



The Geodesic Economy

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"Who needs money anyway?": The New Monetary Economics, Monetary Separation, and Digital Bearer Settlement

Economic Government Group

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One of my best friends in the whole world is Mark Tenney of Mathematical Finance in Alexandria, Virginia. The best man at my wedding, I met Mark during my mostly sad attempt to go to the University of Chicago as a "Student-at-Large", where I snuck in the back door and hung out for almost a year before they threw me out -- though, to my credit, or lack there of, it was for impecuniosity, more than anything else. "First thing you do, you get the money", and all that.

It was fun, though, and I *did* manage to transfer enough credit from Chicago to finish my undergraduate philosophy degree at Missouri. Up until the last five years or so, when I discovered the "University of the Internet", I'd always wished I could afford to go back some day and play some more, especially in finance and economics.

Anyway, Mark was one of those scary mathematical prodigies who finished both high-school and college in three years apiece, finished all-but-a-doctoral-dissertation in Physics at Brandeis in three years, hedging himself with an Master's, then turned on a dime and did the same thing in Finance at Chicago, hedging again with an MBA in Finance. All this before wading into the fray of quantitative fixed-income analytics-for-hire, swinging that claymore-sized intellect of his with both hands.

Last year, I told Mark that I had decided to concentrate on digital bearer transactions full-time, and he asked a bunch of questions like he always does when I reveal my latest off-the-wall idea. And not saying much in reply, which he also always does, being one of the most laconic people I've ever met. That's okay, I suppose. I talk enough for both of us.

Anyway, a few days later, Mark calls me up, all excited. Well, as excited as Mark gets, anyway. "You could issue digital bearer certificates backed up by an S&P 500 portfolio," Mark says with not much affect, followed by dead air, which is my cue to talk.

"Yup," says I, chattering away, "That's easy. Old hat. We talked about stuff like that on cypherpunks *years* ago. The only problem is, it's illegal in the US for various reasons, and proving that you're *only* issuing to and redeeming from foreign nationals is *really* too complicated. We don't call it 'digital bearer settlement' for nothing. Of course, that doesn't keep several smash-the-state cryptoanarchists out there from daydreaming, in color, about that idea pretty much full time. Expressions like 'tax-evasion' and 'money-laundering' only make

them work harder, after all. Me, I'm only in it to reduce transaction costs. Illegal business is chump change compared to putting the entire global economy onto the net in digital bearer form.

"Steve Schear and I even figured that you could do it with just about *any* stock, anywhere, from anywhere, as long as it was legal in the jurisdiction you did it *from*. Sort of an "Unsponsored Network Depository Receipt", UNDRs, for short..." and then, I proceeded to go into an entire rant on *that*. In four-part harmony. Arlo Guthrie would have been proud...

Finally, I run out of gas, like I always do, and Mark says, "If you issue digital bearer certificates collateralized by the S&P 500, you won't need cash anymore." More dead air.

"Well," I said, jumping back in, "maybe, maybe not. I mean, the dollar's pretty much pecunia franca right now, yes? Anyway, you wanna write something up about it, and we'll zing it out onto some of my mail lists for comment?"

I figure that if Mark was excited enough, *he* could bash on the mathematical finance of this idea much better than I ever could, being mostly innumerate myself, with my undergraduate philosophy degree from a midwestern state-school, and leftover student-at-large credit from UofC.

I mean, the closest thing I ever got to a genuine financial education was sneaking out of the University of Chicago Bookstore Graduate School of Business textbook section with books like Brealy & Meyers' "Corporate Finance", and Sharpe's "Investments". Needless to say, reading stuff like that, and hanging around people like Mark at a place like Chicago pretty much set my "if there's not a market for it, it really doesn't matter" view of reality into steel-reinforced concrete. It's kind of the core of my anti-state bias as well, I suppose.

Mark is, of course, a pro at this kind of stuff, having figured ways to use Green's functions to kill off lots of Monte-Carlo modeling, building closed-form solutions for various security prices, and so forth. His asset-liability models sit in the guts of several very large insurance companies, and there are questions about his asset-value calculation methods on the US actuarial exam. One of his latest projects is building the analytical core of start-up e-finance company in an as-yet undisclosed European country, and his client before that was one of the largest financial services firms in the world, owning well-known insurance and mutual fund companies everywhere you would care to name.

So, I didn't hear much from Mark about this idea of his anymore, probably because most of his "wetware" bandwidth is paid for these days, with real money, and he doesn't have much time to spare for actual fun -- much less writing a non-reviewed finance paper that I would just pass around the net for free. And so that's the last I heard of it for a while.

Then, a few months ago, after I'd started up my new company, [IBUC.COM](http://www.ibuc.com), to actually issue digital bearer cash and other stuff some day, some newbie on

the cypherpunks list talked about trying to do yet another internet currency, a smallish rant with a whole bunch of, well, *wrong* stuff in it. So wrong, in fact, I can't even remember most of it. As is unfortunately usual in these circumstances, I ended up writing my own rant in reply. It centered around my own favorite point on the subject, that unless any "internet currency" was exchangeable into *dollars*, or some other standard unit of exchange, nobody was going to pay any attention to it.

There have been several efforts on cypherpunks and elsewhere to think about synthetic currencies based on attention, or machine cycles, for instance, and, while using machine cycles to prevent *forgery* is at the core of most decent micromoney protocols like MicroMint, but you have to denominate your digital bearer cash in something *financial*, or it will be of no real use to normal people. Not that most cypherpunks care about being normal, you understand, but there it is.

Nonetheless, I did toss off some nice words in the direction of the [e-gold](#) guys, who, at the time, were issuing a kind of gold-backed "internet currency", albeit in book-entry form. They had been having some success with it, mostly among the anarcho-survivalist gold-bug crowd. Meaning that a lot of very bright erst- and proto-cypherpunks have been playing with e-gold, for reasons of politics, paranoia, or both. Or at least so I figured at the time, anyway.

Dr. Douglas Jackson, the oncologist-turned-founder of e-gold, is quite a bit more phlegmatic about these things himself, though certainly never a fan of fiat currency. He understands, for instance, that storage costs can make gold-backed account balances actually depreciate over time. But, in implementing the e-gold payment system, he and several thousand e-gold users have ended up with quite a bit more experience in non-credit-card internet payments than anyone else has to date, mostly because they didn't try to do anything too complicated in the early stages.

More to the point, all of Doug's competition (like First Virtual, CyberCash, and DigiCash, to name a few) have killed themselves off going for the main chance. They kept trying to conquer the world, trying to be some kind of *sole* transactor of business on the web, without understanding that finance is a business of herds and swarms and that *nobody* trusts anyone who's the sole *anything*.

Meanwhile, Doug's still doing a tidy, if not land-office, business, precisely because he's *not* trying to take over the world. In fact, I'd say that anyone who's interested in internet payment should pay more than a little attention to e-gold, or, as their evangelist Jim Ray likes to call it, "The little internet payment system that could."

Anyway, [Ian Grigg](#), an expatriate Australian who I can't really call a cypherpunk -- more of a "moneypunk", maybe, since he's spent a lot of time lately down in Anguilla building things for e-gold, among other people -- sees this cypherpunks rant of mine about internet currency after I forwarded it to dbs, the digital bearer settlement discussion list that I run. Ian observed there that if

transaction speed was fast enough, the market would probably converge to a world without cash at all. Shades of Mark Tenney.

Since I respect Ian's opinion, because Ian seems to have read every "Austrian" economist there ever was, and is a great fan of Scottish free banking, not to mention because of all his work for e-gold, which now runs on his "Ricardo" web-market-making system, I thought to myself, "Okay. Maybe. Someday. In the meantime, I want IBUC to do cash, dollars preferably, thank you very much, and after that, other *actual* securities, and, after *that*, we'll see if the dollar really does evaporate as the world's primary exchange currency." And having said so to the list in reply, I left the discussion there for the time being.

Which brings me to a little while ago, when I was half-to-three-quarters of the way through with a nice rant for this column on something else entirely, and ended up throwing it all in the trash.

That was because of something I got in email from *another* friend of mine, one of the best internet transaction lawyers in the business, [John Muller](#), a partner at Bobreck, Flegler and Harrison, in San Francisco. Among other things, John is Chair of the [Web Site Working Group of the American Bar Association Joint Subcommittee on Electronic Financial Services](#) (say *that* ten times fast), and Co-chair of the Automated Transactions and Electronic Agents project of the ABA Cyberspace Law Committee.

What John sent me was the most recent Electronic Financial Services Update, the back issues of which can be seen at <http://www.abanet.org/buslaw/efss/whatsnew.html>, and in that update was "[Towards a Moneyless World?](#)", a paper by Malte Krueger, of the University of Cologne and the University of Western Ontario, for the International Atlantic Economic Conference, which was held in Vienna this past March. Apparently, this paper was also presented in different form to the Second Berlin Conference on Internet Economics a little while later.

And, there, after converting PDF to PostScript, and then PDF to ASCII text so I could read it faster, *there* was a pointer to where my friend Mark Tenney -- and, I bet, Ian Grigg -- got the idea that as transaction latency and transaction costs go to zero, the value function of currency converges to that of more "financial" assets: They were quoting, whether they knew it or not, the so-called "New Monetary Economics" (NME), a phrase coined by Robert Hall, but conceived, in the early 1980's, by no less a pair of financial luminaries than Eugene Fama, of the Efficient Market Hypothesis, and Fischer Black, of the Black-Sholes option equation. Others, like Krueger, apparently, call this the "BFH system", in their honor -- or for other reasons, it's hard for me to tell.

Krueger says, of NME/BFH,

In the current system money (cash and deposits) is used as medium of exchange and unit of account. In the BFH system there would be no common medium of exchange with a fixed nominal value in terms of the unit of account. Instead, assets with variable

prices are used. This implies that, in principle, any asset could serve as a medium of exchange. An example that is often used to illustrate 'moneyless' payments are mutual funds shares. The value of mutual funds' shares varies with the value of the funds' assets and within certain limits they can be used for making payments. So, the medium of payment 'mutual fund share' has a value that is not fixed in terms of the commonly used unit of account. Eugene Fama (1980) argues that monetary separation is efficient because the financial system (Fama uses the term 'banks') serves two functions that are independent of each other: the accounting function and the portfolio management function. Banks could fulfill the accounting function without holding assets or using any medium of payment. It would be sufficient to have a unit of account. As an uninvolved third party, banks could just keep records of transactions. The issue of liabilities and the purchase of assets is derived from the second function, the portfolio management function. In this function banks help individuals to hold their wealth in a form they desire.

What the above means to me is pretty much what Tenney and Grigg said, that Moore's law creates an increasingly geodesic, ubiquitous, public internet network, which, coupled with the financial cryptography of digital bearer settlement, "surfact" currency into its constituent parts. Why keep something which doesn't earn you money, in other words? Why not use something which is as risk-free as possible but still earns money while it's in your possession? Furthermore, the longer money's going to be in your possession, the more incentive you have to invest in something where short-term volatility isn't a problem. We'll leave discussion of my opinion on the "accounting" function as an exercise for the reader.

Anyway, Macroeconomists call this division of unit of exchange from unit of account, monetary separation. And, as a result, we get more and more different kinds of exchange with decreasing transaction cost. Banks go back to being "counting houses" instead of fiduciaries, trustees, keeping track of who owes what to whom, and the returns on money are higher for the users of that money. The advent of the money-market mutual fund, was, of course, a step down this road.

As to whether this means the death of currency, Krueger comes down on the side of network effects -- unfortunately conflating them with path-dependency; network effects being cool, and path dependency being balderdash -- and says that the opportunity costs of keeping track of various different asset classes, and, more importantly, exchanging those different asset classes with others just to effect any trade whatsoever in a virtual re-emergence of barter, still costs too darn much, and thus, the internet gives us monetary integration, and not separation. As someone said of Mozart, "too many notes".

I'm personally not so sure, Moore's law being what it is. It might be easy enough with enough bandwidth and processing power to do all those exchanges and re-balance one's "portfolio" of money-equivalents, paying people in whatever asset class they want, and still make more money than parking money as dollars in a bank somewhere, or, worse, keeping cash on

hand.

However, I also think that it'll be a while, just yet, for that world to emerge, and, frankly, I want to buy things with *dollars*, and right now.

By way of some even *more* twisted synchronicity, Krueger's paper then points to my friend Tatsuo Tanaka's paper on the macroeconomic consequences of internet free banking. Which, oddly enough, I edited and recommended for publication in the peer-reviewed internet journal First Monday four or so years ago. I even invited Tanaka to come up and present the paper at a Digital Commerce Society of Boston luncheon shortly after the paper came out.

Tanaka says, first of all, that internet free-banking is like the expatriate-cash Eurodollar market on steroids. Internet free-banking drives the final nail in the coffin of central bank control of any nation's currency, because, if a currency is stable enough, and maybe even if it isn't, sooner or later more of the currency is "issued" on a fiduciary basis outside a country, collateralized by foreign-held dollar-denominated accounts, for instance, than is issued by the central bank itself. And the net makes *where* the money is, heh, immaterial.

Unfortunately, Tanaka also says that competition for underwriting cash to the net causes the eventual fractional reservation of digital cash against its denominated currency, and that, sooner or later, crises of confidence in all those different issues, and their various partial reserves, force the creation of, you guessed it, monetary union of some kind. Tanaka liked to wax about the eventual creation of a central bank of cyberspace, thus setting most cypherpunks' and other free-money advocates' teeth on edge, mine included, skyward-rolling eyes and all.

But the story gets weirder than that. Recently, Douglas Jackson and his crew at e-gold have been taking their association with "moneypunks" like Mr. Grigg (and, um, others :-), to heart lately. They split themselves into a trustee-underwriter relationship of several firms, and, in the process, have created an offshore subsidiary, based in, where else, Anguilla, to, you guessed it, offer fractionally-reserved, (but non-blinded) gold-denominated digital bearer certificates, called, oddly enough, DigiGold.

The idea behind DigiGold is to fractionally reserve gold denominated transactions, loaning out the reserve's other fraction to offset the cost of gold storage, which, as we noted above, at a percent or more a year, is a considerable one if you're trying to create a currency which is supposed to hold its value. In fact, Ian went so far as to start buying and selling notes denominated in gold recently, apparently as part of his work with DigiGold.

"Gold-denominated Burmese opium futures", indeed.

For one final bit of weirdness, I eventually got around to reading Glassman and Hasset's [Dow 36,000](#) article in the Atlantic Monthly, which, at the core of its analysis, notes that among other things and contrary to received wisdom, equities held in the long term are much *less* risky than even long-term

government bonds are, and how the market has been compensating for that for the last few decades or so by driving equity prices slowly upward to their risk-adjusted "reasonable" price. Like their title says, they say that the Dow could be at 36,000 and still be "reasonable", whatever that means. Mercy.

A splendid read nonetheless, whether you agree with them or not, and the bit about the risk of the equity market certainly makes a compelling argument for a very, very, interesting result for us, in light of all of the above.

At the core of all modern financial analysis is the proposition that government bonds, especially short-term ones, are the safest investment. They're safe because, for instance, the chance of the US government defaulting on any given 90-day T-Bill on any given day is virtually non-existent. T-Bills are literally risk free, and all other investment is calculated against them for riskiness. The Net Present Value equation, for instance, says that if the returns of a proposed investment are less than you would get from a T-Bill, you should forget the investment and keep your money in T-Bills instead.

And, at every year of bond maturity, the government bond sits at the lowest point of the risk "well" for that maturity. Or so I thought, until I saw Glassman and Hasset's description of what all financial theorists knew already for a fact, that the long-term risk of the overall equity market is much less than that of even government bonds.

So. Can we back that "zero" equity-market risk down the maturity curve to the present? Maybe, with a derivative or two. I haven't gone looking for the answer, and it's press time already. I wouldn't be surprised, though, and to walk out on a very thin limb, I'm going to assume it to be true.

Certainly the idea of, say an S&P 500, or maybe a larger-index-based "cash" starts to make sense, if we can do it. After all, Ian Grigg and his friends are trying, for all intents and purposes, to do roughly the same kind of thing with gold. Gold hops around a bunch, and volatility is probably not a good thing for a currency to have. So any financial engineering you can do to at least take the volatility down a bit would be good. And you'd want to do the same thing with equity indices, because, as a functional perpetuity, a stock can be just as volatile as a 30-year bond might be.

What we get, if we do create a low-volatility equity-based currency, is really very interesting.

We get what Gene Fama and Fisher Black must have been thinking about back in early eighties heyday of the "New Monetary Economics": a completely private form of "riskless" return.

Think about that for a minute. Not only do we have digital bearer settlement, so we don't need the nation-state to provide force and ensure the non-repudiation of our transactions, but we don't even need another kind of force either: the confiscatory force of a nation's tax system, making for "riskless" government securities, which, in turn, undergird our very concept of what risk is.

What we get is truly *private* money. That is, someday we can create a completely synthetic currency based upon a commonly-referenced *equity* market index.

Look, Ma, no currency board, much less a central bank. No guns. No sovereign. And we still get money. Amazing.

So now, instead of stepping *back* to a commodity economy to avoid state control of the monetary supply, using something like gold to anchor value on the net, we can step *forward* into the information economy, the geodesic economy: All we need to collateralize our transactions is a sufficiently representative and publicly known equity index, with the volatility hedged for short term use using *other* publicly known derivatives. Presto change-o, a synthetic internet security. And, of course, this works with bearer held stocks, if we ever get those, as well.

Finally, anyone who wants to can do this -- well, if their reputation's good enough. This is finance, after all.

Of course, the sticking point all this fun is the state itself, as I said to Mark Tenney more than a year ago. Remember all the book-entry taxes and regulations about bearer ownership of bonds, TEFRA, et. al., here in the U.S., and then exponentiate that number to get the regulatory barriers for bearer equity.

It'll certainly be easier, for the time being, to issue cash denominated in dollars than it would be to try to climb an enormous ziggurat of regulators and legislators, telling all of them that issuing bearer-form equity-index-denominated money would be a good thing, even if it completely removed *their* central banks, much less *their* very government bonds, from the center of the financial universe. A lead balloon, indeed. Almost makes you want to believe in path-dependency, that does.

But don't despair. Remember that if digital bearer transactions really *do* something I'm betting my company on, sooner or later an equity index-based "internet currency" will in fact emerge as the best way to buy things.

Even more interesting, if we're right, government-extorted revenue will cease to be the foundation upon which the concept of "riskless" return -- and all of finance itself -- rests.

But that's probably what Fama and Black had in mind, right?

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