have been analyzing the international monetary system as if it were a hierarchy with two layers, the dollar on top and all other non-dollar currencies below. We have been treating dollar currency as money, and all non-dollar currencies as forms of credit, as implicit if not explicit promises to pay dollars. And we have been analyzing the current spot and forward exchange rates of those non-dollar currencies, prices established by order flow within a hybrid system of private exchange dealers and central banks, as expressions of the current dollar value of those promises to pay.

This is not such a bad place to start since, according to the most recent BIS numbers, 51% of the volume of foreign exchange trading involves only a few major currencies—the dollar, euro, yen, and sterling—and fully 84.9% of trading volume has the dollar as one leg of the trade. This latter institutional fact has led one participant-observer to opine that "the foreign exchange market is largely the price of the dollar" (DeRosa, 2011, p. 4). It is important however to appreciate that the dollar in question is substantially the international private dollar, which is to say bank money not state money.

Even more, the hierarchical character of the FX market is more than the special role of the dollar relative to everything else. The finer texture of the hierarchy is reflected in the language of trading, which distinguishes "majors" from "minors". The majors are high volume, liquid markets, with tight bid-ask spreads, and all majors have the dollar as one leg: EUR/USD, GBP/USD, AUD/USD, USD/JPY, USD/CAD, USD/CHF. So-called "cross-currency" pairs have no dollar leg, but "euro-crosses" have a euro leg.[9] The minors trade as cross-currency pairs with some major as the other leg. With only a few exceptions, minor cross-currency pairs do not trade. Thus, the private FX dealer system that we emphasized in Section II is differentially available for different currencies, depending on dealer perceptions of risk and return, which themselves depend crucially on the availability of central bank backstops.

The hierarchical organization of spot FX markets carries over also into FX derivatives markets: forwards, futures, and options. Most derivative trades have the dollar as one leg, and most also involve other majors, not minors. By volume, the derivative market is larger than the spot market. Of the $4 trillion a day of FX trades, $1.5 trillion are spot transactions while $1.8 trillion are FX swaps, and the remainder are outright forwards ($.5 trillion), options and exotics ($.2 trillion), and currency swaps ($43 billion). The overwhelming majority of the market is short term; the FX market is fundamentally a money market, not a capital market (King and Rime, 2010).

Fig. 5 offers a stylized picture of current arrangements. The dollar serves as world reserve currency and the majors are clustered into three regional areas—Asia, America, and Europe. The figure shows a hierarchy within each regional area such

[8] Just so, DeRosa (2009, p. 80): "...all these crises were preceded by the accumulation of substantial at-risk positions that were short the U.S. dollar and long local currency. When the crises occurred, the entire market, not counting the central bank, had to buy dollars and sell the local currency immediately in order to hedge."

[9] Before the current Euro crisis, some people thought that the Euro might emerge as a challenger to the dollar, and as a consequence certain euro-crosses were for a while considered majors.

	Asia	America	Europe
Reserve Currency		Public dollar money	
Key Currency	Yen	Private dollar money	Pound Sterling, Euro
Major Credit Money	Australian dollar	Canadian dollar	Swiss franc
Minor Credit Monies			

Fig. 5. The international hierarchy of money.

that minor currencies are implicit promises to pay the major currency that lies above them, major currencies are promises to pay the key currency that lies above them, and only the key regional currencies are promises to pay dollars, the ultimate world reserve currency. Every currency is ultimately a promise to pay dollars, but in most cases that promise is quite indirect. FX dealers and central banks make markets, and hence determine exchange rates, but these individual markets are, in effect, located at the boundaries of each layer. It is only the sum total of all these market making activities that knits the collection of qualitatively disparate monies into the entity we know as the international monetary system. (For example, so-called triangle arbitrage ensures that the exchange rate between a minor and a major, and the exchange rate between a major and a key currency, together imply an exchange rate between the minor and the key currency.)

Of special interest are the relationships between key currencies and the reserve currency, because of their widespread ramifications for lower levels of the hierarchy. For simplicity, I am showing private dollar money, i.e. Eurodollars, as a key currency at the same hierarchical level as the yen, pound, and Euro, although the par exchange rate of private dollar money arguably places it at a somewhat higher level. The figure suggests that a given exchange rate, say between a given minor currency and the dollar, involves more than a bilateral relationship between the United States and the minor currency country. The relationship is rather a multilateral, but still hierarchical, one that involves all the layers of the hierarchy that lie in between the United States and the minor currency country. The relationship between the dollar and all minor currencies that lie below the euro depends on both the relationship between the dollar and the euro, and the relationship between the euro and the minor currencies.

Let it be stipulated that the world is as depicted in Fig. 5. The central question begged by this figure is, What determines the hierarchy?

From a money view perspective, the analytical starting point is always the survival constraint that is enforced by settlement at the daily clearing. The difference between monies at different levels of the hierarchy is all about difference in the cash flows, in and out, of the entities issuing the various monies. At the most basic level, a country that enjoys strong demand for its goods and/or assets from the rest of the world will have no difficulty at the daily clearing. Indeed, quite the reverse, a payments surplus country is in a position to determine what form of money is acceptable in settlement. Its own currency, for example, will typically qualify, and the fact that the rest of the world can use the surplus country currency to settle with it will tend to raise the status of that currency in the international hierarchy of money.

But a payments surplus country is also in a position to offer favorable treatment to monies issued by countries that may or may not enjoy a payments surplus on their own, and this degree of freedom opens other possibilities. Here we must differentiate public and private purpose. States have interests, and to some extent therefore the hierarchy of money follows the political hierarchy of states. But private businesses have interests as well, and the hierarchy of money also follows the hierarchy of national economic development. The point is that the issuers of public and private money, states and banks respectively, are in a position to accept promises of deferred payment in lieu of immediate settlement, and also in a position to extract a price, either political or economic, for that acceptance. The international hierarchy of money is a hybrid hierarchy.

In both public and private cases, the degree of national financial development—meaning the infrastructure of state and private finance, including both banking institutions and capital markets—provides crucial context for the decision whether or not to accept promises of deferred payment. Here too, at the level of the individual nation state and national financial system, we find a hybrid hierarchy. States quite typically arrogate to themselves the right of money issue; taxes are denominated and payable in state money, and state debt is also denominated and payable in state money. But alongside this state money and state credit typically there is also private money (bank money) and private credit (bank loans and securities), both of them typically denominated in state money and even ultimately payable in state money, but quite typically actually paid in private money or by offset of private credit. The relative size of these two systems, public and private, depends on the degree of financial development; in financially developed countries the private money-credit system is typically as large or larger than the state system.

Whatever the degree of financial development, a key issue is always the meshing/friction between the two systems, public and private. This meshing/friction happens at all levels of the money-credit hierarchy, but it is especially important at the very apex of the hierarchy, at the level of the central bank. Opposite extreme institutional forms are the "government

bank" and the "bankers' bank". A government bank focuses on maintaining the market for government debt by standing ready to buy. A banker's bank focuses on maintaining the moneyness of private banks liabilities by standing ready to lend. Most actual central banks are hybrids of the two extremes, and the balance between the two can and does change over time, depending on policy as well as circumstances. In general, financially underdeveloped countries tend to be weighted more toward the government bank model, while financially developed countries tend to be weighted more toward the bankers' bank model, if only because of the relative size of public and private credit in the two different cases. But in times of state crisis, even financially developed countries shift dramatically toward the government bank model, as for example in wars for state survival; the hybridity is always there, but it is also always fluid and subject to change.

All of this is important for FX because foreign exchange is about the exchangeability of one money for another, and the price of that exchange. In that exchange, different national hybrid hierarchies of money and credit come into contact with each other at multiple levels, and there is meshing/friction in that contact at all levels. But always the key issue is how that meshing/friction plays out at the very apex of the two hierarchies. One money exchanging for another is ultimately one central bank facing another, quite literally (recall Fig. 4). Given the hybrid character of central banks, that confrontation always has a dual aspect, both one state facing another and one banking system facing another.

Long story short, the ultimate issuer of money is qualified for the task by the fact that the liquidity constraint does not bind for him, as it does for everyone else farther down the hierarchy and to an increasing degree the farther down you go. (That is why liquidity crisis can always be resolved by the ultimate issuer of money, if only he will.) Anyone can try to issue a demand claim in an attempt to create a money substitute, but only agents near the top of the hierarchy can get their issue readily accepted. In the marketplace, hierarchy in structure shows up as tiering in price, which is often mislabeled/misunderstood as a premium for counterparty risk rather than for liquidity. This liquidity premium is a source of profit for those at the top of the hierarchy, and expense for those farther down. From a standard economics or finance point of view, this premium appears as a distortion from the ideal of a world in which liquidity is a free good. But that ideal is impossible. From a money view perspective, the liquidity premium is nothing more than the incentive for supplying liquidity. Just as the hierarchy of international money fluctuates over time, so too does this premium, all but vanishing during booms only to re-emerge during contractions.

More or less all of the possible hybrid combinations of central bank and private dealers exist somewhere in the global system, and the pattern is by no means random. At any moment in time the international hierarchy of money has a definite structure, with currencies near the top of the hierarchy traded in highly liquid dealer markets that are backstopped by powerful central banks acting primarily as bankers' banks, while other currencies farther down are traded in highly illiquid markets essentially made by central banks acting as government banks, taking on risks that no private dealer is willing to shoulder. Over time, the relative position of individual countries can and does shift around, as also the relative importance of private dealer markets relative to central banks. The system we have now is not the system we will have ten years from now. Always the system is hierarchical, and always it is hybrid, but both hierarchy and hybridity are also always fluid.

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