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**THE MONEY VALUE PROBLEM
CONVERTIBILITY & STABLE
PRICES REVISITED**

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Johns Hopkins Institute for Applied Economics,
Global Health, and the Study of Business Enterprise



The Money Value Problem Convertibility & Stable Prices Revisited

By David C. Patterson

About the Series

The *Studies in Applied Economics* series is under the general direction of Professor Steve H. Hanke, Founder and Co-Director of the Johns Hopkins Institute for Applied Economics, Global Health, and the Study of Business Enterprise (hanke@jhu.edu).

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Abstract

To serve its essential purpose – certainty of value in exchanges among bargainers – convertible currency drew its value as a proxy from that into which it was convertible. Gold came with its challenges as a value standard, and those of physical conversion. The setting of currency value in the discretion of its issuers, by varying the issuance, has led to new and adverse consequences in the fallibility of the discretion. Modern financial markets could provide rule of law conformance to an optimal value standard without physical conversion.

The necessary financial device is already at hand, in the market and in the Fed toolbox. REPO, the sale and re-purchase or purchase and re-sale of a Treasury, at the spread of measured currency value to a target of choice, would duplicate in monetary effect that of specie conversion. Technological advance is steadily obsolescing the “cost-of-living” as target. As consumption mutates with invention, the sensible value standard becomes the American *standard* of living, in the form of a per capita share of total consumption spending.

Effective convertibility to such a standard would resolve multiple policy issues, including any conflict in the “duality” of the Fed mandate and the supposed strictures of the “zero bound”, father to the immense distortions of “quantitative easing”.

Financial or “fiat” convertibility, as we may call it, effectuated by inflation-priced Fed REPO, could be adopted as a discretionary tool by the Fed, but there are strong arguments for a rule of law. We may need one to deal with deteriorating national finances, and welcome one that returns the “management of the economy” to the free market.

“There is therefore a great preponderance of reasons in favour of a convertible, in preference to even the best regulated inconvertible currency. The temptation to over-issue, in certain financial emergencies, is so strong, that nothing is admissible which can tend, in however slight a degree, to weaken the barriers that restrain it.”

“Everybody can understand convertibility.”

John Stuart Mill, *Principles of Political Economy* (1848)

1. Introduction

Market instability, a bias to inflation and vulnerability to fiscal pressures are inherent properties of a discretionary monetary system, not curable defects in it.

Given the low rates of inflation and unemployment that prevailed before COVID, and its ride to the rescue when the crisis hit, critics of the Fed might be forgiven for comparing themselves to the passerby who, on a pre-dawn walk, encountered an eccentric sun worshipper doing an elaborate dance. He did it to make the sun rise, he said. When challenged, he pointed out that it had been working pretty well.

Not *that* well, the passerby might be thinking.

i) With or without crisis, the markets are regularly convulsed by slight nuances in Fed actions or statements. The instability feeds speculation that is unproductive if not positively distortive, and impedes our most important, wealth-creating arrangements, being those of longest term.¹

ii) The Fed’s rate suppression has piled up a mountain of debt, weakening balance sheets, making future crises all-the-more likely and dangerous, and transferring wealth to the already-wealthy owners of the assets whose price it has inflated.

iii) Its ability to monetize the Federal debt will put its independence at ever-greater risk as the debt explodes.

How did we get onto this downhill road and how do we get off it?

The problem is complex but its roots are not. To probe them we may employ a simple allegory, and imagine a community of people who meet periodically in a town market to trade the goods that they produce and consume (or use in further production). To avoid barter, they began at some point to use bits of gold as a medium of exchange, but soon found that these were not as convenient as tickets *exchangeable* for gold bits, or indeed *promises to deliver* such tickets. To enable the promise-giving among people who didn’t even know each other, banks emerged, whose promises in the form of fixed-amount notes or variable-amount checks could serve as “money”.

To control the promise-giving (which had a way of going off the rails with the alternating greed and fear of both bargainers and banks), a central bank (CB) was set up. Its own notes were made the

¹ “We will know that we have regained the degree of assurance that we once enjoyed under the gold standard when there once again exists a thick market for thirty-year corporate bonds.” White (2007).

only universally acceptable ones in final settlement of money promises, and it was given the job of regulating the private banks, as by lending them more of the notes if they got into trouble.

Linkage of the notes to gold was in due course dropped, for various reasons, one of them being CB's claim that it could control the spending of the notes, and therefore their value, by varying credit conditions. It could buy and sell the debt of the Town Council, by far the biggest note-borrower. It could lend and borrow its notes directly in the market, thereby setting everyone else's rates.² Free to choose a more "modern" target value for the notes, it chose that of a stabilized "cost of living".

The plan was logical enough but proved unworkable. In setting a rate, to produce a level of trading that in turn produced a particular ticket value, CB could never accurately predict the market-makers' productivity or selling mood (or ingenuity in promise-giving, balance sheets being infinitely expandable). Difficult enough, the job was made impossible by "reflexivity"³: The market-makers were reacting constantly to each other's actions, and to what CB did, or might do, and to what others might do in further reaction. Even in speaking, CB was by observing, altering, in a game with many players and never an equilibrium.⁴ Its moves in the game being infinitely debatable, even after made, its discretion in making them doomed it to interference by the most powerful among those affected, not least the Council, which periodically replaced its management, and greatly preferred to borrow cheaply, the preference becoming more and more urgent as its spending outran its revenue.

The Fed finds itself in just this position, with just the problems noted by our skeptic of the sun dance, grown from the same root: its discretionary power.

i) The impossibility of its determining a "correct" interest rate, as evident in the perpetual clash of expert opinion on what that might be, commits the decision to a process of which the outcome can never be predicted, guaranteeing the instability of markets that must nonetheless speculate on and react to it.⁵

² This is where we now find the Fed. For description and critique of its current "floor system", see Selgin (2018).

³ See Soros (2003) at 2 (defining the term as "a feedback loop between the participants' understanding and the situation in which they participate", one that "ensures that their actions will have unintended consequences").

⁴ CB has an aggravated "three body problem", known to physicists as the extreme difficulty of predicting the movements of multiple bodies whose movements influence each other. (A good summary is at https://en.wikipedia.org/wiki/Three-body_problem.) It faces "level two chaos", the kind that "reacts to predictions about it, and therefore can never be predicted accurately." Harrari (2018) at 240. To students of complex adaptive systems it is the "El Farol bar problem" of customers seeking their best strategies to avoid the rush, with never-settling results. See Beinhocker (2006) Ch. 4-6. Yogi Berra put his finger on it: "No one goes there anymore. It's too crowded".

⁵ The fallibility of the Fed's models is a commonplace, but what model can cope with not knowing whether the market will react to (a) what the Fed says it will do, (b) a deviation from what it was expected to say, or (c) the conditions that caused it to say what it did? Announcements of stimulus usually boost markets, as intended. For an example (among many) of exactly the opposite effect, see Ramkumar (2019) (stocks slide after Fed unexpectedly fails to raise rates "raising fears about a slowdown in economic growth"). In both theory and practice "quantitative easing" relied heavily on the "signaling channel". Hence the market's downward "tantrum" of June 2013, following a mildly *positive* comment by the Chair that economic risks had "diminished", possibly foreshadowing a QE "taper". Bernanke (2013); Gibson (2013). Reflexivity is epitomized by the Fed's "dot plot",

ii) An agency making highly arguable judgments in the control of interest rates will inevitably be subject to powerful forces in favor of their suppression, from politicians who are re-elected, and business owners who flourish, in the “good times” that the suppression temporarily brings.

iii) One government agency, appointed by another, cannot hope to maintain “independence” in the provision of discretionary assistance to relieve fiscal or economic distress.⁶

None of these problems existed when the value of money and its supply were controlled by specie convertibility rather than model-driven manipulation of interest rates. Aided by modern financial markets, we could restore that control in a form that is even more effective, and more to its purpose, than it classically was.

2. Convertibility.

Specie convertibility conformed the currency value by securing to the converter, not the ownership of (or liability for) specie itself, but currency units of equivalent value. Market arbitrage of the entitlement conformed the units’ general trading value.

a. Specie.

The purposes of physical convertibility were (1) to entitle the individual bargainer to the value of the target resource, and (2) to move the general trading value of the circulating currency unit, steadily but automatically (if never finally or completely), to that target. Physical exchange for gold or silver had various problems that ultimately undid it⁷, but how exactly did it operate when it did?

setting out its prediction of something (its own “future path of policy”) that will depend on private actions taken in response to the prediction itself, which actions will affect future dot plots. Thus “a shift toward higher rates in the dot plot in March 2014 led to a short-term sell-off in both stocks and bonds, a reflection of investors’ fear that the Fed might raise rates sooner than expected.” Kenny (2020) (dot plot commentary). Market selloffs in turn affect Fed policy, as in its change of tune at the end of 2018, after a sharp market correction that its own signals had precipitated, which change then sparked a year-long rally. Scholars debate the “hall of mirrors” effect, see, e.g., Mester et al. (2020), but professionals know it well enough. See, e.g., Levy (2019). So does the Fed. For a lively discussion of how statements by FOMC members had been, in the words of the Vice Chair, “generating a great deal of noise and market volatility”, see FOMC Transcript November 2010 at 3-16.

⁶ For a sense of how implacable – and sympathetic – may be the pressures, consider President Truman’s bitter campaign against rate increases that were clearly needed to stop inflation but would be hard on Victory Bond holders, even as the Korean War raged, “exactly what Mr. Stalin wants”. See Hetzel & Leach (2001) (history of the 1951 Accord).

⁷ They are beyond the scope of this discussion, but classic convertibility could not in any event survive the change in value standard to the “cost of living”, something that cannot be physically exchanged. Various ways around this problem have been tried, with varying success. The earliest and simplest was that of a “tabular standard”, or index of the value of such a basket, which contracting parties could incorporate in private bargains, and might be legally implied unless bargainers opted out. See Jevons (1876) Ch. XXV. Private indexing is of course common, but has ever attained the “automatic default” role that Jevons hoped for. A variant is to have the government issue a special security that it agrees to redeem with a value-equating number of official units, enabling the parties simply to designate settlement in that security. Chile maintains such an inflation-linked official security, the “unidad de fomento”, as do other Latin American countries. For a review see Shiller (1998). The economist Irving Fisher proposed a “compensated dollar” that would take as its target value that of a diverse resource basket, and be

As to purpose (1), what the bargainer wanted – and got – was not the target resource itself, but tradable value-claim units (currency) that *corresponded in value* to it in the market. The market-makers in our allegory never went back to the cumbersome gold bits. If 10 tickets were convertible into one such bit, but the heat of trading had pushed the price of a bit to 11 tickets, what was wanted by someone who came to market with 10 tickets, saved from a previous session, was 11 of them, so as to secure their bargained-for, real resource purchasing power (that of a gold bit), and that’s what they got by stopping off at the ticket counter to exchange their 10 tickets for a gold bit that could then be sold in the market for 11 tickets. If trading was cool and prices fell, with a gold bit now purchasable in the market for 9 tickets, what was wanted by someone who that day had to discharge a *debt* of 10 tickets was to acquire them for 9, and that’s what they got by buying a gold bit in the market for 9 tickets, and turning it in at the ticket counter for the 10 that were owed. Tickets were generally what was wanted in either case, being more convenient for all concerned than the gold itself.⁸

As to purpose (2), conformance of the ticket value to that of 1/10th of a gold bit, that job fell to the arbitrageurs, who would continue exchanging bits for tickets at the counter, or vice versa, until they had closed any gap – but also for *ticker profits*, not *gold per se*.

b. Fiat

The same benefit (and conformance) could be achieved, without physical exchange, by obliging the government to sell and re-buy, or buy and re-sell, a financial asset – conveniently, a U.S. Treasury – at a spread equal to any such variance. Such entirely financial, or “fiat”, convertibility, effected by inflation-priced Fed REPO, would automatically correct for inflation by raising rates, and for deflation by lowering them, with no “zero bound” in the latter case. It would mirror physical convertibility in both, but be more flexible and efficient through its engagement of modern financial markets.

If convertibility, in practical and intended effect, is a system (1) to entitle bargainers to the intended value of their bargains in a variable number of tradable currency units, with (2) market action pulling the trading value of the units constantly to a target, modern financial markets offer a way to re-institute it, to a target of choice.

Assuming that the “**Index Value**” of the dollar and its “**Target Path Value**” are defined as the observed and targeted levels of a specified price index or economic aggregate (“Index Value” being the inverse of real) and that the former is reported by the government on certain “**Report Dates**”, effective

conformed in value by exchange for some physically tradable medium, such as gold, the quantity of which, with the aid of a price index, could be equated in current value to that of the index basket. See Fisher (1911) Ch. XIII. Another idea is to have private funds issue money that they conform in value to that of a designated multi-resource standard, with the government limited to publishing the index, and with issuers competing in the market to get their money accepted as value-conforming. See Greenfield & Yeager (1983), Yeager (2010), and Yeager (2014). The approach suggested herein has elements of each of the above, but is most like Fisher’s, in its goal of a single official currency.

⁸ Thus the plaintiffs in the Supreme Court “gold clause” cases of 1934 did not sue for gold but “gold-equivalent” current dollars. The government frustrated them by giving them dollars that were *not* “gold-equivalent”. For a highly readable history of the gold cases, see Edwards (2018). Civil War Greenbacks, not redeemable for gold, were used to discharge gold-denominated contracts because they were in general circulation and could be delivered in “gold-equivalent” amounts. See Friedman & Schwartz (1963) Ch. 2; Friedman (1961).

convertibility could be put in place using a tool already in regular use by the Fed, the “REPO” (short for repurchase obligation). A simple statute could read:

On the day preceding each Report Date, the Federal Reserve shall offer to sell or buy without limit Eligible Securities, for re-purchase or re-sale respectively, by mutual obligation, on the Report Date, the re-purchase or re-sale price to be the initial sale or purchase price times the ratio of (i) the Index Value of the dollar as stated in the Report to (ii) its Target Path Value for the Report Date.

The conversion right thereby conferred on dollar holders and obligors would be exactly as in any conversion regime, and as described in the 10-ticket example above. REPOs are just fixed (usually short term) loans secured by the REPO'd asset.⁹ A saver/owner – “long” dollars – could lend them to the Fed overnight to receive back more, and so restore the real value of the long position, as against inflation. (The Fed calls this transaction a “reverse REPO” and for short we’ll call it an “R-REPO”.) A borrower/owner – “short” dollars – could borrow them from the Fed overnight to pay back fewer of them, in a “forward REPO” (“F-REPO”), and so, having used the cash borrowed from the Fed to discharge the private debt, restore the real burden of the debt as against deflation. Purpose (1) achieved, for either saver/owner or borrower/owner.

As to purpose (2), conformance of general trading value to target, convertibility as proposed here – we’ll call it “fiat convertibility”, as modern counterpart to the specie form – would work with the same relentlessness, driving interest rates up as the effect of inflation-caused R-REPOs, and down as that of deflation-caused F-REPOs, automatically and proportionally to any value disparity until it was eliminated, through the general deflationary or inflationary effect of the rates (respectively).

How, more specifically, would things actually work?

Taking first (1) the individual’s access to promised value, Wall Street’s ingenuity is without limit, but we can imagine Dollar Value Funds, effectively aggregated brokerage accounts, in which investors large and small could take long or short positions against the Value Index level on a coming Report Date, long by depositing cash and short by posting collateral as for any short position. Each fund would net

⁹ A REPO’s twin “prices” are set so as to lock in a certain profit to the buyer/re-seller (lender) and loss to the seller/re-buyer (borrower), effectively interest in either case, the prices being low enough (versus negotiable value) to ensure “repurchase” by the borrower (or easy recourse by the lender). Any easily transferable asset of sufficiently certain and liquid value will do. Descriptions of REPO operations can be found in Baklanova et al. (2015) and also by the Fed at https://www.federalreserve.gov/monetarypolicy/bst_openmarketops.htm. The REPO’s original purpose – collateralization – is irrelevant when the Fed is the borrower in a “reverse” REPO, described by the Fed, without apparent irony, as “the economic equivalent of collateralized borrowing by the Federal Reserve.” https://www.federalreserve.gov/monetarypolicy/bst_openmarketops.htm) The Fed is of course not the first to finesse constraints on outright borrowing and lending by making financial exchanges-at-a-spread. It put the Medici into business, and facilitates Sharia-compliant lending. See Parks (2005) Ch. 2; Amin (2011). Its unique advantage is to enable Fed lending (by “forward” REPO) to “all comers”, weak and strong, and thus the convertibility regime proposed here. Under it there would be no “leakage” of control through credit providers that the Fed does not regulate or (but for REPO) lend to or borrow from. Gaps in Fed powers to transact with “all comers” are accidents of its history as a bank dealing with other banks, conceptually inconsistent with the idea of an agency in control of interest rates, and anachronistic in a world of non-bank lending. The REPO power is conceptually unlimited, if not yet maximally exercised. It could be employed to lend outright to particular borrowers, the equivalent of the targeted loans that the ECB makes under its TLTRO program. European Central Bank (2019). Better to embrace the power and channel it.

the positions taken with it, and itself be long or short on the day before the Report Date, holding cash (if expecting reported inflation) or Treasuries (if deflation), to be REPO'd with the Fed, for gain or loss as per the Report. The most efficient funds could charge the lowest fees or spreads. What they now give the smallest ETF trader, in exposure to almost anything, almost for free, thanks to information technology, they could give continuously to any dollar holder (or owner).¹⁰ As financial technicians created the money market fund and the ETF, they would make short work of “democratizing” this opportunity.¹¹

As for (2), the action of market arbitrage, it would move rates instantly. By borrowing at a certain (R-REPO) rate the government creates *borrowers up to* that rate (banks who can pay interest on private deposits that they lend-on to the government at a spread). By lending at a certain (F-REPO) rate it creates *lenders down to* that rate (banks who can borrow funds from the government to lend-on to private borrowers at a spread). In a well-functioning free market, both will do so.

Looking at the effect through a slightly different lens, the Treasury market translates all rates into prices and vice versa. Consider a T-Bill that will pay out \$100 on or near the next Report Date, and so would likely be trading at that level, absent convertibility as proposed here. With it in force, if inflation of 1% were expected to be reported (Index over Target), it would pay to sell the bill down to \$99 and R-REPO the cash to the Fed for \$1 of profit. Conversely if deflation of 1% were expected (Target over Index), it would pay to buy the bill for up to \$101 and F-REPO it to the Fed for \$1 of profit. T-Bill price change equals change in the risk-free short-term rate. The REPO spread, forward or reverse, would effectively represent a risk-free overnight rate, allowing the market to set all others.

How forcefully and immediately the mechanism would operate would depend on the frequency of conversion and observability of the value disparity. Monthly conversion to a commodity standard would move rates more or less instantly, commodity prices being continuously observable. Quarterly conversion to a price index like the CPI would move them more gradually (and at greater risk to the converter). Convertibility to a measurable monetary aggregate, as advocated below, would fall

¹⁰ A strong case could – and should – be made that, as the purpose is realization of target value in the currency, independently of any speculative element, conversion gains should be tax exempt, something that makes all the difference in value preservation and has eluded holders of gold (or anyone trying to preserve value by rolling over T-Bills) because of the tax. See [LINKED](#) exhibit “Value \$100 In T- Bills v. CPI Since 1950”. Losses should likewise be nondeductible, along with interest incurred to make gains, as is already the case for interest incurred to earn tax exempt income such as municipal bond interest, and with which the tax system copes quite adequately.

¹¹ All the super-efficient giants of the business are already on the Fed’s list of approved REPO counterparties, albeit only for R-REPO. www.newyorkfed.org/markets/rrp_counterparties.html The proposal here would be to include them for F-REPO. A Blackrock or Vanguard could scarcely be less technologically proficient or reliable than the presently included “primary dealers”, many of which are also fund managers.

somewhere in between. Given the value of large positions immediately paid off¹², the prodigious data and trading heft of the hedge funds would be brought into immediate play, whatever the standard.¹³

The process would never equate the dollar's value exactly to the target. Even the gold price varied slightly from one end of the souk to the other, and might slip between order and execution. Analogously to gold points, or the variance of value from target between conversion dates, there would always be some variance of reported Value to Target, but the corrective pressure would be constant and proportional, the best that can be hoped for in currency value conformance.¹⁴ In an efficient money market, moreover, a variance-driven interest rate *itself corrects* a variance: The real value of money, as a claim to real resources, is that of the resources when claimed, which in turn is the product of (1) number of money units (principal plus interest) times (2) resources per unit, a function of one no less than the other. Information technology merges the two, in the bottom line on today's mortgage, brokerage or other financial statement. In the REPO, it returns credit finance to where it began, as a spread in a financial exchange, employed to circumvent the prohibition of interest.¹⁵

In macro-economic parlance, the spread between opposite REPO conversion rates, driven by the observed variance of value from standard, would constitute a "symmetric corridor" between rates determined in that way rather than by central bank discretion.¹⁶ It would effectively vary the "money supply" much as specie convertibility did: As gold purchases from the government (in an inflation) drained money, and sales to it (in a deflation) added it, so fiat convertibility would (in an inflation) effectively "freeze" reserves held for interest at the positive R-REPO rate, and (in a deflation) spur their lending at the "negative" F-REPO rate, "velocity", as affected by credit conditions, being in all

¹² The Fed is empowered under Section 14 of the Federal Reserve Act to buy and sell "any obligation which is a direct obligation of, or fully guaranteed as to principal and interest by, any agency of the United States". The set that the Fed could employ in R-REPO sale/repurchases is technically limited by its balance sheet, but also irrelevant, given its infinite credit. It could sell and repurchase its own liabilities created for the purpose, assuming that the R-REPO form even needed to be observed, versus a simple overnight, risk-free borrowing at the conversion rate.

¹³ They are standing by. They appear to have employed Fed-offered F-REPOs, in the liquidity squeeze of September 2019, to finance interest rate swaps. See Avalos (2019) (BIS report). Rather than deplore such unintended consequences, the better course is to welcome them as adjustments to the hydraulic credit system, unpredictable in exact form but tending to the desired effect (general credit loosening in that case).

¹⁴ Simplistic illustrations of convertibility's operation, traditionally and as proposed here, are set out in the [LINKED](#) exhibit "Physical & Fiat Convertibility".

¹⁵ See note 9 above.

¹⁶ The Bank of Canada explicitly employs such a corridor of upper and lower overnight rates that it sets. See Lavoie (2019). The Fed's current "system" is a mix of general and specific instructions to its New York Desk: as of one recent date to (1) "maintain the federal funds rate in a target range of 0 to ¼ percent", (2) "support the smooth functioning of markets" for Treasury and agency securities, (3) "support effective policy implementation and the smooth functioning of short-term U.S. dollar funding markets", but in particular (4) offer overnight reverse REPO at 0% up to \$30 billion per counter-party (increasable by the Fed Chair), and (5) roll over all maturing Treasuries and agencies (presumably so long as 4 or 5 do not disserve 1, 2 or 3).
<https://www.federalreserve.gov/monetarypolicy/files/fomcminutes20200429.pdf>.

cases what counts.¹⁷ The problem is not the efficacy of such a system in controlling rates or “supply”¹⁸ but in operating it so as to bring about the desired result – stable currency value – in a complex and reflexive system.¹⁹

The Fed is already – and increasingly – using REPO as a monetary tool, inevitably given the power it confers to lend and borrow with any “counterparty”, in any amount, at any rate, as an “open market transaction”. The question is how the power should be exercised, whether by Fed officials searching for the rate that will correct a variance in value, or by the variance itself.

Addressing the particular “deflation” case (Target over Index), the “zero lower bound” would be eliminated, in that a REPO can be in either direction and at any spread. Negative interest seems incongruous and even menacing to us, as confiscation of savings, but such interest in an F-REPO would not be paid *to the Fed* on loans *to it* (as by docking reserves) but *by the Fed* on loans *by it* (of reserves), as a reciprocal part of the mechanism to maintain the notes’ target value (convertibility). Specie convertibility bore little menace, yet an F-REPO equates exactly to the government being required to issue notes for specie in a deflation, assuming a stable government gold stock.²⁰ The gold standard knew no lower bound. F-REPO spreads in a deflation would in effect be “helicopter money”, dropped neutrally into the credit system (to “all comers”), and why not, if freed from the perilous Fed models and the discretion that they mask?

There would be no threat of the Fed bidding long-term bonds into negative yield territory, to the distress of pension funds. It would simply be loaning cheaply short term, with no one forced to lend at a

¹⁷ “Now the fluctuations in the value of the currency are determined, not by its quantity, whether it consist of gold or of paper, but by the expansions and contractions of credit”. Mill (1848) Ch. III. 24. We deal in the next section below with the role of specie supply in the market, and under “Paying The Bills” below with that of government finances in the process.

¹⁸ Its efficacy in Canada is described by Lavoie (2019), and in the US. by Logan (2019) (N.Y. Desk manager). Hall & Reis (2017) advocate interest on reserves as the sole monetary instrument, but discretionarily.

¹⁹ Such systems are never at rest. James Watts employed a “centrifugal governor” of the steam entering his engine’s pistons, varying it inversely to engine speed, in a negative feedback loop with the unstable coal combustion, as classically described by Maxwell (1867). The device itself is pictured and explained at <http://commons.wikimedia.org/wiki/File:WattReg.jpg> and <http://mi.eng.cam.ac.uk/IALego/steam.html>. If not perfect, Watts’s automatic, “back-end” adjustments at least did not make matters worse, as an order to the stoker might. What’s wanted is a missile guidance system of continuous, instantly responsive course correction. Complexity and reflexivity disable all others.

²⁰ If the government buys a gold bit for the conversion price of \$10, when it is trading in the market for \$9 (dollar deflation), and then resells it in the market for the latter price, it has effectively loaned \$10 and been repaid \$9. The same would be true of a currency board offering a weaker currency in exchange for one that has deflated (the steady dollar for an over-strong local currency that the board has issued), and then returning its stock of the latter to its prior level. The transactions would be identical to loss-making F-REPO’s if the government’s counterparties on both “legs” were the same, as would be true of a class of arbitrageurs. For explication of currency board operations, see Hanke & Schuler (2015).

loss.²¹ There would be no assault on cash, by proponents of “negative interest”, frustrated by its undockability. The government would be issuing additional demand notes, as a *positive* return, on its notes outstanding, in an inflation (the R-REPO spread), and on its term debt, in a deflation (the F-REPO spread), thereby allowing note-*owners* fully to *earn*, and note-*debtors* only to *pay*, the rate that the market would set on a currency that was neither rising nor falling in value.²²

As to the problems first set out above, inherent in the Fed’s discretionary setting of rates, (i) their uncertainty would reside in the objective “inflation” number, more usefully measurable and discountable by the market than the actions of the FOMC, (ii) we would be free of the bias to rate suppression, with its undermining of credit soundness and risk of occasional major inflations, such as that in asset prices under “quantitative easing”, and (iii) a Fed not exercising discretion in the matter could resist pressure to “do something” at the first sign of weak growth or markets, not to mention a budgetary “emergency”. The appropriate thing – *monetary* versus fiscal or regulatory – would be done automatically, and the lines between them made clear.

The value standard and the market would be in charge, doing their essential work of wealth creation among willing and informed bargainers.²³

3. The Value Standard.

Inflation-priced REPO could incorporate any definition of “inflation”, as variance from value standard, provided only that the variance was periodically measurable.

a. A World of Choice.

The standard could be gold, a commodity or commodity basket, a price index (CPI or PCE), or a monetary or economic aggregate. The freedom of choice invites a reconsideration of which would best serve policy ends.

With physical exchange unnecessary to value conformance, the value target could be any price, price index or statistical aggregate that is capable of periodic measurement – a commodity or commodity basket; unit of labor or productivity; “everything” as contained in the GDP or some subset. Fiat convertibility would liberate the choice but be agnostic as to the one made. The arbitration process would be the same, only the controlling data different.²⁴

²¹ Holding physical cash may be inconvenient in larger amounts, but since banks could use it for arbitrage (buy bonds to F-REPO), they would have no imperative to charge their depositors.

²² What then of the short-term saver, partial to T-Bills and dear to politicians? Their price might rise above par in a deflation, but they would still offer the real lending rate in their F-REPO-ability, realizable by a well-run money fund if not by the saver. Private lenders, by funding themselves through F-REPO, would be *paying* only the real borrowing rate. The market on its own would pay and charge these rates, if it could speedily and accurately import inflation expectations into nominal ones, but it never can for a non-convertible currency: The actions of both government and fellow market-makers are too unpredictable. If the real risk-free rate is deemed insufficiently supportive of retail saving, fiscal and regulatory remedies are the appropriate ones, not monetary.

²³ In memorable imagery, the Fed would be moved to “the back seat” and prevented from “occasionally leaning over and giving the steering wheel a jerk that threatens to send the car off the road”. Friedman (1959) at 23.

The standard still *could* be something physical, but without physical exchange. Though convenient as a mechanism, it was never essential to a commodity currency.²⁵ Indeed it had its drawbacks, not only in the production and handling costs of the exchanged resource but in the effect on its real scarcity. Milton Friedman's requirement for a "true" gold standard was a free market in gold, versus the "pseudo" one that resulted from governments physically manipulating stocks of gold and sterilizing its flows. Hence his prescription that, to free the market, the government should *dispose* of its gold stock.²⁶ Fiat convertibility could conform the dollar value to that of gold without the distortions, specifically because it would not need to be physically held or traded by the monetary authority. A free and stable gold market, popularly trusted as such, seems unlikely at least for now.²⁷ If it could be achieved, however, fiat convertibility to its market value would be a practical means to restoration, as it would to the adoption of some other commodity standard, freer perhaps than gold of manipulation risks, because broader, but free likewise of production and handling costs. Whatever the real resource whose value is chosen as standard, the efficiency of today's financial markets, powered by information technology, would supplant physical exchange as the mechanism of conformance to it.²⁸

If modern conditions make possible a modern version of convertibility, however, they also militate for – and enable – a better modern standard.

b. Leaking Baskets.

Technological advance relentlessly undermines the conceptual soundness of price indexes.

When last seen, CB in our town market story was attempting to equate the trading ticket value to the market-makers' "cost of living", but some intractable problems had emerged.

About half of CB's constituents live in town, and half in a suburb, nice but more expensive. The in-towners consume a basket of resources consisting mostly of staples (Basket S) and the commuters one (Basket T) that more heavily features travel costs (to get in and out of town). Being richer, the commuters spend more on Basket T than the in-towners spend on Basket S. The cost of both baskets has gone up since the last market session, but that of Basket T less so, because a new and better rail line

²⁴ A non-trivial benefit would be the reallocation of predictive and tracking resources to real economic data and away from Fed "Kremlinology", colossally wasteful and entirely the product of Fed monetary discretion.

²⁵ As noted by one particularly clear-headed observer, "it is not necessary that the paper money should be payable in specie to secure its value; it is only necessary that its quantity should be regulated according to the value of the metal which is declared to be the standard". Ricardo (1817) Ch. 27.

²⁶ Friedman (1961). Hayek likewise decried the effect of the erratic pace of gold production under – and caused by – the gold standard itself. Hayek (1943). Yeager (2010) makes the same point (at 422-23).

²⁷ Some 17% of all extant gold is held by non-U.S. governments which could buy and sell it for non-economic reasons. As for new gold, China and Russia are the world's top producers. See [LINKED](#) exhibit "Gold & Population". For other obstacles to a restored gold standard, see Selgin (2017) at 207-10, 253-56.

²⁸ Readers already decided on a particular standard might wish to pass over this Section 3 to Section 4, which assumes the standard advocated here but would be generally applicable to any standard, such as "cost of living" or commodity basket, that was responsive to economic conditions.

has opened up, reducing the cost of the commute. In response, 5% of the market makers have moved from town to suburb.

By what percentage has the market-makers' cost of living increased? CB raises the issue at a town meeting, conscious that there may be some debate, as between saver/holders of tickets (who come to market with a certain number to spend), and borrower/owers of them (who come with resources to sell and thereby discharge their debts). The higher the measured "cost of living" increase, and thus lower implied real value of the tickets, the more CB will, by whatever means, be pushing that value up, to the saver/holders' benefit and borrower/owers' detriment, and vice versa.

Everyone's actual expenditure to "live" has increased, but with people moving, and re-mixing their consumption of the two baskets, it is very challenging to determine the "average" percentage increase, so CB proposes a shortcut: It can calculate what in total is spent, by everyone, on the two baskets respectively. That mix must be the "average", in the sense that all individual mixes add up to the total mix, and CB could then weight the percentage price changes in the baskets accordingly.²⁹

But *which* total spending mix to use, beginning or ending or something in between, the mix having changed during the period? Because more total dollars are spent on Basket T (by the richer commuters), the cost of which has risen less, a larger "cost of living" increase will result from using the starting mix than the ending. Ticket holders argue for the starting mix ("I made my bargain on that reasonable assumption."), owers for the ending ("Why on earth would we not use the latest data?")

Unable to agree, the two sides tell CB to use modern statistical methods to estimate actual, experienced rises in living cost. If, for example, it made some assumption as to when exactly the 5% moved, and the basket-mixes they consumed before and after, it could calculate with workable accuracy everyone's actual percentage exposure to the basket-cost increases. Granting for the moment that this could be done, CB asks whether, if it could, people agree on what those increases have in fact been. They do not. Ticket owers (favored by *lower* measured "inflation") point out that a rail ticket is not only cheaper but gets you there in half the time. For the same price you can move further out to the bucolic, 5G-enabled NewProductTown, with its whole new way of "living". Ticket holders (favored by *higher* measured "inflation") don't buy it. They see no particular value in travel speed or reliability, or in living beyond the hubbub. To inform its decision, CB distributes a survey asking for relative value weights to be assigned to (a) fresh country air and (b) fast in-town delivery service. The results are inconclusive.

These are highly simplified statements, respectively, of the "chaining" problem (how to blend the data from different points in time) and that of resource quality (the thing for which prices are actually paid). A colossal amount of statistical work has been done of them, but they persist because they are *conceptual* problems. The disparate effects of CB's choices, in our example, cannot be erased by better information or proficiency in calculation. They flow from different, entirely rational choices made by people with different economic interests, who would still make them if they had common and perfect information (which, just to complicate things, they never can).

The problems are of real-world consequence. A drop in the price of computers, though a boon to business folk (and economists), is no friend to people who don't use them much but live on Social Security checks, which are reduced (or not increased as much) by the downward effect of the price drop on the CPI. Because dropping prices in a category generally bring substitutions into it, using new

²⁹ Broadly and with many qualifications this is the approach taken in official U.S. price indexes.

weights rather than old usually results in a lower total weighted price change, accounting for the fierce opposition to “chaining” (greater use of later weights) by those with savings or fixed income. Fairness problems abound and abstruse adjustments in the index formulae have major budgetary effects.³⁰

Being conceptual, the problems have always existed, but with advancing technology they are becoming steadily more acute.

By how much has the power of a dollar to purchase “health services” declined, if it is much more likely to save a life (dropping, literally, the *cost* of a patient *living*)? How has the value of a dollar’s worth of electric power and internet access changed, if it now brings with it a limitless torrent of information and entertainment?³¹ A large and central effect of the “AI revolution” and the “internet of things” will be to alter the *quality* of consumption: how much easier and quicker it is to get from point A to point B, or to keep the larder stocked and the strains of music flowing. In any coherent view of cost and value, both are discounted by *time*. What then has been the change in cost of a household widget, needed to fix an urgent problem, which can now be at the door in two hours rather than weeks later when a trip to the widget store can be arranged? Indexes weight the price increases of things according to the total *dollars* spent on them. Why not per their true *importance* to us? On that score, would we really agree with the CPI’s current weightings of 7% for lifesaving “medical care services” versus 4% for (largely) discretionary “recreation services”?³² Why not weight by *time spent*, as portion of a day’s “living”? Per one recent study Americans spend an average of over 22 hours per week online³³, yet “internet services and electronic information providers” command a tiny weighting in the CPI (.8%) because they are so efficiently provided. In the COVID pandemic, time spent on the internet, along with its importance, rose quickly and out of all proportion to what was spent for access to it.

A salient feature of technological change, mathematically driven by the compounding interaction of different technologies (e.g., of data collection and its manipulation), is that after some lag, it accelerates.³⁴ The challenges of price indexing will too, and they will never be overcome because they

³⁰ The government’s Boskin Commission, in its landmark study, found various biases in the calculation of the CPI which tended to overstate inflation, and that an overstatement of its rise by only 1% (it estimated the actual historic error to be a little more than that) would, in the reduction of indexed revenues and increase in indexed payments, account for fully one third of the Federal deficit, “behind only social security, health care and defense”. Roth (1996) (Boskin Report) at 9.

³¹ To give an idea of how far off from reality official inflation figures may be, those who produce Britain’s figures recently announced, after a three-year study, that internet access costs had fallen, between 1997 and 2016, not by a little more than half, as previously reported, but by 94%. Office For National Statistics (2020).

³² See [LINKED](#) exhibit “CPI-U Components”.

³³ Cole (2018) at 5-6.

³⁴ For writings of a leading commentator on the subject, see those of Brynjolfsson cited in the reference list. For news from the battlefield between technology and price indexing, see “Alexa, how much is it?” (*The Economist*, October 12th, 2019). For the judgment of a leading economist that technology is winning, see Feldstein (2017). As a sample observation of acceleration, consider that of a recent Stanford University study that “[t]he amount of computation used in the largest AI training runs has doubled every 3.4 months since 2012 (net increase of 300,000x)”, versus its previous doubling at only Moore’s two-year rate. Perrault et al. (2019) at 65.

are ones of concept, not difficulty. No amount of data collection and crunching will yield a number that is becoming ever-more elusive: the “cost of living” as that of an identified resource basket.

c. Gold & The Virtues of Sharing.

Gold delivered, in effect, a spending share, its supply being uniquely constant in relation to population or GDP, making share-of-PCE a logical and worthy successor to it.

CB, meanwhile, is yearning for the day of the gold bits and their steady, reliable purchasing power, but what did that really mean?

Markets are not perfectly efficient. In principle, however, a quantum of the “medium of exchange” – precious metal or shares in the carved stone wheels of the Yap Islanders, in Milton Friedman’s famous example³⁵ – when offered for real resources, will command a share of the counter-offered resources equal to the share that the offered quantum of the medium represents of the total being so “spent”. The purchasing power of a dollar is a function of supply and demand. Thus the spending of a quantum of gold, the stock of which grew at (roughly) the same rate as the population, represented a rough but reliably stable share of the population’s total spending, assuming only a reasonably steady “velocity”, or portion of the gold stock that was typically “spent” within a time period of given length.³⁶

At the most abstract level, a spending-share standard is all but compelled by quickening change. Homo sapiens as agrarian villager could bargain in some unchangingly useful staple (salt, corn), but the explosion of markets by technology and trade required a proxy for some share of what was offered in them. Gold, when carried from one place or time to another – to a foreign market by a trader or to “the world my grandchildren will live in” by a dynast – carried with it a claim not to a particular set of “cost of living” resources but to a portion of what might be on offer at the destination. Amid ceaseless change, “wealth” like everything else is relative and fluid. Only share can be constant.

Put in the terms of our town market-makers, a spender of saved gold tickets got a lot more for them when the market was groaning from prosperity than when it was depleted by a drought. Conversely a farmer with produce to sell, and thereby discharge a gold-ticket debt, had to sell more of it after a good harvest than a bad, to earn the tickets that were owed. But with drought, the ticket-saver in any event got a “fair share” of the reduced offering, and with rain, the ticket-debtor likely had a better crop. Gold tickets, as claims effectively on a share of the market’s current bounty, worked well enough for both.

³⁵ Friedman (1994) Ch. 1.

³⁶ For the estimate of one scholar that historically and “except for occasional gold rushes, the supply of gold has risen at an annual rate of 1 to 2%”, see Skousen, M. (2010). The rate of global population growth has fallen recently but remains in the same band. See [LINKED](#) exhibit “Gold & Population”. Even a bumper year’s production brings only a modest increase in the very large existing stock (gold, once produced, being seldom destroyed), and its production over time is kept fairly steady by a natural arbitrage: Whenever, with general growth and accompanying demand for it, gold becomes worth more in the market than the resources necessary to produce it, more is produced, but not otherwise until demand catches up.

There's no going back to gold, for which CB has long since stopped redeeming tickets, relying instead on the manipulation of credit conditions to control their value. It could limit the total number of tickets created, but the runaway promise-making of the bankers has forever dislodged their quantum from their value.³⁷ CB observes, however, that with its enhanced control tools (especially direct lending and borrowing with all comers), it could exert that control to similar effect as that achieved by the limited supply of gold tickets: It could simply control, "from the back end", the total number of tickets spent and therefore the spending share of each. The total would have to grow with the town's economy, as did the supply of convertible gold tickets, or the share would represent more and more in real terms. Not knowing exactly what the "real" growth rate will be, and lacking the automatic-if-rough tendency of the gold stock to grow apace, CB suggests simply growing the ticket-spend at a set rate. This will be easy to do, as that rate is readily observed (by toting up the sales) and controlled (by varying credit conditions). If set high enough normally to exceed the real offered-resource growth rate, the increase in ticket-spend will normally and to that extent be dilutive of real purchasing power, but the dilutive component is never exactly known, or indeed knowable. The ticket-spend growth rate being set, the dilution, as the reciprocal of what is "real" within the nominal growth rate band, will be as steady as the "real" growth is (pretty steady now that the town's economy is quite diversified), and *some* loss of "real" value actually works quite well for people, especially in a downturn: Sticky wages can remain at nominal levels, and paying them is easier for employers.

CB can employ convertibility to these ends in its classic double fashion: (1) If total spending growth of X% would deliver the benefit (or burden) of a constant (or constantly declining) share of total real consumption to the holder (or owner) of Y tickets, and actual spending growth (Z%) is more or less, the same share is delivered by that number of tickets times the ratio of actual growth to target ($Y \times Z/X$). (2) Arbitrage would move interest rates as necessary to conform total spending to the target.³⁸ All CB needs to do is "convert" tickets accordingly. The plan seems practical and fair, and passes on a vote.

It would be an easy enough one for us to adopt, by making U.S. Personal Consumption Expenditures ("PCE") the inverse "Index Value" in the statute suggested above. If PCE increased by 4% per year plus the rate of population growth – about 1%, for a total of 5% – dollars would lose "real" value to the extent that the "real" value of the goods and services consumed per capita increased by less than that. The government estimates that over longer periods the "real" value of U.S. consumption has grown at about 2% per capita³⁹, so that nominal growth of 5% would imply a 2% loss of "real" per capita purchasing power, but the latter number might be very acceptable given that (a) it will tend to be

³⁷ It had to happen. "Private promises to pay the monetary commodity are as good as the commodity itself – so long as they command wide confidence that they will be fulfilled – and far cheaper . . . A pure commodity standard therefore tends to break down". Friedman (1961) at 6. Like it or not, "free banking" that might restore the efficacy of something limited in supply, as the money base, is at this point a pipe dream.

³⁸ As illustrated in the [LINKED](#) exhibit "Physical & Fiat Convertibility".

³⁹ "Real" PCE adjusted for population growth (of about 1%) has grown at 2.2% since 1950, more in the 1960's (3.3%), less since 2000 (1.3%). These numbers are, of course, products of the inflation indexes used to adjust nominal values, and thus subject to all the measurement problems pointed out above. As the length of measurement period is extended, however, the errors up and down will tend to offset each other and the index-driven calculation become more "accurate", meaning reflective of what, as a polity and over time, we would agree was truly "real". Investors are familiar with the tendency of "tracking error" between two return streams, skewed by different short-term forces but subject to common long-term ones, to collapse progressively with time.

quite stable in “normal” times, as the reciprocal of real growth; (b) a steady incidence of it is a good way to deal with the downside stickiness of wages; and (c) it will likely be offset by some rate of growth that is “real” but incalculable. As a matter of sheer practicality, 2% inflation is already something of a norm.⁴⁰ Over the last 30 years, nominal PCE growth has in fact trended at about 5%.⁴¹

d. Spending Share in Practice & Theory

There are strong policy arguments for an economic aggregate, such as nominal GDP, as target. It would be achieved by making a share thereof the value standard, variances from which would constitute the “inflation” in inflation-priced REPO. Doing so would eliminate any conflict in the “dual mandate” (since value-conformity “performance” would equate to economic). A share of spending (PCE) closely relates to GDP (70%), and would be both more efficacious and more politic.

A spending-share definition of the dollar would help with a number of issues. It would end the path-v.-rate debate. (If the growth path of a monetary aggregate is the target, and it can be hit, why not do so?) It would obviate the solution-less problem of which prices are “too volatile” to consider (How volatile is that, and being important, how are they otherwise taken account of?), in that food and energy would be subsumed in the slower-moving but relevant spending total.⁴²

The case for spending share is strong in behavioral science, which holds, only sensibly, that we much more keenly feel the loss of something already in hand than that of an opportunity to gain something, though the quantum – and odds – of the two “losses” may be the same.⁴³

Spending-share got consensus support among our town market-makers for a good reason. As compared to a defined resource-basket definition of the tickets, it would tend to shift value (a) to borrower/investors in a spending downturn (less in real resources represented by each owed ticket), and (b) away from them in an upturn (the opposite). Being loss-averse, they will likely be happy with the trade-off, because they will less keenly feel the loss of possible profits in an upturn than they would the loss of their businesses in a down. The impact on owners of fixed income streams (interest or wages) will in principle be the reverse: a more keenly felt loss of that income’s value in a downturn (lower real payments) than of a foregone share of possible profits in an up (higher real payments).

This would be a fair fight between the two factions, in modern-day America, if they divided that way, but they don’t. Interest and wage earners are also huge borrowers, in their mortgage and consumer debt, which they service by holding jobs.⁴⁴ As borrowers they benefit from a decline in real

⁴⁰ These reasons would seem sufficient without adding greater Fed latitude to manipulate rates.

⁴¹ Relevant PCE and GDP data are collected in the [LINKED](#) exhibits “PCE Per Capita & GDP” and “PCE v. Target”.

⁴² Since 1990 Personal Consumption *Expenditures* have had less than half the volatility of the PCE *price index*, a quarter the volatility of food prices, and about 1/60th that of energy prices. See [LINKED](#) exhibit “Volatility of PCE, PCE Index, Food & Energy”.

⁴³ For a thorough exploration of “loss aversion”, see Kahneman (2011) Chs. 26-28.

⁴⁴ Americans *own* about \$16 trillion of bonds, time deposits and money market funds. They *owe* about \$15 trillion, mostly in mortgage and consumer debt. See [LINKED](#) exhibit “Household Debt Owned & Owning”. Given the enormous skew of financial assets to the richest decile of the population, the average American is much more a borrower than a lender, certainly including the leverage of companies owned in retirement accounts.

interest payments, and their jobs, provided by the borrower/investors, are all-important to the servicing of their debt. We are a nation of borrowers, and a 30-year mortgage, taken out in hopes of a like length of employment, is as much a levered business venture as any capitalist might undertake. Nationally, the downside losses that a spending-share definition of the dollar would mitigate are the most painful, to the largest number of people.

It may help to think in terms of our ubiquitous, wealth-defining balance sheets. As a nation of optimists (and in general *promise-keepers*), we have more of them than almost anybody, top to bottom. Business and investment people use them very explicitly to balance downside with up, as by mixing more speculative assets with less, on the asset side, and by scheduling maturities, on the liability. Spending-share dollars would do the job for ordinary citizens, who also need the balance but lack the tools to maintain it so explicitly. People on the whole being loss-averse, more will start businesses, buy homes, and generally take wealth-creating risks, if the system operates to moderate real outcomes in either direction, albeit equally.

If the “balance” fails you, the result is bankruptcy. If we should again face large-scale and accelerating defaults on over-incurred debt, we would benefit from an automatic and impartial “debt restructuring”, something that is possible to put in place before the event (as with a bank’s “resolution” plan) but never after. Mortgages in particular, a top concern of the average household, call for *en masse* (monetary) restructuring, being so much more dispersed than business loans.⁴⁵

These points or very similar have been made in the advocacy of nominal GDP as monetary target.⁴⁶ An even stronger case can be made for spending, on grounds of both practicality and policy.

No regime succeeds without popular acceptance based on perceptions of fairness and common benefit, which may not be best served by assuming familiarity with the subtleties of “consumption + investment + government spending +/- net exports”.⁴⁷ If the most terrifying news from the government is “I’m here to help you”, a better pitch might be: “Here to maintain your spending (not mine, by the way⁴⁸), and through yours and everyone else’s, your job and house.”

⁴⁵ Loss aversion was well known to investors before behavioral science proved it, as in the lore of the well-heeled investor who cautioned the portfolio manager to “Remember: You can’t make me rich. I’m already rich. But you could make me poor.” Wage-earners are generally not as rich as investors, but they surely don’t want to be “made poor” in the way that was threatened in the spring of 1934, fall of 2008 or spring of 2020.

⁴⁶ Sumner (2011) at 7 (“When real shocks occur, it is only fair that debtors and creditors share the loss”); Sumner (2012) at 15 (inflation in a downturn “only makes [the lender] suffer along with everyone else” but with knowledge “that each dollar he or she receives in the future will represent a given percentage of society’s total nominal income [while] the average borrower knows that he or she can always pay what is owed”.) Other pertinent writings of this leading proponent of NGDP targeting are cited in the reference list.

⁴⁷ It’s not clear that GDP is even the right target if achievable. For a survey of its foibles, and other candidates, see Coyle (2014).

⁴⁸ Is part of the hesitancy over NGDP targeting, especially on the political Right, reluctance to set the government a task that it can itself discharge by “yet-more” spending? Including it in the target would set up a “you first” interdependence with Congress, the actions of which, as in 2008-2009, are unpredictable to say the least.

As to policy, stabilizing spending would automatically “lean against” economic boom and bust, much as would stabilizing nominal GDP, *if not more effectively*. Consumer spending is a large and growing part of GDP (up to almost 70%). Short rates affect it quite directly through credit card and other consumer and small business loan costs. Consumption spending is more immediately variable than investment or government spending, though it underpins both.⁴⁹ More observable and less complex than GDP, action based on it can also be taken more quickly, time being of the essence.⁵⁰

Defining the dollar as a share of spending would resolve the tension between “controlling inflation” and “supporting the economy”, the supposed duality of the mandate. The Fed could choose spending as its single target under Humphrey-Hawkins. The sample statute suggested above could properly be styled the “Stable Prices and Jobs Protection Act”.

The tension is unresolvable as long as the Fed conceives of its job under the mandate’s “inflation” prong as battling the rise in price of a cost-of-living basket, something which (1) distorts policy through its conceptual flaws⁵¹, (2) can cause just the wrong reaction under stress⁵², and (3) in reality is unobservable if not entirely hypothetical.

The statutory goal is not “low inflation” but “stable prices”. That cannot mean unchanged prices, as their whole function is to change, and no two people experience the same set of changes.⁵³ When statutory language is unclear, courts look to the legislative purpose,⁵⁴ which for a currency system must be to foster the creation of material wealth (including maximum employment) by providing the best bargaining unit for that purpose. In a world of mutating consumption, prices are “stabler” if they express the cost of a *relative standard* of living rather than that of its constantly changing and elusive components.

⁴⁹ The Bureau of Economic Analysis (BEA) describes PCE as the “primary measure of consumer spending on goods and services in the U.S. economy”, and identifies such spending as “the primary engine that drives future economic growth”. <https://www.bea.gov/system/files/2019-12/Chapter-5.pdf>

⁵⁰ The BEA publishes estimates of PCE monthly and of the more complex GDP only quarterly. As so reported, PCE began to fall in July of 2008 and fell each month thereafter, declining 3.8% by year end, whereas nominal GDP as reported first declined in the fourth quarter of 2008, versus the third, and by only 1.8%. Another canary in the consumer spending mine, revolving credit, began its decline in June, whereas that of business loans as reported did not begin until November. See LINKED exhibits “PCE Monthly & v. Target” and “U.S. Revolving Credit & Commercial Loans”.

⁵¹ An example would be the overstating of housing costs, and thus of “inflation” dangers, during the Great Recession, see Sumner (2011), the contention here being that this was effect, not cause (price indexing itself).

⁵² “Shocks” are further treated below.

⁵³ In the five years to the end of 2018, as an example, PCE inflation ran at a fairly benign 1.3%, but housing costs rose at 3% and healthcare at 1.2%. Food prices were quite flat (.5% rate) and gasoline fell sharply (-4% rate). See LINKED exhibit “Major Product Price Changes To End 2018”.

⁵⁴ So do those most familiar with price indexes and their limitations. The Bureau of Labor Statistics, for example, concedes that “the cost of achieving a living standard cannot be observed directly”, and that the CPI therefore “cannot be said to equal a cost-of-living index”, but maintains that “the concept of the COLI provides the CPI’s measurement *objective*”. Bureau of Labor Statistics (2018) (emphasis added).

As for “inflation”, it could use some refinement in its definition.⁵⁵ As the sticker shock of particular price rises, it is better addressed particularly than by the blanketing hand of monetary policy. The elderly will never win the battle over “chaining” of the general index: It affects too many other people, and seniors are not the only ones to protect. The IT revolution, while obsolescing price indexes that chase the resource-basket “cost of living”, will be making specialized indexes, to inform particular fiscal and regulatory decisions, ever-more available and accurate.⁵⁶

A form of “inflation” we do *not* want is the artificial raising of asset prices.⁵⁷ A form we *may* well want is a controlled loss of real purchasing power as represented by the growth margin of nominal consumption over “real” (2%, if that were deemed the right target).⁵⁸ By so defining “inflation”, as the thing that it is the office of monetary policy to control, we would switch out something we *cannot* know or control (resource-basket “cost of living”), for something we *can* (the nominal growth in spending), and in doing so optimize conditions for creating what we *want* (the real).

Advocates of a monetary aggregate as policy anchor should be on board for redefinition. “Inflation” terrifies as a historic specter, so that any proposal that accepts it as the price of a market basket, paid by the householder to advance some broader, dimmer macro-economic cause, all but dooms the cause.

In place of an algebraic phantom, the dollar value standard would be the *American standard of living*, an equal claim on it for an equal number of dollars. Highly stable, easily understood and globally aspired-to (if not pegged-to), it would be a fitting successor to gold.

As a value standard it would in turn justify convertibility, acquitting it of any charge that it is *too* automatic., i.e., too inflexible in a crisis “when emergency action is needed”, the needed action being just the one automatically taken.⁵⁹ Rather, it would qualify convertibility as the answer to the yet-

⁵⁵ Words mean what we want them to, as Humpty Dumpty knew, and that we can change. An imbalance of “humours” was uncritically feared until doctors gave us better tools and understanding. Russians had to make do with their government’s “net material product” reports (ignoring services), until clarity of thinking forced its way through the ideology. Lazy convention can be just as impenetrable, but the economist’s job is to keep new ideas “alive and available until the politically impossible becomes the politically inevitable.” Friedman (1982) Preface.

⁵⁶ The full apparatus of official economic measurement would and should therefore remain in place. For the case that it should employ the “vast and rapidly increasing pool of data” made available by “the digitization of economic activity” but still “residing mostly within the private sector”, see Erlich et al. (2019).

⁵⁷ We discuss “quantitative easing” below.

⁵⁸ This should not be a hard number to find, with advancing information technology and – a key point – the time to do so. The Boskin Commission recommended two indexes: one to give the immediate signals necessary for policy decisions, and a “longer run” version, “updated annually and revised historically” so as to take into account “new commodities and new services and the changing economic, social, and environmental climate within which the consumer is operating.” The suggestion here is that PCE take over the former function, with the latter addressed by periodic reappraisal of the PCE target growth rate.

⁵⁹ We discuss the action of convertibility under the impact of “Shocks” below.

unmet challenge of how to *implement* a monetary aggregate target.⁶⁰ As the failings of discretionary management and a flawed standard compound each other, convertibility and spending share would complement.

4. The Money Value & The Rule of Law.

What might be lost, and what gained, from convertibility as a rule of law?

a. Practicalities.

“Fiat convertibility” would be a statutory entitlement (to inflation-priced REPO). As such it would have constitution-like effect (existing Fed powers to be unchanged but subject to it) and durability (none greater than that of an entitlement). The Fed could be charged, in coordination with the BEA and BLS, to define the value standard and set the schedule for REPO “conversions” to it, for approval by Congress.

Is such a qualification of Fed powers even possible? Changes of any kind in them are controversial, a reflection of their current magnitude. Even “auditing” the Fed kicks up a ruckus.

Convertibility would operate only as an “override” on existing Fed powers, which are themselves the product of multiple accretions and qualifications.⁶¹ This one would be quite uncomplicated: “Whatever else you do, give us the right to bargained-for value in the dollar.”⁶² The dual mandate could remain in place, as argued above, with the right value definition. Other functions of the Fed would be unimpaired and indeed, as argued below, facilitated.

Constitutional overrides already exist on what the Fed can do. It cannot forbid public discussion of its policies, or violate the due process clause. A constitutional constraint on money-creation would be hard to achieve, but it may not be needed or even preferable. Broad constitutional language (as it would have to be) is malleable in the hands of motivated justices (or the gold cases might have been otherwise decided). By contrast there is nothing as secure as an entitlement: Once the right is given – to dollar-holders and dollar-owners alike, and on their own initiative – to claim the promised value, what coalition of them will call for its repeal? If the just compensation clause of the Fifth Amendment were statutory (and it is highly analogous, providing a similar private right not to have value arbitrarily taken by a well-meaning government), would it be that much less secure?⁶³

⁶⁰ We discuss “Market Monetarism” below.

⁶¹ As examples, open market operations were authorized in the Federal Reserve Act of 1913 but only later taken to include “temporary” transactions (REPOs) amounting to outright lending and borrowing with any counterparty. The power to purchase agency securities was first given in 1966. See Haltom & Sharp (2014). Changes over time in the Fed’s power over discount rates and reserve requirements are reviewed in Feinman (1993). Humphrey Hawkins imposed new objectives and reporting requirements in 1978. The long-sought power to pay interest on reserves was conferred in 2008. Dodd Frank in 2010 expanded the Fed’s regulation of “nonbank financial companies” but also increased GAO auditing of it and constrained its emergency lending.

⁶² Convertibility to a standard would little resemble requiring the Fed to “formulate a mathematical rule [to] instruct it how to set monetary policy (e.g., prescribe the current level of the federal funds rate) [with] a five-year projection of inflation”, as under one proposed statute. See Labonte (2018) at 14 (Congressional Research Service review), proposing just the kind of modeling and forecasting exercise that this essay decries.

Some government entitlements lack efficacy because they are just too hard to understand. Not this one. If your dollars (or those you owe) do not in fact equal in value their share of the American “standard of living” (or other defined value standard), you can get the shortfall (or defray the excess) in a REPO conversion, easily made through your broker. Whereas macro-economic demonstrations are accessible only to the few, it was early on observed that “everybody can understand convertibility”.⁶⁴

The proposal herein calls for a mix of technical expertise (“We reckon that the X aggregate or price(s), changing at rate Y and enforced by convertibility in manner Z, will best foster growth and stability.”) with general comprehensibility and appeal (“Yes but why is that good for me and my family?”). The process that suggests itself is a referral of the task to the Fed, acting in conjunction with the Commerce and Labor Departments (BEA and BLS).⁶⁵ The instruction would be to design the schedule and other details of an inflation-priced REPO regime, the definition of “inflation” to incorporate a proposed value standard, and the plan to be approved by Congress and not then changed except on further recommendation and approval.⁶⁶ As an “override”, the regime could be effective on a certain date or dates, with current operations accommodated to it as it came into effect.

b. Market Monetarism.

The money market, unmatched in inflation sensitivity, should in principle be engaged to guide, and better still enforce, monetary discipline. Over periods of any length, however, it acts “reflexively” with the Fed and hence unreliably as a guide for it. Markets are also reluctant to precisely forecast anything as complex and geopolitically accident-prone as the GDP (or a GDP futures market would already have invented itself). Instant and sensitive reaction is what markets are good at, and also the only practical corrective of money value variance. The Treasury market, the world’s most efficient, could do the entire job, of both sensing and correcting, given only a risk-free rate in the form of inflation-priced REPO.

Is there an easier route than “convertibility”, as proposed herein, to the end goal of monetary discipline? The argument is made that with the right help from the financial markets, the Fed could better manage the currency to its target.⁶⁷ Financial markets, if they can’t exactly predict the future, at least gather and weigh the infinity of relevant signals, acting upon them quickly.

⁶³ We can judge from the outrage that followed the Supreme Court’s decision in *Keno v. New London* (2005), allowing public condemnation for private development. Some 42 states reacted by enacting legislation that curtailed condemnation powers. For a thorough review see Ryskamp (2007).

⁶⁴ Mill (1848) Ch. III.13.2. This is not to question the validity of macro-economic demonstrations, in particular of the benefits of stabilized spending. A compelling one is set forth by Beckworth (2014). This essay reaches the same destination by a different route and on a simpler premise: that convertibility to a spending standard would get us there on the surer footing of easily understood free market operation.

⁶⁵ PCE, like other values reported by the BEA, is a statistical construct of some complexity. See Fox/NIPA (2019) Ch. 5 (BEA explication of PCE). The requirement for convertibility, however, is not “accuracy” (wholly elusive) but *consistency*, sufficient to measure *rates of change*.

⁶⁶ The assumed real growth rate might change, for example, analogously in history to changes in the metal content of the dollar, an essentially political decision (taken in this case without interference from the mining industry).

⁶⁷ For writings of a leading proponent of “NGDP targeting” see those of Scott Sumner in the reference list.

The Fed could look to private forecasts. More reliable, usually, are the predictions of market-makers who have put real money behind them. TIPs traders do so, as do traders of futures contracts of all kinds.

As inflation fighters, TIPs have inherent limitations, however. They pay more interest with inflation but also sell for more, insofar as it is expected, protecting only the astute holder whose prediction of inflation is “even better” than the market’s, and penalizing only the government whose control of it is “even worse”. If they were very good predictors of it, holders could hedge accordingly and governments could adjust policy until prediction equaled target, but they aren’t.⁶⁸ Like stocks (or futures), they are traded instruments whose prices represent bets on how *others* will trade, including the Fed itself.⁶⁹ If confidence in the Fed were complete, the spread would always equal its stated target, when in fact it varies with the betting, as it always will in a discretionary system of Fed “rules” that are better described as predictions of what, “as a rule”, it will do.

Monetary lag is itself a problem, in that the market’s confidence in its own predictions drops quickly with their length. The “spider” (S&P future) is the world’s most heavily traded equity derivative, with vast amounts bet on it, but volume collapses and spreads widen dramatically beyond about nine months, barely time for a policy change to reach the checkout counter.⁷⁰ (Why otherwise would a GDP futures market not have invented itself, as markets usually do when there are profitable bets to be made?)

TIP spreads can tell us how bad the problem is, as futures could, but not solve it. The available market solution is modern missile guidance: continuous course correction as conditions change. Fiat convertibility would alter short rates instantly and automatically, bending value to standard – thereby “targeting nominal GDP” if that were the standard chosen. REPOs initiated by dollar converters would in effect be short term futures contracts entered by them with the Fed, continuously and systematically.

c. Shocks.

Monetary discretion is often urged to enable the Fed to cope with economic “shocks”, but shocks are only aggravated instances of normal economic variation, and the failings of discretion are the same at either level. The force of inflation-priced REPO would be proportional to that of the

⁶⁸ Over the full period for which both CPI and TIP spreads are meaningful and available (TIPs outstanding first exceeded \$150 billion in 2003), the 5- and 10-year spreads have mis-predicted CPI inflation by more than .5% on average, sometimes on the downside and sometimes on the up. See [LINKED](#) exhibit “CPI & TIP Spreads”.

⁶⁹ As an example of the “reflexivity”, a Fed that targeted the TIP spread on June 21, 2013, would have been targeting one that was 15% (30+ basis points) smaller than it had been only a month earlier, having narrowed in the meantime “in tandem with the market’s expectation that the Federal Reserve would [taper](#) its quantitative easing policy,” as famously hinted by the Chairman on May 23. Kenny (2019). Successful market bets on the effect of the hint would themselves have depressed the TIP price. The spread *widened* markedly in the four days of and after the FOMC’s September meeting, at which it surprised markets by *not* tapering.

⁷⁰ An analysis of SPDR volume and spreads is set out in the [LINKED](#) exhibit “SPDR Option Data”. For an assessment of private growth forecasts, concluding that their “accuracy falls sharply at quarterly horizons beyond the first”, see Stark (2010).

shock, and automatically corrective of it, if the “inflation” standard reflected general economic activity (as spending share would).

Economic shocks can be of such force and unpredictability as to suggest the need for flexibility in the Fed’s response. Often cited as examples are the “oil shock” of a supply disruption and the “productivity shock” of rapidly dropping computing costs. The “correct” response to the first might be stimulus, to prevent activity from collapsing, and to the latter, constraint, to keep it from overheating, whereas price index stability would dictate the opposite (contraction to counter the oil price rise and stimulus to counter the computing price fall). Watchful regulators may want the freedom to react “correctly”.

But their problem in all cases is uncertainty as to what will happen, and indeed what is happening. *Will* activity in fact collapse from the oil shock? It’s more likely to do so if the shocking event is a front-page war in the Middle East than if it’s a decline in technical well-recovery rates, buried in Section Two. As for falling computing costs, the oft-cited paradox of their effects being seen “everywhere but in the productivity statistics” attests to the difficulty of assessing them. Nowadays these two “shocks” would almost certainly overlap and counteract each other, given the voracious energy needs of computing but the resourcefulness of tech companies in reducing their costs. Is a viral epidemic inflationary because it shuts down supply channels, or the opposite because it shuts down the mall?

The flaw is not in having a rule-of-law monetary regime, but in not having one that is driven by what counts: whether a *change in total spending* is really afoot, net of *all* concurrent events, shocking or not and large or small. Fiat convertibility would address shocks neutrally and proportionately, with the Treasury market as first responder, than which there is none quicker or more sensitive.

It would “nudge” rates in response to “normal” fluctuations in spending, under that standard. If the shock was extreme, so would be the monetary reaction. When the pandemic crisis hit in March of 2020, it became apparent that PCE as reported for that month, at April 30, would be sharply negative. In the event it was -4%. That deficit to a PCE growth target would have invited F-REPOS at that spread on \$13 trillion of Treasury securities held by the public, or some \$500 billion pumped neutrally but automatically into the credit system.⁷¹ Negative funding costs for competing banks and on-line lenders would have sharply lowered borrowing rates for consumers and small businesses. This would have been powerful monetary reaction, of the kind most specifically needed (versus asset price inflation), but by definition not *over*-reaction, defined as uncorrectable later, since the correction would come automatically with the recovery of spending. It would surely not have been the *only* proper action by the Fed, as guardian of the system’s operation, but the right *purely monetary* one.⁷²

If, when the crisis has passed, we again face “shockingly” persistent weak spending (“secular stagnation”), convertibility to a spending standard would bring the steady but proportionate monetary adjustment necessary to protect borrowers from a relentless increase in their real liabilities.

⁷¹ See [LINKED](#) exhibit “April 2020 Debt Issuance & Monetization”.

⁷² For the limited help that the Fed’s bond buying, in the pandemic, afforded to households and small businesses, while pouring out a torrent of cheap bond money to large corporations, see Wigglesworth (2020).

d. Value & System.

Designed originally to maintain a central bank reserve and otherwise oversee the *banking system*, the Fed has acquired by default and accretion the power to set the *currency value*. The two powers are conceptually distinct and better separated, with the latter returned to a rule of law. Mandatory inflation-priced REPO would assist rather than impinge on the exercise of Fed regulatory authority.

It may be argued that the Fed, as regulator of the credit system, must necessarily and *ipso facto* control the money value, which is a function of money supply and demand, and hence of credit conditions.

But this is true only because the government has made it so. The “elastic” currency that the Fed was set up to supply, in 1913, was to be elastic in its availability, not its value (that of 23 grains of pure gold, under the Gold Standard Act of 1900). The job – we may call it the Bagehotian, since England was likewise on the gold standard when that author wrote – was to manage the *system* for the making and keeping of *promises to deliver* such value, and in particular to prevent it from seizing up from cascading defaults by private banks lacking the necessary liquid reserves.⁷³ It was the subsequent abandonment of convertibility, and the substitution of credit control alone to manage the currency value, that merged the two jobs into one and made the central bank, as manager of the spending, manager also of “the economy” as powered by it.

There they will remain unless re-separated. “Regulatory” control of how private lenders are permitted to behave, with what help or hindrance from the government, necessarily affects spending. (Emergency lending to banks also enables them to lend more.) “Monetary” action to stimulate spending cannot but affect the soundness of balance sheets. (It only *works* by causing lending and borrowing that wouldn’t otherwise occur.)

In fact the two jobs are in nature quite different. The value job is a lagged, asymptotic affair that can only be done through steady but unswerving adjustments to target – the essential action of convertibility. Liquidity rescues, whether of individual borrowers or “the market”, are by nature short-term actions that are bound, as in all “complex adaptive systems”, to be called for unpredictably. Regulation likewise must respond constantly to changing conditions. As dependable as we would like value to be, a North Star to which the vessel is continuously steered, the intervening winds and tides will continue to be as turbulent and unpredictable as nature and human energy can make them.

The way for both jobs to be done best – the “value” job to inform private bargains and the “system” job to facilitate them – is to re-institute convertibility as a permanent monetary override of necessarily mutating regulation – an autopilot that absorbs but presses back continuously against the muscling of the regulatory tiller in its contest with the gusts and currents. Convertibility would override the pilot’s actions only *if* necessary, but would be sure to do so *as* necessary.

Trying to do both jobs at once has only made both harder. In the 2008 crisis, value ran head-on into system, as inflation fears caused the Fed to borrow from the market (asset sales to maintain a

⁷³ At the time of *Lombard Street*, England’s Bank Charter Act of 1844 vested the “value” function in the separate “Issue Department” of the Bank of England, an early example of a “currency board” limited strictly to issuing specie-convertible notes. <https://www.legislation.gov.uk/ukpga/Vict/7-8/32/enacted> For further analysis of such boards, and of “dollarization”, see Hanke & Schuler (2015) and Hanke (2018).

target Fed funds rate) simultaneously with lending into it (to rescue stressed institutions).⁷⁴ In the aftermath of the crisis, and in reaction to it, aggressive regulatory control of banks impeded the recovery and with it the achievement of target growth and inflation.⁷⁵

The liquidity squeeze of September 2019 again pointed up the overlap and conflict. Forces of a primarily regulatory nature spiked short term rates and thereby caused the Fed to temporarily “lose control” of monetary policy.⁷⁶ It reasserted control by injecting reserves on which, having relieved the liquidity pressure, it could continue to “administer” the reserve and REPO rates. The *regulatory* need for more reserves happened in this case not to be adverse to the current “stance of monetary policy”, but it could have been, had inflation been currently seen as a concern, as in 2008.⁷⁷

Complexity and reflexivity reigned. The premise of the Fed’s “ample reserves framework” is that high-powered bank reserves can be increased without inflationary effect by paying some *de-powering* rate on them. But the crisis revealed that the increased rate had excessively curtailed the quantum of lendable bank reserves (by increasing direct Treasury and “foreign official” deposits with the Fed), which in combination with a complex of other forces (mostly of the government’s own regulatory or tax making), caused the squeeze, rate-spike and “loss of monetary control” – inevitably in hindsight but unpredictably beforehand, at least in timing or severity.⁷⁸ No one can be sure when a squeeze might recur, as one did in March of 2020, because the set of governing forces is too complex and includes action by the Fed itself, with entangled regulatory and monetary effects.

They could be disentangled. A “standing REPO facility”, for example, could avert liquidity shortages by providing automatic, stigma-lite access to it by collateral holders, the more of them the better. Opening it to the Treasury and to “foreign official institutions” would make for a bigger, freer market in reserves, as would allowing the Treasury to REPO directly with the public.⁷⁹ But while it is true that a Bagehotian monopolist of reserves must decide what rate to charge or pay on them, the premia or discounts could as easily be to a free market rate (e.g., SOFR) as to a manipulated one.

⁷⁴ In the Fed’s own retelling, “In response to the [2008] crisis, the Federal Reserve began to expand its lending, [but simultaneously] sold a significant portion of its holdings of Treasury securities to drain balances from the banking system.” The purpose for the latter action, opposite in effect to the former, was to “hit, on average, its target for the federal funds rate”. http://www.federalreserve.gov/monetarypolicy/bst_frlabilities.htm. That rate was subsequently reduced to zero. For detailed accounts, see Sumner (2011); Sumner (2012); Thornton (2015).

⁷⁵ For a first-hand account of the adverse effect of Fed regulation on the recovery, see Allison (2016). The explosion in Fed bank regulation since the crisis is summarized in McLaughlin et al. (2016).

⁷⁶ The Fed denied this but the market wasn’t buying. See Rennison, et al. (2019) (quoting the reaction of a “US bank’s money market head” that “[t]he Fed did just lose control of monetary policy. Unequivocally.”)

⁷⁷ A monetary “nominal income target” would be naturally allied with liquidity management, increasing it with economic contractions and vice versa, cf. Selgin (2017) at 259, surely a point its favor, but why not let the alliance operate automatically, rather than in the Fed’s manifestly-fallible discretion?

⁷⁸ The complex of factors are reviewed in Selgin (2019) (Part 1) and Beckworth (2019) (Galper interview).

⁷⁹ See Selgin (2019) (Part 2).

Disencumbering regulatory issues of monetary content would help with a number of them. The size of the Fed balance sheet, shown by recent events to pose a complex of monetary and regulatory issues, could be addressed solely on the regulatory, with the value-setting level of interest necessary to pay on reserves set by the market and convertibility. System-optimal reserve levels may change over time, and quickly in crises, but any level *not* justified on regulatory grounds could not be defended on monetary, as convertibility would operate at any level.

The level of *required* reserves could be addressed coherently. Starting as safeguards against bank failure (which by definition they couldn't prevent if they had to be maintained⁸⁰), they morphed into monetary tools (the more reserves required to be maintained, the fewer lendable), irrelevant where these are always more than "ample", with the interest paid on them now described by the Fed as "intended to eliminate effectively the implicit tax that reserve requirements used to impose on depository institutions".⁸¹ So why have them in the first place?⁸² If there is no good reason, or reason only for lower levels, we could free up the interbank lending market to that further extent.⁸³

Knotty issues such as those of regulating and extending Fed facilities to new and "non-bank" credit providers, or issuing a "Fedcoin", could be addressed on their regulatory merits, and the Fed's performance better judged.

No one can do two interactive things simultaneously, at least not well. Regulators will continue to regulate, the Fed no doubt prominently among them.⁸⁴ The market could set the rates that produce the target currency value, given the state of regulation and all other value-affecting forces.

e. Quantitative Easing & The Zero Bound.

The Fed's experiment in large scale purchases of longer-term assets sprang from its assumption that short rates could not, or in any event should not, be made to "go negative". The assumption was fallacious, in that a "negative" forward REPO rate would be corrective of "deflation" (and of recession, if the undershot value target were an economic aggregate), automatically and proportionally and without QE's large and destructive distortions.

⁸⁰ For the history see Feinman (1993) (reserve requirements proved to be "no help at all in providing liquidity during a panic because a given dollar of reserves could not be used simultaneously to meet a customer's demand for cash and to satisfy reserve requirements").

⁸¹ <https://www.federalreserve.gov/monetarypolicy/resbalances.htm>

⁸² Canada doesn't. Its success, in providing liquidity when needed, and in controlling rates "without changing whatsoever" the reserves level, is recounted by Lavoie (2019).

⁸³ If reserves are still to be required, they could at least be freed up for actual use under defined conditions. See Nelson (2019); Beckworth (2019) (Nelson interview). In the pandemic crisis, reserve and liquidity requirements were relaxed but as an emergency measure without guidance as to when they might be re-imposed.

⁸⁴ A system without the Fed as reserve monopolist and regulator is perhaps as easily imagined as a British one "in which Queen Victoria could be dispensed with." Bagehot (1873) at 68. Were it depoliticized as economy-and-markets-manager-in-chief, the Fed might regain some of its needed emergency powers. For the case that Dodd-Frank overly impaired them, see Hubbard & Scott (2015).

As convertibility would have brought quick and needed monetary reaction in the heat of the 2008 and 2020 crises, it could have saved us from “QE” in the aftermath.

Having belatedly reduced short term rates by the end of 2008, Fed officials concluded that more was needed to combat recession, but considered themselves blocked by the zero bound from reducing them further. “Large scale asset purchases” (and reserve interest to put a “floor” under rates as necessary) were the result.⁸⁵ The economic benefits have been controversial, but the hazards plain enough, and more than sufficient to warrant re-examination of the zero bound premise.

One is to the Fed’s independence. Asset purchases are by definition “quasi-fiscal” in benefiting the present owners, and aspiring issuers, of the purchased assets. Housing has long been openly favored but there are plenty of applicants for help from “fiscal QE”. The more assets are purchased, the more insistent – and fair – will be the question: “Why not those that also help with climate change?” If they must later be sold, to reverse course and forestall inflation, the question will be: “Since you are altering the balance sheet anyway, why not sell an extra amount of Treasuries and buy Climate Bonds with the extra proceeds, in a renewed ‘Operation Twist’ that kills two birds with one stone?”

Bagehotian “system” problems are made worse. The levered inflation of asset prices at some point leads to their collapse, threatening a contagion that must be halted by still-more credit, to the point of the government assuming the debt: housing-related in 2009 and corporate junk in 2020.⁸⁶ Moral hazard is inherent in asset purchases, which “bail out” the seller, whether as rescue or as windfall, and they are all-the-more-likely if looked on as regular and necessary monetary tools. (Would the CDS and junk bond holders have been bailed out but for the looming threat of general recession?)⁸⁷

⁸⁵ Longer term asset purchases for monetary purposes were introduced by Chair Bernanke, In the heat of the crisis, as “a way to bring down returns on assets and create stimulus even if the policy rate is down to zero.” FOMC Transcript October 2008 at 59. In its formal presentation of asset purchase alternatives, in March of 2009, the Fed staff set the conceptual framework: “[T]he reason for this policy is not to deal with the strains of financial markets per se. It may have that effect by strengthening the economy and so on and so forth—an indirect effect—but the main purpose [is] to get around the zero bound by driving down the average level of long-term interest rates and getting other general financial conditions to improve.” FOMC Transcript March 2009 at 38. “Optimal policy simulations” of different short term rates were presented, prompting future-Chair Yellen to observe that this analysis “would take the fed funds rate to –6 percent if it could, and because it can’t, I think we have to do everything we possibly can to use our other tools to compensate.” Ibid at 201. For a full review of how the Fed “stumbled into QE”, stymied and propelled by the zero bound, see Thornton (2015).

⁸⁶ <https://www.federalreserve.gov/newsevents/pressreleases/files/monetary20200615a1.pdf> The U.S. entered the 2020 pandemic crisis with record government debt (80% of GDP) and record corporate debt, as a percentage either of assets (62%) or of GDP (47%). See [LINKED](#) exhibits “QE Effects 2010-2020” and “CBO Projections”. Lenders chasing yield accept worse terms to get it. Moody’s North American Loan Covenant Quality Indicator “bottomed out at its weakest-ever level in the fourth quarter of 2019”. Moody’s Investor Service (2020). For the lower quality of U.S. corporate debt generally, at this peak of leverage versus prior, lower ones, see Barua and Buckley (Deloitte) (2019).

⁸⁷ There was muddling of “system” and “value” from the start of QE. Famously a practice in search of a theory, it was first defended publicly as not about “the quantity of bank reserves” (as in Japan) but as “credit easing” that focused on “the mix of loans and securities that [the Fed] holds” and on “supporting the functioning of credit markets”. Bernanke (2009). Some FOMC members were not so clear on the point. “We’ve talked about credit frictions, and we’ve talked about the demand for bank reserves. I think if we’re honest with ourselves, we admit that we as a group don’t have a clear view—we haven’t decided between these two theories.” FOMC Transcript

The most pernicious effect has been on society at large. The massive purchases of longer-term Treasuries and agencies has inflated the prices of all long-term assets, as substitutes and by lowering the cost to finance them. It may be debatable what has happened in theory, but not in practice: a widening of the wealth gap that must be the largest in history, supremely meriting the classic condemnation of inflation that it “affects different classes unequally” and “transfers wealth from one to another”.⁸⁸

If the root problem is the assumption that large scale asset purchases are compelled in deflationary, low-rate conditions, the root solution must be a system that operates without them and under any conditions, providing liquidity neutrally “to the market”, rather than to particular asset owners (unless for good and particular Bagehotian reasons).⁸⁹ Inflation-priced REPO would do so, proportionally to the need. Political invaders would be recognizable on sight, and the Treasury could determine the nation’s debt maturity schedule without Fed operations along it that also distort the yield curve generally, periodically creating dangerous asset price bubbles like the current one.⁹⁰

March 2009 at 82 (Lacker). The confusion persisted. “Operation Twist” in September of 2011 featured the rolling of mortgage security holdings “to help support conditions in mortgage markets”, but it was unclear in the FOMC discussion whether this was to support market functioning, or buttress the housing sector, or because “the marginal propensity to consume of people who are refinancing is probably pretty high relative to other participants in the economy who might be affected by that couple of basis point backup in Treasury bills”. FOMC Transcript September 2011 at 201-23. It persists today, in Fed pronouncements that QE is intended to “foster smooth market functioning and accommodative financial conditions”, the former, *regulatory* concern having passed with the March 2020 crisis but the latter, *monetary* action being deemed necessary for the general economy. <https://www.federalreserve.gov/monetarypolicy/files/monetary20210317a1.pdf>

⁸⁸ Keynes (1923). Between end-2009 and end-2014, the period of post-recession QE (GDP regaining its pre-crisis peak in Q1 of 2010, and the monetary base peaking in August of 2014), the Fed kept its target Fed Funds rate near zero and purchased \$2.3 trillion of assets. U.S. companies availed themselves of the low rates by borrowing an additional \$2.7 trillion (growth of total debt) but also buying in more than \$2 trillion of stock (net of new issues), thus leveraging up their share prices at the low rates. GDP grew by \$3 trillion, and the book value of U.S. (non-financial) companies by \$4 trillion, but the market value of their stock by \$10 trillion. As for savers, “non-jumbo” deposit rates (less than \$100,000) declined from .34% to .08%. Consumer spending (PCE) grew at only 3.8%. Over the full QE era, 2010 through the second quarter of 2021, the margin by which the net worth of the richest 10% of Americans exceeded that of all others more than doubled, growing by \$34 trillion, of which \$24 trillion was accounted for by stock market wealth. Of the explosive \$11.4 trillion of such wealth fathered by “COVID QE”, in just 2020 and the first half of 2021, fully 89% or \$10.4 trillion went to the richest 10%, raising their share of such wealth to a historic high of 89%. An astonishing 56% or \$6.4 trillion went to the richest 1%. See LINKED exhibits “QE Effects 2010-2014” and “Fed Distributional Accounts 2010-2021”.

⁸⁹ As noted above (note 16 and accompanying text) fiat convertibility can be viewed as a “corridor system” (of F-REPO and R-REPO rates), but one that, rather than admitting of asset purchases for monetary (“value”) purposes *only at the zero bound*, cf. Selgin (2020), would admit them *only for regulatory (“system”) purposes*. A zero bound monetary exception, applied with Fed discretion under the all-justifying dual mandate, will regularly swallow the rule, as the QE history shows. Better to relieve such purchases, by convertibility, of monetary effect used either to deter or justify them, and let them be judged solely on Bagehotian grounds, with which the Fed has had trouble enough. See Selgin (2017) Ch. 8.

⁹⁰ QE’s invasion of fiscal territory was evident from the outset, both in Treasury reaction and in the FOMC’s own discussion. To a member’s question whether QE would not have the same effect as “if the Treasury announced a program to quit issuing long-term bonds and issued short-term bonds”, the staff answer was that it would, but that Treasury officials “operate under a mandate of being regular and predictable and minimizing their borrowing costs over time, so they don’t really have a clear structure through which they should make debt management changes

f. Paying The Bills.

Effective convertibility as a rule of law would complement the discretionary fiscal power. In a deflation, inflation-priced REPO would automatically provide new dollars to spend, as welcome “seigniorage”. In an inflation, it would inflict instant fiscal pain, as necessary constraint, impervious to dilatory academic debate.

A \$100 T-Bill would trade up to \$101 in expectation of a 1% dollar over-valuation, and down to \$99 in expectation of a 1% under-valuation, thereby directly and immediately affecting the Treasury’s borrowing cost, with a gain or loss of \$1 as the difference between what the bill’s auction brings and the \$100 to be shortly paid out on it. Conversions would thus deliver “seigniorage” (or withdraw it) proportionally to the value discrepancy.⁹¹

The saving (or cost) on term debt would accrue at each auction in the discounted present value of the expected REPO-ability of the debt over its term. Fiat convertibility would thus be Modern Monetary Theory for free marketers: automatic currency issuance to meet spending needs, curbed as necessary to protect its value, but by the Treasury market, not Congress or the regulators.⁹²

On a steady borrowing schedule, in normal times, the benefits (or costs) would be delivered steadily, but urgently in a crisis. As noted above, the 2020 pandemic would have brought about an end-April F-REPO rate of perhaps -4%, had fiat convertibility been in effect to a PCE-growth standard. The Treasury issued more than \$2 trillion of bills during that month, on which a 4% premium (recoupable by buyers in month-end F-REPOs) would have exceeded \$80 billion – dollars credited automatically and

like that in order to affect economic outcomes.” FOMC Transcript November 2010 at 24. Should the chickens of short duration come home to roost, in debt sales by either Fed or Treasury into a high-rate environment, the taxpayer will bear the associated “borrowing costs” and “economic outcomes”. We only have one government, with one debt maturity schedule. Fed officials strove for the Treasury’s co-operation, and got it in the latter’s Supplemental Financing Program to drain reserves injected by the Fed during the financial crisis, see U.S. Department of the Treasury (2008), but the inherent conflict remained. A year into QE the Fed staff conceded that shifts by the Treasury “in the composition of the debt that they issued did have the effect of reducing the effectiveness of our own LSAP programs”. FOMC Transcript September 2011 at 99. During Operation Twist the Treasury was *lengthening* the schedule while the Fed was *shortening* it, to the annoyance of at least one committee member. Ibid. at 255-58 (Lacker).

⁹¹ If “seigniorage” is the spending power that a sovereign derives solely from its currency issuance, then for a government (like ours) that is required – and able – to borrow what it spends (and hasn’t taxed), it is the budget saving represented by “remitted” interest on monetized debt, or in the case of new debt, the premium at which it can be issued, the saving in each case derived from, but dependent on, the currency’s “soundness” from forbearance to over-issue. Note issuance itself being cost-free to the government, REPO spreads should not affect “remittances”, accounting fictions that are only made necessary by that of intra-government interest on monetized debt.

⁹² Congress would surely welcome a comparable means to determine the optimal revenue-raising tax rate. Convertibility could in any event help it with spending. A sensible companion to the suggested statute would be one prorating unemployment benefits, up for F-REPO spreads paid by the Fed, down for R-REPO, thereby spending or absorbing, respectively, the associated interest saving or cost to the Treasury. If the value target were a level of spending by consumers, a recessionary drop in that level would automatically put spendable cash directly into their (high propensity) hands, monetary stimulus made fiscal. That doing so is “free”, a dividend of monetary discipline, should help with budget hawks. In the design and marketing of stabilizers, automaticity is all. Spendable dollars would be withdrawn as spending revived, a feat that fiscal Keynesians have never achieved.

immediately to the Treasury's account, in service rather than at risk to the currency value, the subsidy to be continued during the spending drought and reversed automatically when it ended.⁹³

In both normal and crisis times, fiat convertibility would work the classic monetary effect of the government "printing and spending" new dollars, or withdrawing old ones by taxing or borrowing them, no differently in effect from its issuing Greenbacks to pay the troops, and later redeeming them with taxed or borrowed gold dollars, that effect being inflationary or deflationary (respectively) only as general conditions might be.⁹⁴

Convertibility as the Fed's *chosen* "(self-)operating system" would in principle operate in this way, to allow and indeed constitute government self-funding by appropriate money creation. Several aspects of government financing argue for a *rule of law* that would also impose a reciprocal restraint.

The danger lurking in all balance sheets is that of a feedback-driven crisis, as deteriorating ability to repay itself destroys confidence, raises debt service and reduces options, further destroying what remains of either confidence or repayment ability, in a downward spiral.

The problem is acute for government debt, and not just because it is so easily over-incurred, for the benefit of people who will not themselves repay it (special interests or whole generations).

A government's debt, if issued in its own currency, is strictly "pay-in-kind", i.e., with more of its own notes – "PIK", as private lenders know it. Debtors need never default on such debt. The sole sanction and endgame is loss of its acceptability. But whereas a private lender can at least see when the

⁹³ As they continued to be rolled over (about 30% per month), the ongoing monthly premium to the Treasury, at 4% on \$4 trillion of bills outstanding, would be about \$40 billion. By contrast, on its purchase of about \$630 billion in Treasuries in April of 2020, the Fed saved the Treasury perhaps \$2 billion in monthly interest, owing to low "zero-bounded" rates. The Treasury's unmonetized notes and bonds must also be steadily rolled over. Looking to a previous crisis, in September of 2008 the Treasury was about to issue or re-issue \$17 trillion in debt of all maturities over the next 24 months, during all but a few of which PCE was below its pre-crisis peak. See [LINKED](#) exhibits "April 2020 Debt Issuance & Monetization" and "2008-2010 Debt Issuance & PCE". The numbers will be much larger going forward.

⁹⁴ As value-guarantee, convertibility would underpin foreign demand for the dollar. \$6.6 trillion is held globally as foreign exchange reserves, or over 60% of all such reserves, with the percentage declining but the quantum growing. See [LINKED](#) exhibit "World Currency Composition". For an estimate that "half or a bit more than half of U.S. currency circulates abroad", surging since the Financial Crisis, see Judson (2012). Dollar seigniorage may be the largest but also most benign form of tribute that smaller countries have ever paid to a central power to maintain global peace and financial order. We may not be fully collecting it. Price index inflation has been below 2%, as has PCE growth below 5%, suggesting that technological advance, demographics and global need for dollars justify a *greater* supply of them, at lower total debt cost to us, than now provided. It's impossible to know if such a gap exists, but if it does, it cannot be closed by discretionary Fed action because such action is too uncertain in its effect, and risks inflation if misjudged. Fiat convertibility would close it in reliable, automatic increments, unexceptionable as merely conforming the currency value. The fiscal issue is not just one of lost opportunity. Long-term *deflation* would pose affirmative *danger* in the extension of the government's debt schedule.

debtor's running costs will wipe out its cash account, it is impossible to know when confidence in a currency will fail (or speculations against it, when successful, would not be so rewarding).⁹⁵

Private lenders know that the key to averting a crisis is to see it coming and act in time, when options still exist. Debt covenants are their "early warning systems", employing some measurable indicium of the borrower's financial strength, such as cash flow or coverage of debt service, to trigger a rate increase or other action at a timely stage in the deterioration. Sensitivity of detection and automaticity of response are the essential elements. Like the private debtor's coverage ratio, variance from a value standard can be promptly and objectively observed. Under fiat convertibility a negative variance, foretelling a crisis however distant, would be instantly answered by R-REPOs which, like a good covenant, raised the interest bill in good time, without further delay or debate. It couldn't put the debtor in default, on its own notes, but it would exert immediate, automatically proportional fiscal pressure. As a statutory monopoly, the dollar needs a statutory covenant, put in place at the only time it can be: *before* a crisis looms.

On present trends one will at some point.⁹⁶ If so, it will be fueled by two things over which Congress has limited control (entitlements) or none at all (debt service), leaving to the Fed the critical decision of when to stop or reverse the monetization (or jack up reserve interest). It failed in the 1970's due to irresolution and doctrinal debate, of which there will always be plenty in Fed deliberations.⁹⁷ Central bank independence all but *caused* the Weimer hyper-inflation.⁹⁸

g. Reframing The Debate

A "convertibility" regime would enable a serious re-think of the Fed's role as general manager of the economy. The market would set rates, driven by and corrective of inflation, rather than the Fed setting them as an exercise in such general management. Libertarians would gain a fundamental civil right, and be spared the indignity of Fed-dependence. Monetary activists would be assured of action when needed, and of assistance where possible in public causes.

⁹⁵ For an account of the fortunes made on Britain's "Black Wednesday" in 1992, see Kuepper & Scott (2020), and for the difficulties that economists have had in fashioning "early warning systems" for currency failure, Glick & Hutchison (2011).

⁹⁶ The mighty U.S. economy regularly makes Chicken Little of the debt alarmist, but nothing is mightier than compound interest. The Congressional Budget Office currently projects that net interest, already the fastest-growing Federal expenditure, will exceed the entire primary deficit by the mid-2030's, and be larger than the total of all non-mandatory spending, including defense, by the mid-2040's. The projections assume the sunset of popular tax breaks, with rates rising only moderately, and were made before passage of the \$1.9 trillion American Rescue Plan Act. <https://www.cbo.gov/publication/56977#data>

⁹⁷ The history was reviewed at the St. Louis Fed's Special Conference on the subject. See Rasche (2005). The Fed's current vow is inflation that "averages 2 percent over time", but anyone who has ever put together a performance record knows that the average depends on the choice of time *period*, to cite only one point of likely debate.

⁹⁸ There was plenty of internal opposition to the Reichsbank's blind money-printing, but it was impotent under the Reichsbank Autonomy Act of 1922, on which the victorious Allies had insisted. See Fergusson (1975) at 75, 83, 145; Hanson (2017).

Knowing what we do of human ingenuity, and of “the economy” as an infinity of possible futures, diverted by a butterfly wing and massively skewed by a Fed “mistake”, would we really accept the Fed’s management of the economy if not as the necessary means to control one element of it – the money value? We readily accept, for national security, the Strategic Oil Reserve, but would ridicule efforts to vary its level so as to set the energy price that “neither stimulated nor impeded economic growth”. Bureaucratic “management” of our growth or employment rates would strike us as Stalinist nonsense, were the rates not served up as the “maximum non-inflationary” ones. Willing bargainers would not need the Fed to set the rate that was “natural” for them, had it not interfered in the first place.

For its part, the Fed is as much victim as culprit. This workman’s problem *is* his tool: If the tool to manage the currency value is discretionarily to manage the interest rate, the Fed must also, willy nilly, be discretionarily managing “the economy”, which runs on that rate.

We can certainly imagine a Fed that managed the credit system, in aid of the economy, with rates set by the market. In all its regulatory and Bagehotian activities, including provision of needed liquidity, it would still be *affecting* rates, as it must, and as all government action does, but it would not be setting their supposedly optimal levels generally. That job would be done by the market, under a regime of effective convertibility.

There is no serious reconsideration of the Fed’s role that lacks an alternative solution to the money value problem. The absence of one, as at present, unanswerably justifies the status quo.

The one proposed here should have appeal to both Right and Left. Advocates of free markets could do without their daily distortion by the smallest Fed tweak and sometimes-inconsistent utterances. Libertarians will favor a regime that fully tolerates cash and operates as a citizen right. Advocates of economic equality might ask whether perhaps the Fed made a “mistake” in the massive transfer of wealth to the richest Americans by QE, or whether it can ever be free of the undue influence of the rich. Fiscal strength is equally required for a strong defense and a strong safety net. A convertibility regime would constrain the government but also force it to act.⁹⁹

Did we really choose the Fed as manager of the economy, or rather accept it, as our previous means of managing the money value fell away and we had not yet found a replacement? Do we really want it managing either rates or economy, when the market could do a better job given the right currency regime? Has the market failed in that job, or not been tried lately?

⁹⁹ It would quell any doubts, such as were raised by the Fed’s actions in and after the 2008 crisis, as to its “willingness to tolerate even as much inflation as they say they want”. Krugman as quoted in Nunes & Cole (2013) Ch. 5. We think we are smart nowadays but we are not all of one monetary mind. Ruinous contraction, or boldness foregone when needed most, are still entirely possible in changing discretionary hands.

References

- Alexa, how much is it? Technology is making inflation statistics an unreliable guide to the economy (2019) *The Economist*, Special Report: The End of Inflation? The World Economy (October 12), retrieved from: <https://www.economist.com/special-report/2019/10/10/technology-is-making-inflation-statistics-an-unreliable-guide-to-the-economy>
- Allison, J. A. (2016) "Making a Financial Choice: More Capital or More Government Control", Cato Institute, Committee on Financial Services. <https://www.cato.org/publications/testimony/making-financial-choice-more-capital-or-more-government-control>
- Amin, M. (2011) "A Simple Introduction to Islamic Mortgages", www.mohammedamin.com. https://www.mohammedamin.com/Islamic_finance/A-simple-introduction-to-Islamic-mortgages.pdf
- Avalos, F., Ehlers T., and Eren, E. (2019) "September stress in dollar repo markets: passing or structural?" BIS Quarterly Review, The Bank for International Settlements (BIS), Basel, Switzerland, December 8, 2019. https://www.bis.org/publ/qtrpdf/r_qt1912v.htm
- Bagehot, W. ([1873] 1999) *Lombard Street: A Description of the Money Market*. John Wiley & Sons, New York. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=2ahUKewjg4qm_4dngAhVFhOAKHVNvDW0QFjAAegQIChAC&url=https%3A%2F%2Ffraser.stlouisfed.org%2Ffiles%2Fdocs%2Fmeltzer%2Fbglom62.pdf&usg=AOvVaw14fAlTtTsUOPUDuWip41QX
- Baklanova, V., Copeland, A., and McCaughrin, R. (2015) "Reference Guide to U.S. Repo and Securities Lending Markets", Federal Reserve Bank of New York Staff Reports, no. 740. https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr740.pdf
- Barua, A. and Buckley, P. (2019) "Rising corporate debt. Should we worry?" Deloitte Insights, Deloitte Development LLC., Member of Deloitte Touche Tohmatsu Limited. https://www2.deloitte.com/content/dam/insights/us/articles/5042_ibtn-april-2019/DI_IbtN-April-2019.pdf
- Beckworth, D. (2014) "Inflation Targeting: A Monetary Policy Whose Time Has come and Gone", Mercatus Center at George Mason University, Arlington, VA. <https://www.mercatus.org/system/files/Beckworth-Inflation-Targeting.pdf>
- _____ (2019) "Bill Nelson on the Repo Market Stress, the Fed's Operating System, and the Prospects for a Standing Repo Facility", Macro Musings with David Beckworth, Mercatus Original Podcast (October 7). <http://macromusings.libsyn.com/bill-nelson-on-the-repo-market-stress-the-feds-operating-system-and-the-prospects-for-a-standing-repo-facility>

_____ (2019) “Josh Galper on the Current State of Repo Markets, Key Bottlenecks, and a Balanced Proposal to Restore Stability”, Macro Musings with David Beckworth, Mercatus Original Podcast (December 23).

<https://macromusings.libsyn.com/josh-galper-on-the-current-state-of-repo-markets-key-bottlenecks-and-a-balanced-proposal-to-restore-stability>

Beinhocker, E. (2006) *The Origin of Wealth*. Harvard Business School Press, Boston.

[https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=2ahUKEwif0paan6vjAhXymOAKHUBTDYgQFjABegQIARAC&url=http%3A%2F%2Fkadamaee.ir%2Fpayesh%2Fbooks-tank%2F10%2FBeinhocker%2520-%2520The%2520Origin%2520of%2520Wealth%3B%2520Evolution%2C%2520Complexity%2C%2520and%2520the%2520Radical%2520Remaking%2520of%2520Economics%2520\(2006\).pdf&usg=AOvVaw2kBWxo3RmTzmlSbQPdSOGN](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=2ahUKEwif0paan6vjAhXymOAKHUBTDYgQFjABegQIARAC&url=http%3A%2F%2Fkadamaee.ir%2Fpayesh%2Fbooks-tank%2F10%2FBeinhocker%2520-%2520The%2520Origin%2520of%2520Wealth%3B%2520Evolution%2C%2520Complexity%2C%2520and%2520the%2520Radical%2520Remaking%2520of%2520Economics%2520(2006).pdf&usg=AOvVaw2kBWxo3RmTzmlSbQPdSOGN)

Bernanke, B.S. (2009) “The Crisis and the Policy Response”, Remarks at the Stamp Lecture, London School of Economics, London, England (January 13).

<https://www.federalreserve.gov/newsevents/speech/bernanke20090218a.htm>

_____ (2013) “Transcript of Chairman Bernanke’s Press Conference”, June 19, 2013.

<https://www.federalreserve.gov/mediacenter/files/FOMCpresconf20130619.pdf>

Brynjolfsson, E., Collis, A., Diewert, W. E., Eggers, F. and Fox, K. J. (2019) “GDP-B: Accounting for the Value of New and Free Goods in the Digital Economy”, *National Bureau of Economic Research Working Paper No. 25695*.

<https://www.gwern.net/docs/economics/2019-brynjolfsson.pdf>

Brynjolfsson, E. and McAfee, A. (2014) *The Second Machine Age*. W. W. Norton and Company, New York, NY.

<https://books.google.com/books?id=PMBUAgAAQBAJ&lpg=PA1&pg=PA1#v=onepage&q&f=false>

Brynjolfsson, E., Rock, D. and Syverson, C. (2017) “Artificial Intelligence and the Modern Productivity Paradox: A Clash of Expectations and Statistics”, *National Bureau of Economic Research Working Paper No. 24001*, Cambridge, MA.

<https://www.nber.org/papers/w24001.pdf>

Bureau of Labor Statistics (2018) *Handbook of Methods*, “Chapter 17. The Consumer Price Index”, BLS Publishing, Office of Publications and Special Studies, Washington DC.

<https://www.bls.gov/opub/hom/pdf/cpihom.pdf>

Cole, J. I. (2018) “Surveying the Digital Future. The 16th annual study on the impact of digital technology on Americans”, *2018 Digital Future Project*, Center for the Digital Future at USC Annenberg, University of Southern California, Los Angeles, CA.

<https://www.digitalcenter.org/wp-content/uploads/2018/12/2018-Digital-Future-Report.pdf>

Coyle, D. (2014) *GDP: A Brief but Affectionate History*. Princeton University Press, Princeton, NJ.

<https://books.google.com/books?id=t7pKCAAQBAJ&lpg=PP1&pg=PP1#v=onepage&q&f=false>

Edwards, S. (2018) *American Default: The Untold Story of FDR, the Supreme Court, and the Battle over Gold*. Princeton University Press, Princeton, NJ.

<https://press.princeton.edu/titles/11230.html>

Ehrlich, G., Haltiwanger, J., Jarmin, R., Johnson, D. and Shapiro, M. (2019) "Minding Your Ps and Qs: Going from Micro to Macro in Measuring Prices and Quantities", University of Michigan (gehrlich@umich.edu); University of Maryland and NBER (haltiwan@econ.umd.edu); U.S. Census Bureau (ron.s.jamin@census.gov); University of Michigan (johnsods@umich.edu); and University of Michigan and NBER (shapiro@umich.edu).

<http://www-personal.umich.edu/~shapiro/papers/ReengineeringIndicators-MindingP&Q.pdf>

European Central Bank (2019) "Targeted longer-term refinancing operations (TLTROs)", retrieved from:

<https://www.ecb.europa.eu/mopo/implement/omo/tltro/html/index.en.html>

Federal Open Market Committee, *Transcript of the Meeting of the Federal Open Market Committee on October 28–29, 2008*.

<https://www.federalreserve.gov/monetarypolicy/files/FOMC20081029meeting.pdf>

_____ *Transcript of the Meeting of the Federal Open Market Committee on March 17–18, 2009*.

<https://www.federalreserve.gov/monetarypolicy/files/FOMC20090318meeting.pdf>

_____ *Transcript of the Meeting of the Federal Open Market Committee on November 2–3, 2010*.

<https://www.federalreserve.gov/monetarypolicy/files/FOMC20101103meeting.pdf>

_____ *Transcript of the Meeting of the Federal Open Market Committee on September 20–21, 2011*.

<https://www.federalreserve.gov/monetarypolicy/files/FOMC20110921meeting.pdf>

Feinman, J. N. (1993) "Reserve Requirements: History, Current Practice, and Potential Reform", *Federal Reserve Bulletin* (June), pp. 570-589.

<https://www.federalreserve.gov/monetarypolicy/0693lead.pdf>

Feldstein, M. (2017) "Underestimating the Real Growth of GDP, Personal Income, and Productivity", *Journal of Economic Perspectives*, Vol. 31, No. 2 (Spring), pp. 145–164.

<https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=2ahUK EwiU2-DE57LIAhWSv1kKHZv1CM0QFjABegQIAxAC&url=https%3A%2F%2Fwww.nber.org%2Ffeldstein%2FUnderestimatingtheRealGrowthofGDPPersonalIncomeProductivity.pdf&usg=AOvVaw25ZcX7JqT3ZoeresHwDBly>

Fisher, I. (1911) *The Purchasing Power of Money*. Macmillan, New York.

https://www.econlib.org/library/YPDBooks/Fisher/fshPPM.html?chapter_num=1#book-reader

Fox, D. R. and McCulla, S. H. (2019) "NIPA Handbook: Concepts and Methods of the U.S. National Income and Product Accounts", Bureau of Economic Analysis, U.S. Department of Commerce, Suitland, MD, November 2019.

<https://www.bea.gov/resources/methodologies/nipa-handbook>

Friedman, M. (1959) *A Program for Monetary Stability*. 10th printing with new preface, Fordham University Press, New York.

https://en.wikipedia.org/wiki/A_Program_for_Monetary_Stability

_____ (1961) "Real and Pseudo Gold Standards", *Journal of Law and Economics*, Vol. 4 (October), pp. 66-79, The University of Chicago Press, Chicago.

<http://www.jstor.org/stable/724906>

_____ ([1962] 1982) *Capitalism and Freedom*. The University of Chicago Press, Chicago.

<https://books.google.com/books?id=iCRk066ybDAC&lpg=PP1&pg=PP1#v=onepage&q&f=false>

_____ (1994) *Money Mischief*. Harcourt Brace, New York.

https://books.google.com/books/about/Money_Mischief.html?id=IDF_uNIWQ_oC&printsec=frontcover&source=kp_read_button#v=onepage&q&f=false

Friedman, M., Schwartz, A.J. ([1963] 1993) *A Monetary History of the Marketed States, 1867-1960*. Princeton University Press, Princeton, NJ.

<https://press.princeton.edu/titles/746.html>

Gibson, K. (2013) "U.S. Stocks Sink, Yields Rise After Fed Move", MarketWatch (June 19).

https://www.marketwatch.com/story/us-stocks-in-mild-retreat-on-fed-day-2013-06-19?mod=article_inline

Glick, R. and Hutchison, M. (2011) "Currency Crises", Federal Reserve Bank of San Francisco, Working Paper Series, San Francisco, California, prepared for the *Encyclopedia of Financial Globalization: Evidence on Financial Globalization and Crises*, (September 15).

<http://www.frbsf.org/publications/economics/papers/2011/wp11-22bk.pdf>

Greenfield, R. L. and Yeager, L. B. (1983) "A Laissez-Faire Approach to Monetary Stability", *Journal of Money, Credit and Banking*, Vol. 15. No. 3 (August), pp. 302-315.

http://www.jstor.org/stable/1992481?seq=1#page_scan_tab_contents

Hall, R. and Reis, R. (2017) "Achieving Price Stability by Manipulating the Central Bank's Payment on Reserves." *National Bureau of Economic Research and London School of Economics Centre for Economic Policy Research*.

<https://web.stanford.edu/~rehall/CBPR051617>

Haltom, R. and Sharp, R. (2014) "The First Time the Fed Bought GSE Debt", Federal Reserve Bank of Richmond (April), EB14-04.

https://www.richmondfed.org/-/media/richmondfedorg/publications/research/economic_brief/2014/pdf/eb_14-04.pdf

Harari, Y. N. (2018) *Sapiens: A Brief History of Humankind*. United Kingdom: Harper.

<https://www.google.com/books/edition/Sapiens/FmyBAwAAQBAJ?hl=en&gbpv=0>

Hayek, F. A. (1943) "A Commodity Reserve Currency", *Economic Journal*, Vol. 53, No. 210 (June-September), pp. 176-184.

<http://www.jstor.org/stable/2226314?Search=yes&resultItemClick=true&searchText=hayek&searchText>

[=Commodity&searchText=Reserve&searchText=Currency&searchUri=%2Faction%2FdoBasicSearch%3FQuery%3Dhayek%2BCommodity%2BReserve%2BCurrency%26amp%3Bprq%3Dhayek%26amp%3Bgroup%3Dnone%26amp%3Bhp%3D25%26amp%3Bfc%3Doff%26amp%3Bso%3Drel%26amp%3Bwc%3Don%26amp%3Bacc%3Doff&seq=1#page_scan_tab_contents](#)

Hetzel, R. L. and Leach, R. F. (2001) "The Treasury-Fed Accord: A New Narrative Account", Federal Reserve Bank of Richmond, *Economic Quarterly*, Volume 87/1 (Winter 2001).

https://www.richmondfed.org/-/media/richmondfedorg/publications/research/economic_quarterly/2001/winter/pdf/hetzel.pdf

Hubbard, G. and Scott, H. (2015) "A Financial System Still Dangerously Vulnerable to a Panic", *The Wall Street Journal* (March 1).

<http://www.wsj.com/articles/glenn-hubbard-and-hal-scott-a-financial-system-still-dangerously-vulnerable-to-a-panic-1425249064>

Jevons, W. S. (1876) *Money and the Mechanism of Exchange*. D. Appleton and Co., New York.

https://www.econlib.org/library/YPDBooks/Jevons/jvnMME.html?chapter_num=1#book-reader

Judson, R. (2012) "Crisis and Calm: Demand for U.S. Currency at Home and Abroad from the Fall of the Berlin Wall to 2011", Board of Governors of the Federal Reserve System, International Finance Discussion Papers, IFDP 1058.

<http://www.federalreserve.gov/pubs/ifdp/2012/1058/ifdp1058.pdf>

Kahneman, D. (2011) *Thinking Fast and Slow*. Farrar, Straus and Giroux, New York.

https://books.google.com/books/about/Thinking_Fast_and_Slow.html?id=ZuKTvERuPG8C&printsec=frontcover&source=kp_read_button#v=onepage&q&f=false

Kenny, T. (2019) "Analyzing the 10-Year Treasuries and TIPS Yield Spread", The Balance, Dotdash Publishing, New York, NY.

<https://www.thebalance.com/10-year-treasuries-historical-chart-416897>

_____ (2020) "What Is the U.S. Federal Reserve Dot Plot?", The Balance, Dotdash Publishing, New York, NY.

<https://www.thebalance.com/what-is-the-fed-dot-plot-416891>

_____ (2020) "An Explanation of Fed Tapering and Its Impact on the Markets", The Balance, Dotdash Publishing, New York, NY.

<https://www.thebalance.com/fed-tapering-impact-on-markets-416859>

Keynes, J. M. (1931) *Essays in Persuasion, Inflation And Deflation*, "Social Consequence of Changes in the Value of Money" (1923) MacMillan, London.

http://www.gutenberg.ca/ebooks/keynes-essaysinpersuasion/keynes-essaysinpersuasion-00-h.html#Social_Consequences

Kuepper, J. and Scott, G. (2020) "Black Wednesday: George Soros' Bet Against Britain. How George Soros Broke the Bank of England", The Balance, Dotdash Publishing, New York, NY (February 12).

<https://www.thebalance.com/black-wednesday-george-soros-bet-against-britain-1978944>

Labonte, M. (2018) "Federal Reserve: Legislation in the 115th Congress", Congressional Research Service, Library of Congress, Washington, D.C.

<https://fas.org/sgp/crs/misc/R44848.pdf>

Lavoie, M. (2019) "A System with Zero Reserves and with Clearing Outside of the Central Bank: The Canadian Case", *Review of Political Economy*, pp. 145-158 (June 18).

<https://www.tandfonline.com/doi/full/10.1080/09538259.2019.1616922>

Levy, M.D. (2019) "The Fed and Financial Markets: Suggestions to Improve an Unhealthy Relationship", Hoover Institution, *Strategies For Monetary Policy: A Policy Conference* (May 3).

https://www.hoover.org/sites/default/files/levy-monetary_policy_and_financial_markets_hoover_may_2019-v2.pdf

Logan, L. (2019) "Observations on Implementing Monetary Policy in an Ample-Reserves Regime", Remarks before the Money Marketmakers of New York University, New York City (April 17).

<https://www.newyorkfed.org/newsevents/speeches/2019/log190417>

Maxwell, J. C. (1867) "On Governors", *Proceedings of Royal Society*, Vol. 16, No. 100.

http://upload.wikimedia.org/wikipedia/commons/b/b1/On_Governors.pdf

McLaughlin, P., Reese, C., Sherouse, O. (2016) "Dodd-Frank and the Federal Reserve's Regulations" (February 4), Mercatus Center at George Mason University, Arlington, VA.

<https://www.mercatus.org/publication/dodd-frank-and-federal-reserve-s-regulations>

Mester, L. J. (Moderator), Clarida, R., Rieder, R., Tenreyro, S. (2020, February 21). *Hall of Mirrors: Feedback Between Monetary Policy and Financial Markets* [Panel Discussion]. 2020 U.S. Monetary Policy Forum, Sponsored by the Initiative on Global Markets at the University of Chicago Booth School of Business, New York, NY.

Mester remarks:

<https://www.clevelandfed.org/~media/content/newsroom%20and%20events/speeches/sp%2020200221%20pdf.pdf?la=en>

Clarida speech: <https://www.federalreserve.gov/newsevents/speech/clarida20200221a.htm>

Tenreyro remarks: <https://www.chicagobooth.edu/~media/research/igm/events/usmpf/2020/silvana-tenreyro-remarks-for-2020-mpf-panel.pdf?la=en&hash=96E7BC40410C0FD470A4273F7F9F24CA786F8E03>

Mill, J. S. (1848) *Principles of Political Economy*. (Book III). Longmans, Green and Co., London.

https://www.econlib.org/library/Mill/mlP.html?chapter_num=33#book-reader

Miller, S. M. and Ndhlela, T. (2019) "Money Demand and Seignorage Maximization before the End of the Zimbabwean Dollar", Mercatus Working Paper, (February), Mercatus Center at George Mason University, Arlington, VA.

https://www.mercatus.org/system/files/miller-money-demand-mercatus-working-paper-v1_1.pdf

Moody's Investor Service (2020) "The Fed Can Be Patient About Raising Interest Rates" *Moody's* (April 27).

http://www.moodys.com/researchdocumentcontentpage.aspx?docid=PBC_1225313

Nelson, Bill (2019) “The Fed’s Balance Sheet Can and Should Get Much Smaller”, Remarks at Brookings Symposium on Repo Market Disruption (December 5).

<https://www.brookings.edu/wp-content/uploads/2019/11/Nelson-remarks.pdf>

Nunes, M. and Cole, B. M. (2013) *Market Monetarism, A Roadmap to Economic Prosperity*.

<https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&ved=2ahUKewi0tdOPsevgAhXuT98KHcmKDX8QFjACegQIBxAC&url=https%3A%2F%2Fthefaintofheart.files.wordpress.com%2F2018%2F12%2FMarket-Monetarism-and-Economic-Prosperity.pdf&usg=AOvVaw2nKOPngXVeYU5gysbA8PQF>

Office For National Statistics (2020) “Improvements to the Measurement of UK GDP: an Update on Progress”, London.

<https://www.ons.gov.uk/economy/nationalaccounts/uksectoraccounts/articles/improvementstothemeasurementofukgdp/anupdateonprogress/pdf>

Parks, T. (2005), *Medici Money*. Atlas Books LLC, W. W. Norton & Company, New York.

https://books.google.com/books/about/Medici_Money.html?id=3MPmpQpi7PoC&printsec=frontcover&source=kp_read_button#v=onepage&q&f=false

Perrault, R., Shoham, Y., Brynjolfsson, E., Clark, J., Etchemendy, J., Grosz, B., Lyons, T., Manyika, J., Mishra, S. and Niebles, J.C. (2019) “The AI Index 2019 Annual Report”, AI Index Steering Committee, Human-Centered AI Institute, Stanford University, Stanford, CA (December).

https://hai.stanford.edu/sites/g/files/sbiybj10986/f/ai_index_2019_report.pdf

Ramkumar, A. (2019) “Stocks Slip After Fed Decision, Erasing Earlier Gains”, *The Wall Street Journal* (March 20).

<https://www.wsj.com/articles/global-stocks-weaken-ahead-of-new-round-of-u-s-china-trade-talks-11553072835>

Rasche, R.H. (2005) “Federal Reserve Bank of St. Louis Review, Reflections on Monetary Policy, 25 Years After October 1979, Proceedings of a Special Conference of the Federal Reserve Bank of St. Louis”, March/April, Volume 87, Number 2, Part 2.

<https://research.stlouisfed.org/publications/review/2005/04/15>

Rennison, J. and Noonan, L. (2019) “Week of Repo Turmoil Puts Wall Street Traders in a Spin”, *Financial Times* (September 20).

<https://www.ft.com/content/fa14c286-db59-11e9-8f9b-77216ebe1f17>

Ricardo, D. (1817) *On the Principles of Political Economy and Taxation*, London.

<https://socialsciences.mcmaster.ca/econ/ugcm/3ll3/ricardo/Principles.pdf>

Roth, Jr., W.V. (1996) “Final Report of the Advisory Commission to Study the Consumer Price Index” (“Boskin Report”), Committee on Finance, Marketed States Senate, U.S. Government Printing Office, Washington D.C.

<https://www.finance.senate.gov/imo/media/doc/Prt104-72.pdf>

Ryskamp, J. (2007) *The Eminent Domain Revolt*. Algora Publishing, New York.

<https://www.algora.com/135/book/details.html>

Schuler, K. (1994-2004) *Currency Boards and Dollarization*, "Currency Boards for Developing Countries: A Handbook" (1994), International Center for Economic Growth, Yorktown, New York. Reproduced by permission. All other material copyright 1997-2004 or as dated by Kurt Schuler.

<https://web.archive.org/web/20120310130618/http://www.dollarization.org/>

Selgin, G. (2017) *Money Free and Unfree*. Cato Institute, Washington D.C.

<https://www.cato.org/books/money-free-unfree>

_____ (2018) *FLOORED! How a Misguided Fed Experiment Deepened and Prolonged the Great Recession and Why the Fed – or Congress – Ought to End It*. Cato Institute, Washington D.C.

<https://object.cato.org/sites/cato.org/files/pubs/pdf/working-paper-50-updated.pdf>

_____ (2019) "Stop the Presses! or, How the Fed Can Avoid Reserve Shortages without Bulking-Up, Part 1", CATO at Liberty, Cato Institute, Washington D.C. (November 12).

<https://www.cato.org/blog/stop-presses-or-how-fed-can-avoid-reserve-shortages-without-bulking-part-1>

_____ (2019) "Stop the Presses! or, How the Fed Can Avoid Reserve Shortages without Bulking-Up, Part 2", CATO at Liberty, Cato Institute, Washington D.C. (November 14).

<https://www.cato.org/blog/stop-presses-or-how-fed-can-avoid-reserve-shortages-without-bulking-part-2>

_____ (2020) *The Menace of Fiscal QE*. Cato Institute, Washington D.C.

https://books.google.com/books/about/The_Menace_of_Fiscal_QE.html?id=5R9VzQEACAAJ

Selgin, G. and White, L.H. (1999) "A Fiscal Theory of Government's Role in Money". *Economic Inquiry*, Vol. 37, No. 1 (January), pp. 154 – 165. The Institute of Economic Affairs.

<https://www.cato.org/sites/cato.org/files/alt-money-univ-reading-list/selgin-a-fiscal-theory-of-govt-role-in-money.pdf>

Shiller, R. J. (1998) "Indexed Markets of Account: Theory and Assessment of Historical Experience", Presented at the 1997 International Conference of the Central Bank of Chile, "Indización, Inflación y Política Monetaria", Santiago, August 11–12, 1997.

<https://www.nber.org/papers/w6356.pdf>

Skousen, M. ([1977] 2010) *Economics of a Pure Gold Standard*, Fourth Edition, The Foundation for Economic Education, Inc., Irving-on Hudson, NY.

https://www.amazon.com/Economics-Pure-Gold-Standard-Skousen/dp/1453753087/ref=ntt_at_ep_dpi_7

Soros, G. (2003) *The Alchemy of Finance*, John Wiley and Sons, Inc., Hoboken, New Jersey.

https://www.google.com/books/edition/The_Alchemy_of_Finance/qxkiYul2wgoC?hl=en&gbpv=0

Stark, T. (2010) "Realistic Evaluation of Real-Time Forecasts in the Survey of Professional Forecasters", Federal Reserve Bank of Philadelphia.

<http://www.philadelphiafed.org/research-and-data/publications/research-rap/2010/realistic-evaluation-of-real-time-forecasts.pdf>

- Sumner, S. B. (1991) "The Development of Aggregate Economic Targeting", *Cato Journal*, Vol. 10, No. 3 (Winter).
<http://object.cato.org/sites/cato.org/files/serials/files/cato-journal/1991/1/cj10n3-8.pdf>
- _____ (2009) "The Real Problem was Nominal", *Cato Unbound* (September 14).
<http://www.cato-unbound.org/2009/09/14/scott-sumner/real-problem-was-nominal>
- _____ (2011) "Re-Targeting the Fed", *National Affairs* No. 9.
<http://www.nationalaffairs.com/publications/detail/re-targeting-the-fed>
- _____ (2012) "The Case for Nominal GDP Targeting", Mercatus Research, Mercatus Center.
http://mercatus.org/sites/default/files/NGDP_Sumner_v-10-copy.pdf
- _____ (2013) "A Market-Driven Nominal GDP Targeting Regime", Mercatus Research, Mercatus Center.
http://mercatus.org/sites/default/files/Sumner_NGDPtargeting_v2.pdf
- _____ (2014) "Nominal GDP Targeting: A Simple Rule to Improve Fed Performance", *Cato Journal*, Vol. 34, No. 2 (Spring/Summer).
<http://object.cato.org/sites/cato.org/files/serials/files/cato-journal/2014/5/cato-journal-v34n2-7.pdf>
- Thornton, D.L. (2015) "Requiem for QE", Cato Institute, Policy Analysis No. 783
<https://www.cato.org/publications/policy-analysis/requiem-qe>
- U.S. Department of the Treasury (2008) Treasury Announces Supplementary Financing Program, September 17, 2008 [Press release].
<https://www.treasury.gov/press-center/press-releases/Pages/hp1144.aspx>
- White, L. H. (2007) "What Type of Inflation Target?" *Cato Journal*, Vol. 27. No. 2, pp. 285, Cato Institute.
<http://object.cato.org/sites/cato.org/files/serials/files/cato-journal/2007/5/cj27n2-16.pdf>
- Wigglesworth, R., Rennison, J. and Armstrong, R. (2020) "America's two-track economy: the small business credit crunch", *Financial Times* (December 14).
<https://www.ft.com/content/1ae439b1-75e7-4b55-876c-66533ac37db8>
- Yeager, L. B. (2010) "Privatizing Money" *Cato Journal*, Vol. 30, No. 3 (Fall 2010), Cato Institute.
<http://object.cato.org/sites/cato.org/files/serials/files/cato-journal/2010/11/cj30n3-1.pdf>
- _____ (2014) "The Continuing Search for a Monetary Constitution", *Renewing the Search for a Monetary Constitution*, Cato Institute Press.
<https://books.google.com/books?id=hTMwBwAAQBAJ&pg=PT10&lpg=PT10&dq=yeager+%22the+continuing+search+for+a+monetary+constitution%22&source=bl&ots=wvIxKd4kxZ&sig=3AjAWfITXJTgvtpM865GaoskqQ&hl=en&sa=X&ei=ZpRLVbqWCcOiNvLNgKAH&ved=0CCQQ6AEwAQ#v=onepage&q=yeager%20%22the%20continuing%20search%20for%20a%20monetary%20constitution%22&f=false>