

Ptolemaic Economics in the Age of Einstein

Jetlag has me up and at the keyboard at 5.54am here in London, 43 minutes before sunrise, which today is at 6.37am.

Only it's not "sunrise", is it? As we all know, it's really "Earth Axial Rotate" at the point in its 24 hour axial rotation when the Sun—around which the Earth rotates once each year—becomes visible from London.

We still call it "sunrise" because it's a lot less awkward—and a lot more romantic—than saying "Earth Axial Rotate Earth-Sun Radial Alignment", which is what it really is. We all know that it's not really the Sun "rising" at all: that implies that the Earth is fixed while the Sun rotates around it, whereas ever since Copernicus we have known that, though it looks that way to a naïve observer on Earth, that's not what really happens.


However, not merely before Copernicus, but for a very long time after him, many people continued to believe that that was how it really is: that the Sun *does* rotate around the Earth, that the Earth is not merely fixed, but fixed at the Centre of the Universe, and not merely the Sun but all Celestial bodies rotate around it in perfect spheres.

What broke us from that belief was the empirical failure of the theory which encapsulated it and still made sense—as much as it could—of the anomalies between the predictions of that theory, and actual reality. [Claudius Ptolemy's](#) treatise the "Mathematike Syntaxis" (or Mathematical Composition), which became known as the [Almagest](#) (meaning "The Great Treatise"), was published in about 150 BC, and it provided a plausible model for [earth-centric beliefs](#) about the nature of the Universe that dated back millennia. It held sway not merely until Copernicus wrote his [De revolutionibus orbium coelestium](#) in 1543, but for many decades after, as not only the Church but also incensed Ptolemaic astronomers fought to suppress the new, more accurate, but to them heretical and false model of the Universe.

Why the brief discourse on Astronomy? Because reading what Paul Krugman is saying about banking feels like reading a Ptolemaic Astronomer describing sunrise today *as if that's actually what's happening*. He is dismissive of the view that banks can "create credit out of thin air"—so dismissive in fact, that anyone unacquainted with the empirical evidence might be fooled into believing that his case is so strongly supported by the facts that it's not even worth the bother of citing the empirical data that backs it up.

That is so NOT the case: the empirical evidence overwhelmingly supports the case Krugman is trying to dismiss out of hand, that banks can and do "create credit out of thin air", with the supposed regulatory controls over their capacity to do so being largely ineffective.

Figure 1: Krugman's 3rd post on banking and money creation



The Conscience of a Liberal

PAUL KRUGMAN

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Banking Mysticism, Continued

A bit of a followup on my [previous post](#).

As I read various stuff on banking — comments here, but also various writings here and there — I often see the view that banks can create credit out of thin air. There are vehement denials of the proposition that banks' lending is limited by their deposits, or that the monetary base plays any important role; banks, we're told, hold hardly any reserves (which is true), so the Fed's creation or destruction of reserves has no effect.

This is all wrong, and if you think about how the people in your story are assumed to behave — as opposed to getting bogged down in abstract algebra — it should be obvious that it's all wrong.

First of all, any individual bank does, in fact, have to lend out the money it receives in deposits. Bank loan officers can't just issue checks out of thin air; like employees of any financial intermediary, they must buy assets with funds they have on hand. I hope this isn't controversial, although given what usually happens when we discuss banks, I assume that even this proposition will spur outrage.

But the usual claim runs like this: sure, this is true of any individual bank, but the money banks lend just ends up being deposited in other banks, so there is no actual balance-sheet constraint on bank lending, and no reserve constraint worth mentioning either.

That sounds more like it — but it's also all wrong.

Yes, a loan normally gets deposited in another bank — but the recipient of the loan can and sometimes does quickly withdraw the funds, not as a check, but in currency. And currency is in limited supply — with the limit set by Fed decisions. So there is in fact no automatic process by which an increase in bank loans produces a sufficient rise in deposits to back those loans, and a key limiting factor in the size of bank balance sheets is the amount of monetary base the Fed creates — *even if banks hold no reserves*.

In fact the evidence is so strongly in favour of the case that Krugman blithely dismisses that it's difficult to decide where to begin in refuting his Ptolemaic fantasies to the contrary. I'll lead with his "gotcha!" argument in this post, but before that I'll return to the Ptolemaic Astronomy-Neoclassical Economics analogy—because it's quite a strong one that deserves further elucidation.

Ptolemy and Walras—Brothers in Arcs

The Geocentric models of the universe, of which Ptolemy's system was a variation, had 3 guiding principles, which Cardall describes as follows:

- (1) All motion in the heavens is uniform circular motion.
- (2) The objects in the heavens are made from perfect material, and cannot change their intrinsic properties (e.g., their brightness).
- (3) The Earth is at the center of the Universe. (Cardall, 2000)

The key problem with this base theory is that it manifestly didn't fit the facts, because of the behaviour of celestial bodies that we now call Planets—which is the ancient Greek word for "wanderers". Far from obeying uniform circular motion, these Wanderers literally did wander all over the sky. We're generally not aware of this today because it's no big deal from our better-informed Heliocentric model of the solar system, but for the ancients it was a big deal. A simulation by [David Colarusso](#) indicates how much the apparent behaviour of the Wanderers violated the three core tenets of the Geocentric model.

Ptolemy's contribution was to provide "tweaks" to this core vision, which maintained its overall integrity while fitting it much more closely to the data. He stuck with most of proposition (1) and all of (2), but modified (3) to "The Earth is **near** the center of the Universe". With the Earth slightly off-center, the generally elliptical motion of The Wanderers could now be explained by what was called The Eccentric. But their habit of "retrograde" motion—the fact that they would occasionally reverse direction in the night sky—was still an anomaly.

To solve that, Ptolemy added circular motion on circular motion. All celestial bodies still followed a great circle—called the Deferent—but the planets also did their own rotations on the Deferent on mini-circles called Epicycles.

But even that wasn't enough, because the planets also appeared to speed up on part of their motion through the heavens, and slow down on others (today we know this is just because sometimes they are closer to the earth on their elliptical orbits around the earth, and therefore appear to move more rapidly). So Ptolemy added "Equant" motion: the big "Deferent" circle each planet moved on was divided into segments by lines through a point which was not its center, and the planet moved through each differently sized slice in the same time—thus speeding up in the big slices and slowing down in the small ones.

By these tweaks, a paradigm which was utterly unlike the real world was actually able to mimic it to a tolerable level of accuracy. But the system was extremely complicated, and it took an enormous amount of brain power to be a Ptolemaic astronomer. Looking back on this once dominant theory,

Cardall tellingly observes how the very complexity of this absolutely false mental construct helped preserve it despite mounting evidence that it did not describe reality:

That ancient astronomers could convince themselves that this elaborate scheme still corresponded to "uniform circular motion" is testament to the power of three ideas that we now know to be completely wrong, but that were so ingrained in the astronomers of an earlier age that they were essentially never questioned. (Cardall, 2000)

Why am I reminded of Neoclassical Economics? Let me count the ways...

Firstly, there are similar underlying principles to the DSGE models that now dominate Neoclassical macroeconomics, and as with Ptolemaic Astronomy, these underlying principles clearly fail to describe the real world. They are:

- (1) All markets are barter systems which are in equilibrium at all times in the absence of exogenous shocks—even during recessions—and after a shock they will rapidly return to equilibrium via instantaneous adjustments to relative prices;
- (2) The preferences of consumers and the technology employed by firms are the “deep parameters” of the economy, which are unaltered by any policies set by economic policy makers; and
- (3) Perfect competition is universal, ensuring that the equilibrium described in (1) is socially optimal.

If that were actually the real world, then not only would there not be a crisis now, there would never have been a Great Depression either—and recessions would simply be minor statistically unpredictable but inevitable events when the majority of shocks hitting the economy were negative, and they would rapidly be resolved by adjustments to relative prices (wages included, of course).

So economists like Krugman—who describe themselves as “New Keynesians”—have tweaked the base case to derive models that “ape” real-world data, with “sticky” prices rather than perfectly flexible ones, “frictions” that slow down quantity adjustments, and imperfect competition to generate less-than-optimal social outcomes.

This is Ptolemaic Economics: take a model that is utterly unlike the real world, and which in its pure form can't possibly fit real world data, and then add “imperfections” so that it can appear to do so.

Figure 2: Krugman's 3rd post on banking and money creation

So how much currency does the public choose to hold, as opposed to stashing funds in bank deposits? Well, that's an economic decision, which responds to things like income, prices, interest rates, etc.. In other words, we're firmly back in the domain of ordinary economics, in which decisions get made at the margin and all that. Banks are important, but they don't take us into an alternative economic universe.

Now, under current conditions — that is, in a liquidity trap — the monetary base is indeed irrelevant at the margin, because people are indifferent between zero interest public liabilities of all kinds. That's why there are no immediate policy differences between some of the monetary heterodoxies and what IS-LMists like me are saying. But that's not the way things normally are.

Feel free to start yelling.

Walk like a Ptolemain

Krugman's rejection of the proposition that banks can create money—in the sense that “their ability to create money is not constrained by the monetary base” as he puts it in an update—is also a vintage Ptolemain manoeuvre. A *scientific* response to this proposition would be to disprove it via empirical evidence. Krugman instead appeals to his own authority, relies on deductive logic—which I'll return to shortly—and derides those who believe that banks and credit growth matter in macroeconomics as “Banking Mystics”.

What Krugman displays here is not greater insight but blind ignorance. A recent addition to the overwhelming evidence that credit growth is a crucial factor in macroeconomics is an empirical paper by those well-known bastions of Banking Mysticism, the *National Bureau of Economic Research* and the *Federal Reserve Bank of San Francisco*. The paper analyses 200 recessions in 14 countries over 140 years, and summarises its results as follows:

This paper studies the role of leverage in the business cycle. Based on a study of nearly 200 recession episodes in 14 advanced countries between 1870 and 2008, we document a new stylized fact of the modern business cycle: more credit-intensive booms tend to be followed by deeper recessions and slower recoveries. **We find a close relationship between the rate of credit growth relative to GDP in the expansion phase and the severity of the subsequent recession.** We use local projection methods to study how leverage impacts the behavior of key macroeconomic variables such as investment, ending, interest rates, and inflation. The effects of leverage are particularly pronounced in recessions that coincide with financial crises, but are also distinctly present in normal cycles. The stylized facts we uncover lend support to the idea that financial factors play an important role in the modern business cycle. (Oscar Jorda et al., 2011a, Oscar Jorda et al., 2011b)

That emphatically decides the key empirical dispute—whether the level and rate of growth of aggregate private debt has macroeconomic effects—in favour of the case I put.

Unreserved Lending

There is also a wealth of studies to support the contention that reserves don't constrain lending—that if anything, the causal link runs from lending to reserves, and not the other way around. I referred to some of these in my last blog post, so I won't repeat that issue here. Instead I'll take up Paul's "gotcha" argument to the contrary:

Yes, a loan normally gets deposited in another bank — but the recipient of the loan can and sometimes does quickly withdraw the funds, not as a check, but in currency. And currency is in limited supply — with the limit set by Fed decisions. So there is in fact no automatic process by which an increase in bank loans produces a sufficient rise in deposits to back those loans, and a key limiting factor in the size of bank balance sheets is the amount of monetary base the Fed creates — even if banks hold no reserves.

Sigh. The level of currency restrains lending? So banks stop lending as they approach the limits to currency set by the Fed's printing of notes?

I can't improve on the comments of [Neil Wilson](#) on Krugman's argument here:

Krugman needs to start attending the real world. The latest argument is utter tosh. For there to be a constraint in the real world, you have to have the actual power to stop another entity from doing something.

What Krugman is suggesting is that the Fed has the power to limit the amount of currency in issue. In other words he's suggest that to control the economy the ATMs will be left to run dry and you will be told 'no' when you go and try and draw cash at the bank counter.

Sweepstake on how many attoseconds it would take to cause general pandemonium if that every happened. Here in the UK there has been a suggestion that the fuel pumps might be short of fuel if the tanker drivers did decide to go on strike. It has caused complete chaos even though nothing is different this weekend than last. Krugman is beyond grasping at straws now.

And even if the Fed could do that—even if it did attempt to control bank lending by manipulating reserves (something it gave up on doing about 30 years ago)—there are two factors needed to make manipulating reserves a control mechanism over bank lending:

1. Reserves themselves; and
2. A mandated ratio between deposits at banks and reserves

Paul doesn't seem to have caught up with the fact that this mandated ratio no longer exists, for all practical purposes, in the USA and much of the rest of the OECD. Six countries have no reserve requirements whatsoever; the USA still has one, **but for household deposits only. Error! Reference source not found.** shows the actual rules for reserves in the USA—taken from an OECD paper in 2007 (Yueh-Yun June C. O'Brien, 2007). The reserve ratio of 10% only applies to household deposits; corporate deposits have no reserve requirement. And the reserves are required with a 30 day lag

after lending has occurred—by which time the deposits created by the lending are percolating through the banking system.

Figure 3: USA Reserve Requirements

Table 12
Main Features of the Reserve Requirement System in the United States

Feature	Description	
1. RR Type	Lagged RR (LRR)	
2. Reservable Liabilities and Required Reserve Ratios (RRR)	Reservable Liability	RRR (%)
	Net transaction deposits (NT) ¹	
	For the amount from \$0 to the prevailing reserve requirement exemption level ² (\$7.8 million for 2006)	0
	For the amount above the prevailing reserve requirement exemption up to the prevailing low reserve tranche level ² (\$48.3 million for 2006).....	3
	For the amount above the prevailing low reserve tranche	10
Non-personal time and savings deposits ³	0	
Net Eurocurrency liabilities ⁴	0	
3. Reserve Computation Period (CP) ⁵	<ul style="list-style-type: none"> • For weekly deposit reporters – 2 weeks, beginning every other Tuesday and ending on the second Monday. • For quarterly deposit reporter – 1 week, beginning on the third Tuesday of the quarter-end month and ending the following Monday. 	
4. Reserve Maintenance Period (MP) ⁵	<ul style="list-style-type: none"> • For weekly deposit reporters – 2 weeks, beginning on the 31st day (Thursday) following the start of the associated CP and ending on the second Wednesday. • For quarterly deposit reporters – 1 week, beginning on the 31st day (Thursday) following the start of the associated CP and ending the following Wednesday.⁶ 	
5. Lag	A lag of 30 days from the start of a CP to start of the corresponding MP.	

This, and the *banking* crisis we are now in, finally inspired the Federal Reserve's research department to conclude that, effectively, the "money multiplier" doesn't exist. Carpenter and Demiralp note that today reserve requirements "are assessed on only about one-tenth of M_2 ", and conclude that

the narrow, textbook money multiplier does not appear to be a useful means of assessing the implications of monetary policy for future money growth or bank lending. (Seth B. Carpenter and Selva Demiralp, 2010, p. 29)

So Paul's "gotcha" lacks at least one of the blades needed to make it work—and if he cares to consult the extensive academic literature on the role of reserves post the failed Monetarist experiment of the 1970s, he will see that the other blade doesn't exist either: Central Banks now supply whatever level of reserves is needed to maintain their short-run interest rate target.

Who's the Mystic then?

Krugman's claim that those who argue banks play an essential role in macroeconomics are "Banking Mystics" has a natural riposte: Neoclassical economists like Krugman who believe that capitalism can be modelled without either money or banks are Barter Mystics (David Graeber, 2011). How on earth can someone believe that the manifest reality that transactions involve money being exchanged for goods can be ignored, and pretend instead that goods are exchanged for goods? How on earth can the institutional reality of banks be ignored by those who claim to be macroeconomists?

How on earth indeed. It's because they're still living in a pre-Copernican universe, deluded by the imagined perfection of the Spheres.

Cardall. 2000. "The Universe of Aristotle and Ptolemy,"

Carpenter, Seth B. and Selva Demiralp. 2010. "Money, Reserves, and the Transmission of Monetary Policy: Does the Money Multiplier Exist?," *Finance and Economics Discussion Series*. Washington: Federal Reserve Board,

Graeber, David. 2011. *Debt: The First 5,000 Years*. New York: Melville House.

Jorda, Oscar; Moritz H. P. Schularick and Alan M. Taylor. 2011a. "When Credit Bites Back: Leverage, Business Cycles, and Crises," National Bureau of Economic Research, Inc, NBER Working Papers: 17621,

Jorda, Oscar; Moritz Schularick and Alan M. Taylor. 2011b. "When Credit Bites Back: Leverage, Business Cycles, and Crises," Federal Reserve Bank of San Francisco, Working Paper Series: 2011-27,

O'Brien, Yueh-Yun June C. 2007. "Reserve Requirement Systems in Oecd Countries." *SSRN eLibrary*.