

Payments without Money

Peter Stella

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The Global Monetary System: How it Works and How it will Evolve

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It's appropriate that I begin with a shout out to a famous Cambridge professor. No, not an economist, but a philosopher, Ludwig Wittgenstein. He was, of course, an associate of Keynes and quite close to Piero Sraffa and Frank Ramsey,

If you haven't read Ray Monk's biography of Wittgenstein, *The Duty of Genius*, I'd highly recommend it.

For me, Wittgenstein's outlook can best be summarized in two phrases: "The aim of philosophy is to free us from the hold that certain words or forms of expression have on us". And "we eliminate misunderstandings by making our expressions more exact".

Words don't have intrinsic meanings; they obtain their meanings from how people use them in common language. So meanings are derived from popular usage. If we are not precise in our scientific definitions, this characteristic of words can lead to unfortunate consequences.

To give one example. The term QE or quantitative easing. This was a policy adopted by Japan in the 1990s. It was a total failure. When the Fed started its large-scale asset purchases in the 2010s I knew Fed Chair Ben Bernanke, who was one of our professors at Stanford, would not use the term QE—anything but QE, because QE had failed. More seriously, what the Fed and other central banks did was different from what Japan had tried a couple decades earlier. The Fed called its policy "credit easing". Unfortunately the subtlety was lost on the financial press and markets and almost all economists.

The different policies undertaken by the Fed, Bank of England, ECB, the BOJ during the midst of the Global Financial Crisis were all called QE, then subsequent actions QE2, an allusion that was too cute to pass up, then QE3 and finally QE ∞ . But this was simply wrong from a careful analytical perspective. What the Fed did at the beginning was not Japan's QE, nor was the second round of large scale asset purchases the same as the first. There were significant differences among the various policies adopted. But the hold of "QE" on our minds has made it virtually impossible to talk sensibly about all those policies subsumed under that general appellation.

Regrettably, generations of economic historians writing about this episode will undoubtedly, not being monetary policy specialists, perpetuate a misleading narrative. All because of the impact of the hold of the term "QE" on their ability even to think of different *flavors* of QE. It is as if we insisted that the indigenous people of the Arctic, who have a dozen words for different types of snow: wet snow, dry snow, icy snow, etc. to record only in their daily weather records, either "snow" or "no snow". It's borderline criminal.

I find it apropos that the only pupil of Wittgenstein to write anything remotely philosophical, Maurice O'Conner Drury, entitled his collection of essays *The Danger of Words*.

This afternoon, the dangerous word I want to talk about is “money”. We all think we know what it is, what it does, where it is, where it goes. But do we really? I would conjecture that we know *less* about money now than we did 300 years ago when Sir Isaac Newton was Master of the Royal Mint. Modern misunderstandings about money are appalling and dangerous.

The misconception about money I will discuss today is perhaps the most misleading and dangerous.

That misconception, put simply, is that more payments require more money.

That idea is absolutely and plainly false and the reason I entitled my remarks Payments Without Money.

Let me here provide one bit of evidence that more payments do not require more money—the annual value of payments effected through Fedwire, the primary US payments system, increased by about 50,000 percent between 1957 and 2007 (from US\$ 1.3 trillion to US\$ 670.7 trillion) while the deposits held at the Federal Reserve by banks, the funds used to make those payments, *fell* by about 37 percent. (From US\$ 22.1 billion in 1957 to only US\$ 14 billion in 2007).

Explain that fact if you think it is necessary to hold more money to make more payments.

I hope that at this point you are at least modestly shocked.

In what follows I will try to convince you that that it is no more necessary to have more money to make more payments than it is necessary to have more electrons to make more electricity or more ink, paper and envelopes to send more letters, electronically.

But before I begin let me posit several predictions based on my conjecture:

First, the current hugely inflated central bank balance sheets we currently see will eventually shrink during your lifetime---if not mine--asymptotically to zero if not completely to zero.

Second, the term “money” will drop into scientific obscurity—a process that is well underway.

Third, crypto coins are extremely unlikely to ever be used in large quantities to make payments. I’m not downplaying the associated technological innovations, but the coins themselves.

Now, how is it possible for quadrillions of dollars of payments to be made with so little money?

Let me start with an analogy.

There is a bus that runs from Union Station in Washington, D.C. to Grand Central Station in New York City, a distance of 226 miles. The journey takes about 4 hours one way. Almost exactly the same as traveling between London and Liverpool by bus. Discounting time for refueling, maintenance, etc. one bus could make exactly 3 round trips in 24 hours. If the bus could take 100 persons, then 300 persons could travel round trip Washington-New York per day. If 600 persons wanted to travel in a day you would need two buses, 900 persons, three buses, etc. From this one might legitimately make the claim that there is a linear relationship between the number of people who want to travel and the number of buses or vehicles required. If we followed this line of thinking in the monetary world we would get the famous quantity theory of money, a linear relationship between payments and money required.

Now, imagine the company buys a bus that travels at $\frac{1}{2}$ the speed of light (roughly the speed that data flows through modern networks). It would take that bus not 4 hours to make the trip but 2.5

milliseconds. So in the time it takes me to say this sentence, the bus could make 1.440 round trips. In a day, the bus could make 17,776,991 round trips. Taking 100 persons at a time that would be close to 1.8 billion people. That's more than 5X the entire population of the US.

In that world, there obviously is no meaningful correspondence between the number of buses and the number of people moved. All you are likely to need is one bus and one dedicated bus lane.

Now, you may be thinking, good story, but is "money" the bus or is "money" the people.

The answer is neither.

In modern payments systems, money does not move in physical space, it does not travel. What happens is records are adjusted in databases, in the cloud. Is the cloud in New York, New Jersey, Florida, Iceland, London? Ledgers are updated on the basis of validated transfer of ownership requests. For example, "transfer α from A to B" where A and B are account addresses and α is a currency amount. They are routed through a network after being validated, verified, documented. In my analogy, the bus passengers are the messages and the bus, or more precisely, the dedicated bus lane, is the network through which the messages pass. And yes, at some point you would need a second bus and a second dedicated traffic lane—an increase in bandwidth so to speak if you needed to transport more than 1.8 billion people in a day.

Now, you may ask if the passengers are just instructions, then how does the "money" get from one place to another? I've already mentioned that...money does not travel, the ownership of it just changes and those ownership instructions are the passengers. Most US securities trades agreed on "Wall Street", say, for example, between a Danish teachers pension fund and a Japanese investment bank are recorded in a database in Jacksonville Florida.

Indeed, why should money move if it can winter in sunny Florida?

That neither money nor securities travel is very important to grasp.

Let us transition to international payments. Here we find some dangerous metaphors.

We have all read tens, hundreds, and in my case thousands of times phrases such as money/capital is *flowing into or out of* markets. Markets are *awash* with *liquidity*. Markets are *frozen*. These metaphors are dangerous because they reinforce the false notion that money travels.

When Eurodollars "flow" from London to Kenya they do not board an aircraft at Heathrow and disembark in Nairobi. There is simply a series of accounting entries transferring the ownership of a dollar account balance from a UK resident to a Kenyan resident. The dollars "stay" in London.

I've described an international transfer within a single domestic payments system in a single country. Transfers within the Eurozone are quite similar, indeed the same infrastructure, TARGET2, and the same pricing schedule, is used for Euro transfers within and between Eurozone countries.

It is thus interesting to examine the speed of those transactions—equal for both intra and international—because the Eurozone represents the technical state of the art of what is possible for international transfers if the global payments system used one identical systems architecture.

Here is some data from TARGET2.

Apart from the beginning of morning queue sorting that takes about ½ an hour, the median transfer takes 26 seconds and 99.9 percent of transfers take less than 45 seconds. Now those are pretty fast transfers but a far cry from ½ the speed of light.

There are two broad factors that slow payments.

The first, already mentioned, is the early morning queue. TARGET2 is not open 24/7 so there are quite a lot of transfer requests waiting to be executed at the start of the day. A complicated algorithm sorts out the requests and tries to net incoming and outgoing transfers bank by bank with the aim of selecting the most efficient transfer sequence akin to an air traffic control system. If we return to our bus analogy, anyone who has ever taken a bus or a plane knows that it takes quite some time to board and unload the passengers. Even if it took only 5 minutes to load and 5 minutes to unload our hypothetical bus, that would be 125,000 times longer than the time spent riding the bus. Hence the people moving potential is dramatically reduced by the queuing process.

The second reason, and this is particularly the case for international payments, is that it takes various algorithms and validation systems time to verify the encrypted instructions, cross-check various items, pass through automated controls on money laundering and the financing of terrorism. With cross currency international transactions one has the added difficulties of dealing often with intermediaries in two different payments systems, and there is the matter of determining the exchange rate and synchronizing the two legs of the transaction potentially between time zones where the local payments systems are not in contemporaneous operation¹.

This latter task is facilitated by the company CLS (continuous linked settlement) that settles more than US\$ 6 trillion in foreign exchange transactions in 18 currencies daily. CLS also queues payments to enable netting of payments of participating entities (not only banks) thereby reducing the need for cash settlement by 96 percent on average. That is, of the US\$ 6 trillion in trades, only about US\$ 240 billion in funds actually changes hands (ownership).

This processing, some of it still manual, amounts to the analogous customs and immigration controls on cross border physical traffic. Though it has never taken me longer to fly to England than to get through customs and immigration at Heathrow, I've come close!

International transactions are also hampered by the antiquity of some of the legacy components of the various domestic payments systems that comprise the global payments network. If you have ever tried to execute an international payments order you are probably painfully aware of that. Most of you are likely too young to remember, but there was a time when PC file names could not be longer than 8 characters. You can imagine the limitations that imposed. Today, smart contracts or smart money, enable the inclusion of considerably more information on each transfer request.

The delays in processing *international* transfer requests are currently the most important roadblock being addressed by major central banks including the Bank of Japan, ECB, SNB, and Monetary Authority of Singapore among those in the forefront.

¹ In the major domestic payments systems, the need for cash settlement is closer to 1 percent.

By the way the joint research initiative run by the Bank of Japan and the ECB to examine the possible use of distributed ledger technology in financial market infrastructure, in particular to overcome the lack of interoperability of payments systems in different time zones is called the *Stella Project*!

Let me now wrap up and summarize.

Unlike in Hollywood, real-life detectives do not follow the trail of money, they follow the communications that transfer ownership of funds, securities and cybercoins. Money laundering is not physically washing away the traces of the path of money, it is changing the ownership of that money so many times, in so many jurisdictions, through so many sham companies that it becomes impossible to identify the beneficial owner.

The technologies that have enabled modern payments systems to effect astonishingly high values of transfers are actually quite old. Netting of account balances has been practiced for 500 years, electronic transfers for more than a century. Where the improvements still need to be made is in, so to speak, the last mile. The processing, validating, inspection, and accounting related to transfers. Much as in the boarding and unloading of our hyperdrive bus, this is where fintec solutions will likely play a very important role in facilitating payments and connecting them to straight through accounting systems.

“Money” is a dangerous word. Dangerous because the way it is used in our language transfixes our minds in a way that undermines our ability to comprehend the fascinating modern payments landscape.

Thank you for your attention.

Note: The figure for footnote 1 comes from *The Pay Off* by Gottfried Leibbrandt and Natasha de Teran, Page 154. Elliott and Thompson, 2021.