
Central Banking without Romance

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Abstract

Many economists, including former Federal Reserve chairman Ben Bernanke, believe that the gold standard generates poor economic outcomes including output volatility, price instability, financial panics, the spread of recessions via the exchange rate, and speculation-induced collapse. These problems, however, do not by themselves demonstrate the superiority of central banks over the gold standard. Comparative institutional analysis requires demonstrating that the relevant alternative, in this case a central bank, can improve upon these outcomes in practice. We use this standard to compare central banking and the gold standard in the United States. Recent theoretical and empirical evidence suggests that the Fed has not been able to measurably improve upon the gold standard even when it comes to these deficiencies.

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1. Introduction

There is a broad consensus among economists that the gold standard suffers from major deficiencies. In a recent survey of prominent economists, none agreed with the proposition that a gold standard would improve price stability and employment (IGM 2012). In a series of lectures at George Washington University, former Fed Chairman Ben Bernanke (2012a; 2012b) surveyed the major theoretical and empirical problems with the gold standard. According to Bernanke (and most other economists), the gold standard prevents optimal monetary adjustment, leading to output and price instability, cannot prevent financial panics, transmits bad policies between countries, and can lead to speculation-induced collapse.¹

These deficiencies certainly provide critiques of the gold standard that must be taken into consideration when comparing alternative monetary structures. They fall short, however, of demonstrating the superiority of central banking institutions over the gold standard. Comparative institutional analysis requires demonstrating that the relevant alternative institution, in this case the Fed, can do better than the gold standard on these same margins.

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¹ It should be noted that Bernanke has made limited defenses of the Fed-managed gold standard in his academic work. While some studies, such as Eichengreen (1992) and Irwin (2012; 2014), cite the gold standard as a primary cause of the Great Depression, Bernanke defends the gold standard and places the blame on the Fed itself, describing the bank failures and monetary contraction of the period as a “self-inflicted wounds” (Bernanke and James, 1991, p. 40). At Milton Friedman’s 90th birthday, Bernanke (2002) famously confessed, “Regarding the Great Depression. You’re right, we did it. We’re very sorry. But thanks to you, we won’t do it again.”

Comparative institutional analysis is a long-running theme in public choice economics.² Pre-public choice economics is often analogized to the tale of the Roman Emperor in which the Emperor chooses between two singing contestants (Boettke, 1998, p. 27; Boettke, Coyne, and Leeson, 2007, p. 128). After hearing the first contestant sing, the Emperor declares the second contestant the winner on the belief that the second contestant could not possibly be worse than the first singer. Rather than assume an idealized alternative would improve upon real institutions, public choice scholars recognized the need to compare alternative institutional arrangements based on how they operate in practice, factoring in both knowledge and incentive problems (Aligica and Boettke 2009; Demsetz, 1969; Friedman, 1947; Pennington, 2011).

Buchanan (1999[1979], p. 45) argued for a positive institutional analysis of “politics without romance.” Such analysis, he notes (p. 45), is necessary for a thorough understanding of governmental institutions as it “forces the analyst to compare relevant institutional alternatives.” In addition, Buchanan (p. 47) stressed that economists should “compare social institutions as they might be expected actually to operate rather than to compare romantic models of how such institutions might be hoped to operate.” Positive comparative analysis has since become a major pillar of public choice economics and of political and governmental institutional analysis in general. Following Buchanan and other public choice scholars, comparative analysis of institutions “without romance” has been applied to a variety of topics including statutory legal interpretation (Eskridge, 1988), free speech (Farber, 1991), zoning laws (Fraietta, 2013), and religious liberty (Horwitz, 2013).

While public choice scholars have made substantial contributions to monetary theory, the romance, so-to-speak, has largely not been removed from central banking (Buchanan, 2015, p. 51; Boettke and Smith, 2016; O’Driscoll, 2013). While the consensus view is correct that the pre-Fed gold standard was flawed in many ways, this position does not prove that central banking is a superior alternative because it fails to demonstrate that the Fed can and has improved upon the gold standard. Comparative institutional analysis requires demonstrating that the Fed can outperform the gold standard on these same margins taking into consideration the institutions in which monetary authorities operate (Salter and Luther, 2018; Salter and Smith, 2018) and demonstrated knowledge (Salter and Smith, 2017; W. White, 2013) and incentive problems (Binder and Spindel, 2017; Boettke and Smith, 2013; Conti-Brown, 2016; Smith and Boettke, 2015; White, 2005) inherent to monetary policy.

We examine the consensus view of the gold standard in light of this standard of comparative institutional analysis. More specifically, we analyze Bernanke’s (2012a, p. 23-26) detailed list of “Problems with the gold standard” that to him, and many economists, demonstrate the superiority of the Fed. While Bernanke and other scholars offer critiques of the gold standard, many theoretically ideal features of central banks can be inferred from these criticisms. We compare U.S. economic performance on the gold standard to performance under the Fed surveying the most recent theoretical and empirical evidence. We find, despite the gold standard’s defects, that the theoretical and empirical evidence fails to satisfactorily demonstrate that the Fed can—and has—been able to measurably improve upon it. Section 2 defines the gold standard and provides a brief review of the different forms it has taken across U.S. history. Section 3 evaluates

² Comparative institutional analysis is also a long-running theme in philosophy (Rawls, 2001, p. 178; Shapiro, 2007, p. 6; Brennan, 2014, pp. 57-9).

each of Bernanke's (2012a; 2012b) five major problems of the gold standard using recent theoretical and empirical evidence. Section 4 concludes.

2. What is a Gold Standard?

To properly assess the consensus view on the major problems of the gold standard that Bernanke (2012a; 2012b) surveys, it is first necessary to define the gold standard and its practical application. The gold standard is broadly defined as a monetary system using any monetary unit of a certain weight of gold (Bernanke, 2012b, p. 13; Selgin, 2013, p. 2), but there are many forms that the gold standard can take in practice. Gold-based monetary systems can vary drastically from a decentralized commodity standard, where the forces of supply of and demand for gold determine the purchasing power of the currency, to a completely centralized system in which the purchasing power of the currency, in terms of gold, is actively managed by a central bank. In this section, we discuss the different forms a gold standard can take and provide a brief history of the major variations of the gold standard in the United States. We also discuss Bernanke's (2012a; 2012b) definition of the gold standard in light of this history.

A decentralized gold standard is a monetary system in which the quantity and purchasing power of gold are determined by the forces of supply and demand. On a decentralized gold standard, the supply of and demand for gold can automatically adjust to changing conditions and economic shocks. If a shock increases the demand for money, the purchasing power of gold will rise, causing profit-seeking suppliers of gold to increase the amounts of gold they produce. If the shock decreases the demand for money, the purchasing power of gold will fall, leading suppliers to decrease the amount of gold brought to market.

It is important to note that a gold standard does not necessarily mean that every banknote is "backed 100 percent by gold in a vault," only that "money is *meaningfully denominated* in gold" (White, 1999, p. 46 [emphasis in original]). Gold standards are often facilitated by the competitive issue of private banknotes which allows banks to respond to changes in the demand for money, and in turn allows the quantity of money supplied to adjust to meet the quantity demanded (Hogan, 2012; Selgin and White, 1994; White, 1999 pp. 26-50).

While the U.S. was on some form of a gold standard from 1792-1971, the form of the gold standard changed drastically over this period and can be split into several sub-periods, only some of which should be considered to be a "gold standard" for the purposes our comparison. Between 1792 and 1913, the United States monetary system operated on a decentralized bimetallic system. While it is referred to as a "gold standard," both gold and silver were freely coined and jointly provided the nation with fiat and coin exchange media (Selgin, 2013, p. 4). Over the course of more than a century, changes in the supply and demand for gold and silver caused the money supply to alternate between a de facto silver standard and a de facto gold standard. The period between 1879 through 1913 is commonly known as the international "classical" gold standard. The classical gold standard allowed gold to flow between countries to regulate national money stocks, international trade, and the automatic adjustment of price levels (Selgin, 2013, p. 9).

In contrast to the decentralized system, a managed gold standard is centrally managed by a single entity such as a central bank or currency board. In such a system, the monetary authority manages the quantity of money in the economy and thus its

purchasing power. As in the decentralized system, the monetary unit is defined by a certain weight of gold. Rather than being purely subject to market forces, however, the monetary authority can adjust the quantity of money in the economy by increasing or decreasing the percentage of reserves it holds or the weight of gold for the monetary unit. A centralized gold standard can, in theory, be used to conduct monetary policy in a manner similar to a central bank issuing fiat currency, the limit being that the quantity of currency is constrained by the government's gold reserves. An international gold exchange standard is a variation of a managed gold standard, in which countries operate on an international gold standard but with each country controlling its own money supply within its borders.

The U.S. monetary system was converted to a managed gold standard system by the Federal Reserve Act of 1913 (Selgin, 2013, p. 11). The Fed's original mission was "to serve as a lender of last resort and to try to mitigate the panics that banks were experiencing every few years," and "to manage the gold standard" (Bernanke, 2012b, p. 18). As the political climate changed over time, however, the Fed's missions changed as well (Conti-Brown, 2016; W. White, 2013). In response to the Great Depression, the U.S. effectively went off the gold standard in 1933. Roosevelt (1933a; 1933b) issued executive orders that outlawed the private ownership of gold and made it illegal for banks to pay out gold coin, bullion, or certificates. From 1933 until 1944, the Fed managed a domestic fiat currency while participating in an international system of floating foreign exchange rates based nominally on gold.

In 1944, the Bretton Woods conference returned the world to a modified international gold exchange standard with an exchange rate peg implemented with the intention of preventing trade and exchange manipulation, as well as securing monetary and fiscal independence (Bordo, 1993, pp. 163-4; Steil, 2013, Ch.6; Amato and Fantacci, 2014). Under the agreement, the U.S. dollar was tied, with adjustable pegs, to gold at a fixed price of \$35.00 per ounce and became the world's reserve currency (Bordo, 1981, p. 7; Bordo, 1993; Eichengreen, 2007, p. 9). Thus, foreign currencies, rather than being tied directly to gold, were (adjustably) pegged to the U.S. dollar, which was convertible to gold, albeit in a limited fashion (Bordo, 1993, p. 160; Eichengreen, 2007, p. 9).

The Bretton Woods system itself can be split into two periods, the pre-convertibility period, which lasted from 1946-58, and the convertibility period, which lasted from 1959-67 (Bordo, 1993, pp. 163-168; Eichengreen, 2007, p. 10).³ The pre-convertibility period was a transitional phase towards the system designed at the Bretton Woods Conference of 1944. The convertibility period of the Bretton Woods system collapsed due to the failure of the adjustable peg in a world of increasing capital mobility, the growing lack of confidence in the system, especially in the reliability of the U.S. dollar (Steil, 2013, p. 336; Eichengreen, 2007, p. 11), and the U.S.'s weakening commitment to convertibility (Bordo, 1993, p. 160). The U.S.'s commitment to convertibility was waning because persistent U.S. deficits were rapidly depleting U.S. gold reserves, decreasing confidence in the ability of the U.S. to sustainably commit to redeeming currency for gold (Bordo, 1981, p. 7). As countries continued to withdraw gold from the U.S. between 1967 and 1970, the United States ended its commitment to the gold standard in 1971 (Steil, 2013, p. 337).

³ The shift between these two periods was gradual, so these dates are rough approximations rather than definitive cutoff points. For instance, European countries did not adopt convertibility until 1961 (Steil, 2013, p. 2).

Given these variations, what are the appropriate periods of comparison to evaluate a gold standard? Because the Fed's actions have been largely discretionary and only lightly constrained by any gold standard, historical studies generally compare the centralized monetary system under the Fed to the decentralized monetary system of the pre-Fed period. While Eichengreen (1992) posits that the Fed's actions during the Great Depression were constrained by the gold standard, subsequent studies find the Fed's gold holdings were more than adequate to have conducted a more expansionary monetary policy (Bernanke and James, 1991). Similarly, although it might be argued US exchange rate policy was constrained by the Bretton Woods gold exchange standard prior to 1971, domestic monetary policy was loosely if at all constrained by this policy, as illustrated by consumer price index (CPI) inflation, which reached an annualized rate above 10% in March of 1969.⁴ We therefore follow the literature in comparing the decentralized institutions of the pre-Fed gold standard relative to the centralized management of the money supply under the Fed. This distinction provides us with two roughly equal sample periods to compare: 122 years for the pre-Fed gold standard (1792-1913) versus 104 years under the Fed (1914-2017).

In surveying the widely-held major problems with the gold standard, Bernanke (2012b, p. 13) acknowledges the important distinction between centralized and decentralized systems. He notes that a gold standard "is at least a partial alternative to a central bank", because it can be managed, but that "a true gold standard creates an automatic monetary system." Some confusion, however, enters his analysis when he states that the gold standard "sets the money supply and price level generally with limited central bank intervention" (Bernanke, 2012a, p. 22), which seems to indicate that, by a gold standard, Bernanke is referring to a managed gold standard. He then goes on to offer, primarily, criticisms of a decentralized gold standard.

Since, as we will demonstrate in subsequent sections, Bernanke's criticisms of the gold standard are primarily applicable to a decentralized gold standard, not a managed gold standard, we assume, unless otherwise noted, that Bernanke's survey of the major problems with the gold standard are problems with a decentralized gold standard without a central bank. In the remainder of this paper we define a gold standard as a decentralized monetary system in which the purchasing power and quantity of money are tied to gold through the forces of supply and demand, as existed in the United States prior to the establishment of the Federal Reserve. In this definition, there is no central bank to determine the quantity or the purchasing power of money. We contrast this with the centralized monetary system that has existed under the Fed.

3. Evaluating the Consensus View of the Gold Standard

In a lecture delivered at George Washington University, Bernanke (2012a, pp. 23-26; 2012b) surveys the consensus view of the gold standard by detailing what he perceives as its five major problems. The first problem with the gold standard is that, because governments have no monetary-adjustment mechanism for fine-tuning the economy, it leads to economic instability. Second, given the fluctuations in the supply and demand for gold, the gold standard contributes to short- or medium-run price instability. Third, the gold standard has been unable to prevent financial panics. Fourth, an international gold standard would enable the international transmission of economic

⁴ Available from the Federal Reserve Bank of St. Louis at <https://fred.stlouisfed.org/series/CPALTT01USQ657N>

shocks and mismanaged monetary policy. Lastly, the gold standard, by encouraging speculation and arbitrage, could lead to a possible collapse of the monetary system.

While these widely-held criticisms of the gold standard provide important arguments in an assessment of alternative monetary systems, they do not, by themselves, provide sufficient evidence to demonstrate the superiority of the Fed. More specifically, detailing the defects of the gold standard does not, in and of itself, provide a complete analysis without a comparison to the relevant alternatives. A complete analysis of alternative monetary structures requires comparing the gold standard, with its deficiencies, to the Fed, with its deficiencies. In this section we submit the consensus view of the major problems of the gold standard, as detailed by Bernanke (2012a; 2012b), to this standard by examining them with a survey of recent theoretical and empirical evidence.

While Bernanke's criticisms of the gold standard are by no means exhaustive, they are representative of the most common objections made by mainstream economists as cited in each subsection. The controversial nature of the gold standard has often made it a target for unjustified comments by economists often unfamiliar with the pertinent theory or history. In contrast to these unsupported comments, thorough academic analyses discussed below come to more measured conclusions (Eichengreen, 1992; Timberlake, 2005; White, 1999; 2008; Hogan, 2012). Although further criticisms might be leveled in the future, we have endeavored to present an even-handed analysis of the most relevant points of debate. By providing a critique of the current major criticisms of the gold standard in this paper, we hope future research is directed to a deeper search for additional weaknesses and strengths of the gold standard.

While we utilize recent theoretical and empirical evidence for our survey, these results must still be interpreted with modesty. Any comparative institutional analysis of different monetary regimes in U.S. history requires comparing drastically different time periods. For instance, one could argue that modern increased capital flows and globalization might bias studies of economic and price stability against the Fed. Alternatively, improvements in the structure of the economy and the good fortune of a long period of relatively small economic fluctuations following WWII could bias these results in favor of the Fed (Carlino, 2007; Stock and Watson, 2003; Summers, 2005). It is also important to note that these critiques apply equally to opponents and proponents of the gold standard. We now consider the major criticisms discussed by Bernanke (2012a).

3.1. Economic Stability

“The strength of a gold standard is its greatest weakness too: Because the money supply is determined by the supply of gold, it cannot be adjusted in response to changing economic conditions.” - Bernanke (2012a, p. 23)

According to the consensus view, the money supply on a gold standard cannot be adjusted in response to changing economic conditions (Bernanke, 2012a, p. 23). In theory, a central bank can actively manage the supply of money to dampen the natural boom and bust cycle of the economy, reducing economic volatility. Thus, many economists argue that without a central bank to stabilize and fine-tune the economy, the gold standard increases economic volatility.

A complete analysis, however, requires demonstrating that the Fed can adjust the money supply in response to changing economic conditions in a fashion superior to the gold standard. We find that this case has not been adequately demonstrated for three

reasons. First, this view implicitly assumes that a central bank has the requisite knowledge and the proper incentives to adjust the money supply to prevent economic fluctuations in a manner superior to the gold standard's automatic adjustment mechanisms, but the literature on the political economy of the Fed suggests otherwise. Second, this view assumes that the Fed has, in practice, performed better than the gold standard. The empirical evidence, however, finds that the Fed has not been able to improve economic stability relative to the gold standard. Third, this view assumes that, without a central bank, the government has limited means to influence the supply of money. Yet even on a decentralized gold standard, governments have tools available to pursue macroeconomic stabilization policies.

First, the statement by Bernanke implicitly assumes that the Fed *does* have the ability to properly adjust monetary policy to changing economic circumstances while the gold standard *does not*. This requires the assumption that the Fed has the expertise, knowledge, and adequate foresight to determine the optimal course and timing of monetary policy, at least in a fashion superior to the gold standard. It also assumes that Fed decision-makers have the incentives and independence to implement the optimal monetary policy, despite political and bureaucratic pressures. Deviations from either of these idealized assumptions of either perfect knowledge or perfect incentives on behalf of the Fed decision-makers severely undermine the implicit theoretical assumption that the Fed has the ability to respond to changing economic circumstances in a fashion superior to the gold standard.

There are, however, severe epistemic limitations when it comes to carrying out monetary policy at the Fed (Horwitz, 2000; Laidler, 1993; Salter and Smith, 2017; W. White, 2013). The complexities associated with determining the optimal monetary policy lead to the susceptibility of monetary policy to pressures from political and special interest groups. Reviewing the historical evidence on Fed independence, Boettke and Smith (2013) find the Fed's monetary policy has been influenced by pressures to accommodate government debt issuance, electoral pressures from the executive and legislative branches, and even from internal bureaucratic pressures (also see: Binder and Spindel, 2017; Conti-Brown, 2016; Salter and Smith, 2018; Smith and Boettke, 2015). Thus, even if the technically optimal monetary policy can be found, it is likely to be undermined by the pressure for the politically optimal monetary policy (Friedman, 1994).

Given these theoretical limitations on central bankers' knowledge and incentives, it is an empirical question as to whether the Fed's management of the monetary system has improved economic performance relative to the decentralized gold standard. As discussed in section 2, market forces on the gold standard regulate the supply of the quantity of gold to meet the quantity demanded. Profit-maximizing gold miners increase or decrease the quantities they supply in response to changes in expected demand (Rockoff, 1984, p. 617). Increases in the price of gold provide the incentive for increased gold prospecting and extraction for use as money, while decreases in the price of gold decrease prospecting and extraction and increase non-monetary uses of gold (White, 1999, Ch.2).

Historically, gold suppliers have effectively matched the quantity of monetary gold they supplied to the quantity demanded by the public. For example, Rockoff (1984) studies the operation of the gold standard specifically under large supply shocks, and finds that historic surges in the production of gold such as the 1850's gold rushes in California and Colorado were not random discoveries. Instead, these discoveries were

responses to the increased profitability of gold mining, demonstrating a supply-side adjustments to meet the demand for gold (Rockoff, 1984, pp. 639-640). On the gold standard, even significant shocks to the supply of gold led to minimal disruptions in monetary equilibrium as judged by the rates of inflation and deflation. For example, the discovery of the Americas led to an influx of gold and silver that caused a “price revolution” in Spain and much of Europe over three quarters of a century (Fischer, 1989).⁵ Yet, as Hogan (2012, p. 34) describes, “[a] tripling of the price level over 75 years implies a compound rate of inflation of 1.48 percent—a level far below the target rate of most central banks...”.

With these automatic adjustment mechanisms, the gold standard historically did at least as well as the Fed at creating economic stability (Ritschl, Sarferaz, and Uebele, 2008, p. 12). Although some early studies do find that the Fed’s monetary policy helped dampen the business cycle, Romer (1986) demonstrates that the pre-Fed GNP data used in those studies were faulty and unreliable. Using improved data sets, Romer (1986), Miron and Romer (1990), and Davis (2004; 2006) find that the Fed’s monetary policy since World War II has not reduced the frequency or duration of recessions relative to the pre-Fed period. Similarly, Selgin, Lastrapes, and White (2012) find that the Fed has not improved the predictability of the price level or the volatility of economic production.⁶

Has the Fed succeeded as implied by Bernanke in reducing economic volatility by adjusting the money supply in response to changing economic conditions? Table 1 shows the means and standard deviations of annual real GDP growth in the Fed and gold standard periods based on historical data from Johnson and Williamson (2018).⁷ We see that average GDP growth was higher during the pre-Fed period than in the full Fed period, while the volatility of GDP growth was lower than under the Fed. Many comparisons of Fed and pre-Fed performance exclude the years of the World Wars and the Great Depression since these volatile periods are considered non-emblematic of true Fed performance. The third column of Table 1 shows the mean and standard deviation of GDP growth in the post-World War II period since 1946. Even excluding the Fed’s volatile early years, we see that the standard deviation of GDP growth is still higher in the postwar Fed period than it was during the pre-Fed gold standard. Thus, the Fed has not successfully adjusted to changing economic conditions as posited by Bernanke (2012b). It is only during the Great Moderation, shown in the final column, that the volatility of GDP growth finally declined to a level below that of the gold standard.

Table 1. Growth and volatility of real GDP in the Fed and gold standard periods

	Gold Standard 1792-1913	Full Fed 1914-2016	Postwar Fed 1946-2016	Great Moderation 1985-2016
Mean	4.20%	3.33%	3.71%	2.64%
Standard deviation	3.73%	5.03%	4.30%	1.61%

Source: Johnson and Williamson (2018)

⁵ There is some debate on the extent to which gold and silver discoveries played in the price revolution (McCloskey, 1972; Ramsey, 1971), which might diminish the perceived effects of monetary shocks during this period.

⁶ Also see White (2015).

⁷ Calculations using per capita real GDP growth lead to similar results.

Given the low standard deviation of GDP growth during the Great Moderation, would a gold standard have been able to outperform the Fed over this period? First, although Bernanke (2004) and others attribute the Great Moderation to improvements in monetary policy, many studies attribute the decline in economic volatility over the recent decades to a variety of factors including advances in businesses' inventory management practices, information technology, and a lack of exogenous shocks (Summers, 2005; Clark, 2009). Second, some studies argue that decreased volatility in real GDP during the Great Moderation has also seen an accompanying increase in large economic crashes (Jorda, Schularick, and Taylor, 2016; Jenson, Petrella, Rayn, and Santoro, 2017). Considering the prior evidence that the gold standard performed well in periods without exogenous shocks and, as discussed later, attenuating crashes, it seems plausible that a gold standard would have led to an even *Greater Moderation*.

Finally, Bernanke (2012b, pp. 13-15) assumes that a government on the gold standard is unable to pursue macroeconomic goals. However, governments on the gold standard do have tools at their disposal to influence economic activity. In fact, history provides many examples of the U.S. government taking actions to pursue macroeconomic goals while on the gold standard (Sylla, Wright, and Cowen, 2009, p. 65; Taylor, 1999, p. 324). During the asset bubble of 1792, for example, Alexander Hamilton "moved quickly to minimize the economic fallout" and "[l]ike Greenspan two centuries later, he was successful" (Sylla et al., 2009, p. 65). The United States attempted macroeconomic stabilization with varied success around the Panic of 1819 (Cowen, 2000, p. 1057; Rezneck, 1933, p. 29), the Panic of 1837 (Taylor, 1951, pp. 340-341; Sellers, 1991, p. 344; Fenstermaker, 1965, pp. 62 & 73), and the 1929 crash (Cowen, 2000, p. 1057; Bernanke and James, 1991, p. 40). Certainly not all attempts at macroeconomic stability while on the gold standard were as successful, either due to misjudgment, lack of information, or the undeveloped understanding of monetary issues at the time. Still, they demonstrate the operability of tools for macroeconomics adjustment. It is plausible that, rather than reflecting a weakness of the gold standard, these episodes primarily reflect the lack of the requisite knowledge and incentives on the part of policy-makers to understand and manage the tools for macroeconomic fine-tuning at their disposal.

3.2. Price Stability

"Although the gold standard promoted price stability over the very long run, over the medium run it sometimes caused periods of inflation and deflation." - Bernanke (2012a, p. 26)

The next commonly-held problem with the gold standard is its inability to maintain price stability over medium time horizons (Bernanke, 2012a, p. 26; Bordo and Filardo, 2005, p. 9; IGM, 2012; Hall, 1982, p. 122). Again, however, this reasoning does not prove that the Fed is a superior alternative to a gold standard because it does not offer a comparative analysis of these monetary systems.

A complete analysis must demonstrate that the Fed is more capable of maintaining price stability over the medium-run than the gold standard. The empirical evidence indicates that this is not the case for three reasons. First, historical evidence indicates that the price level was not more volatile on the gold standard than it has been under the Fed. Second, historical periods of medium-run inflation and deflation on the gold standard were not caused by gold supply shocks but rather by government interference with the money supply. Third, Bernanke implicitly assumes the Fed does

not, itself, cause medium-run periods of inflation and deflation. In fact, extreme experiences of inflation and deflation have both been worse under the Fed than on the gold standard. Importantly, deflations on the gold standard were mostly “good” deflation resulting from a progressing economy, while deflations under the Fed were often pernicious.

Like Bernanke (2012a, p. 26), economists generally concede that long-run price stability was much better on the gold standard than it has been under the Fed.⁸ Indeed, the United States experienced almost zero cumulative inflation in over 120 years on the gold standard, while prices have increased by more than 2,300% in 100 years under the Fed (Selgin et al., 2012, p. 570). Some studies also find that short-run price level volatility has been no better under the Fed than on the pre-Fed gold standard. Selgin et al. (2012, Table 1), for example, show that the standard deviation of inflation averaged 8.33% on the classical gold standard (1875-1914), which is only slightly higher than the standard deviation of 6.78% under the Fed (1915-2010). Hogan (2015) finds that the volatility of inflation was actually statistically significantly lower in the national banking period (1866-1913) than it was in the post-World War II period (1946-1984) and that price volatility under the Fed has only fallen during the Great Moderation.

Over the medium-run, there are sometimes periods of inflation and deflation on the gold standard, but the gold standard is likely not the culprit. Gold discoveries have not led to significant inflations on the gold standard. Rockoff (1984, p. 632) finds, instead, that these periods of inflation and deflation were caused by governments influencing gold mining through “deliberate acts of monetary policy and other acts that inadvertently altered the supply of gold.” Hogan and Smith (2016) analyze economic performance in the Fed and pre-Fed periods after accounting for wartime inflations and find that much of the medium-term volatility in the pre-Fed period—on the gold standard—was largely due to major wars, when the gold standard was suspended or undermined, rather than properties inherent to the gold standard. In addition, deflations on the gold standard were often benign, caused by increases in productivity rather than shortages of money (Bordo, Dittmar, and Gavin, 2007; Bordo and Filardo, 2005; Bordo, Lane, and Redish, 2004). While deflation caused by mismanaged monetary policy can cause economic harm, deflation resulting from productivity growth represents a progressing economy (Selgin, 1997).

Bernanke (2012a, p. 26) also assumes that the Fed itself has not caused periods of medium-run inflation and deflation. Elsewhere, however, Bernanke (2002; 2013) himself acknowledges that some of the worst episodes of medium-run inflation and deflation in U.S. history have occurred under the Fed. The deflation of the interwar (post-World War I) period was caused, not by the unimpeded operation of the managed gold standard, but by countries leaving the gold standard, inflating their currencies, and then subsequently attempting to return to the gold standard at the pre-war parity without adjusting for that inflation (Bernanke, 2010; White, 2013, p. 14). The Fed was responsible for the deflation of the early 1930’s which played a causal role in the Great Depression (Bernanke, 2002; Burns, 1957, P. 26-7). The Fed also caused the Great Inflation of the 1970’s (Bernanke, 2013). These events arguably had bigger negative impacts on the economy than any inflation or deflation of the pre-Fed period. This is especially the case if you take into consideration the fact that it was often wars, and the subsequent suspension or manipulation of the gold standard, which caused the major

⁸ See, for instance, Kydland and Wynne (2002).

pre-Fed disruptions (Hogan and Smith, 2016). Thus, medium-term inflation appears to have been worse under the Fed, and while there is some evidence from the Great Moderation that short-run, year-to-year inflation volatility has improved under the Fed, it is unclear whether this outcome has been driven by Fed policy (Hogan, 2015; Hogan and Smith, 2016).

Table 2 shows the average rates of inflation in the Fed and gold standard periods over the “medium run,” defined as periods of 5 or 10 years, based on historical CPI data from Officer and Williamson (2018). We take the absolute value so that the effects of inflation and deflation are cumulative rather than offsetting.⁹ The first two columns show the average 5- and 10-year changes in the price level respectively for the gold standard and Fed periods. The final two columns show the same data as compounded annual growth rates (CAGR). For 5-year periods, the average on the gold standard was 12.16%, while the average under the Fed was 21.34%. For 10-year periods, the average change was 15.17% on the gold standard but 42.92% under the Fed. The fact that average growth rates were positive on the gold standard does support the notion that price movements were not strictly offsetting on the gold standard, so there were periods of medium-run inflation and deflation as described by Bernanke (2012). As the numbers show, however, the problem of medium-run inflation and deflation was clearly worse during the Fed period than during the period of the gold standard.

Table 2. Medium-run absolute price-level changes in the Fed and gold standard periods

	Average absolute price growth		Annualized absolute growth rates	
	Gold Standard 1792-1913	Fed period 1914-2017	Gold Standard 1792-1913	Fed period 1914-2017
5-year periods	12.16%	21.34%	2.32%	3.94%
10-year periods	15.17%	42.93%	1.42%	3.64%

Source: Officer and Williamson (2018)

3.3. Financial Panics

“The gold standard did not prevent frequent financial panics.” - Bernanke (2012a, p. 25)

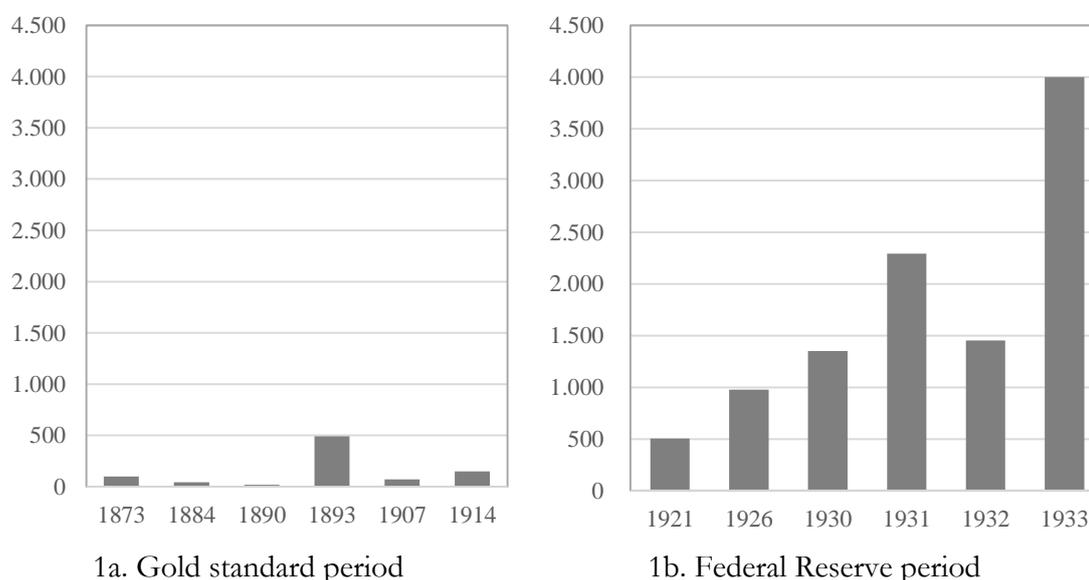
Another commonly-held problem with the gold standard is that it contributed to financial panics in the United States and around the globe. A complete analysis, however, requires demonstrating that the Fed can (and does) prevent financial panics in a manner superior to the gold standard. There are three reasons this does not appear to be the case. First, evidence indicates financial panics were not more frequent or severe before the Fed. Second, panics before the Fed were often caused by government interference with the monetary system rather than by the unimpeded operation of the gold standard. Third, many studies find the Fed played a causal role in two of the worst economic events in U.S. history: the Great Depression and the 2007-2008 financial crisis.

⁹ We begin the gold standard period in 1792 and the Fed period in 1914, but using alternative starting years leads to similar results.

First, historical evidence does not support the claim that financial crises were worse before the Fed. Jalil (2015, f.n. 30) writes, “there is no evidence of a decline in the frequency of financial panics during the first fifteen years of the existence of the Federal Reserve...” Selgin et al. (2012, p. 582) also find that “the Fed did not actually reduce their [financial panics] frequency” and “no genuine post-1913 reduction in banking panics, or in total bank suspensions, took place until after the national bank holiday of March 1933”. Even excluding the recent crisis, banking crises appear to be more common in recent decades. Bordo, Eichengreen, Klingbiel, and Martienz-Pena (2001, p. 72) find that since 1973 banking crises have been more frequent, being “double that of the Bretton Woods and classical gold standard periods and matched only by the crisis-ridden 1920s and 1930s.”

Figure 1 shows the number of bank suspensions during financial crises before and after the founding of the Fed. Figure 1a shows the data provided by Bernanke (2012a, p. 21) to argue that prior to the Federal Reserve, on the gold standard, financial crises were not adverted. The worst year is the financial crisis of 1893, in which 491 banks suspended operations. Figure 1b, which is not given by Bernanke (2012b) but is based on the same data source, shows suspensions during financial panics after the founding of the Fed. In 1921, 505 banks were suspended, which is more than in any year before the Fed. Another 976 banks were suspended in 1926 and a high of 4,000 in 1933. While Bernanke may be correct that the gold standard did not prevent financial panics, the data used by Bernanke (2012b) indicate that this problem became even worse under the Fed.

Figure 1. Bank suspensions during bank panics in the Fed and gold standard periods



Source: Wicker (2000, p. 143) for 1873-1907, Federal Reserve Board (1976, p. 283) for 1914-1933.

Furthermore, panics in the gold standard period were generally caused by poor banking regulations rather than problems with the gold standard itself. White (2013, p. 20-1) finds that “Runs and panics are not inherent to free banking on a gold standard, but only to a banking system weakened by legal restrictions. The pre-1933 banking panics in the United States therefore do not indict the gold standard, but rather indict the legal restrictions that weakened banks.” Champ, Smith, and Williamson (1996, p.

828) make the theoretical case that bank panics in the pre-Fed period “occur when there are restrictions on the issue of currency by private banks, but they do not occur if banks are unrestricted.” Weber (2012) examines state deposit insurance systems before 1865 and finds that these systems tended to increase bank failures.

In addition, many studies find that Fed monetary policy played a role in creating the financial panics of both the Great Depression and the 2008 financial crisis. Bernanke and James (1991, p. 40) argue that the initial monetary contraction in the United States was not caused by the gold standard but rather by poor Fed policy. As noted in the introduction, Bernanke (2002) acknowledges the Fed’s causal role in creating the Great Depression, saying to Milton Friedman, “You’re right, we did it.” Although Bernanke (2015) attempts to minimize any blame that might be placed on the Fed regarding the recent financial crisis, many studies find that the Fed’s expansionary monetary policy was a major contributing factor in the housing boom and subsequent bust that led to the crisis (Koppl, 2014, Taylor, 2009, L. H. White, 2009; L. J. White, 2009; Schwartz, 2008, p. 23). Other studies argue that the Fed’s actions during the financial crisis were not consistent with the classical rules for last resort lending (Hogan, Le, and Salter 2015) and “many economists believe it greatly worsened the crisis and the Great Recession that followed” (Ball, 2016, p. 1). Bernanke (2015, pp. 28 & 170) acknowledges his regret regarding the Fed’s delay in easing monetary policy leading into the Great Recession, which likely magnified the economic downturn.

3.4. Exchange Rates

“All countries on the gold standard are forced to maintain fixed exchange rates. As a result, the effects of bad policies in one country can be transmitted to other countries if both are on the gold standard.” - Bernanke (2012a, p. 24)

Another commonly-perceived problem with the gold standard is that an international gold standard creates a system of fixed exchange rates that will cause bad economic policies to be transmitted between countries. As Bernanke (2012b, p. 14) states, the system of fixed exchange rates that characterize an international gold standard has “at least one problem which is that if there are shocks or changes in the money supply in one country and perhaps even a bad set of policies, other countries that are tied to the currency of that country will also experience some of the effects of that.” Thus, the concern of Bernanke and others (IGM 2012) is that bad economic policy and economic shocks in one country will be readily transmitted to other countries, leading to the spillover of business cycles between countries.

A complete analysis, however, requires demonstrating both that fixed exchange rates on the gold standard tend to propagate business cycles between countries and that the international transmission of bad policy was more severe on the gold standard than under the Fed. The evidence, however, is not consistent with these hypotheses. First, the gold standard also has counter-synchronous properties operating through the specie flow mechanism that would tend to counter-act the transmission of bad policies between countries. Bernanke (2012a; 2012b) only discusses fixed exchange rates in the context of central banking and fails to acknowledge the benefits of the price-specie-flow mechanism that accompany an international gold standard. Second, Bernanke (2012a, p. 24) implicitly assumes that the Fed has prevented bad policies from being transmitted between countries. The empirical evidence, however, finds that the synchronization of international business cycles has increased, not decreased, under the Fed.

While it could be possible in theory that fixed exchange rates on the gold standard may have tended to increase the synchronization of business cycles between nations, which we dispute below, this problem was likely to have been mitigated by the counter-synchronous effects of specie flows on the gold standard. The international gold standard automatically stabilized the quantities of money in participating nations since gold specie flowed to countries where it was most valuable according to Hume's price-specie-flow mechanism. The mechanism functions as follows: If there is a positive shock in the domestic supply of gold, the increase in the domestic money supply will increase aggregate demand for both domestic and foreign goods. As imports increase, foreign payments will cause gold to flow out of the domestic economy until the relative purchasing power between countries is stabilized by purchasing power parity. In short, an increase in the supply of gold causes prices to rise, which causes specie to flow out of the country until relative prices return to their equilibrium levels.

The price-specie-flow mechanism shows how gold flows would rapidly bring "gold from the rest of the world into any single country where demand for money has grown" (White 2008, p. 3). The price-specie-flow mechanism allows for the purchasing power of gold to equilibrate by "causing gold to flow from the country where prices are relatively high to those where they are not, encouraging monetary expansion in those countries and monetary contraction in the one suffering a gold drain" (Selgin, 2013, p. 10). Bordo and Schwartz (1989, p. 247) write that the gold standard was historically effective at mitigating potential harms from capital flows as "increased gold output altered money supplies, expenditures, and prices in country after country in the manner predicted by Hume and Ricardo."

Second, Bernanke provides no evidence that the Fed has effectively prevented bad policies from being transmitted between countries. On the contrary, the empirical evidence shows that international synchronization of the business cycle increased, not decreased, under the Fed (Miles and Vijverberg, 2014). Artis, Choliarkis, and Harishandra (2011, p. 173) provide "evidence in favour of a secular increase in international business cycle synchronization within a group of European and a group of English-speaking economies that started during 1950–1973 and accelerated since 1973." Similarly, Bordo and Helbling (2011, p. 208) "find a secular trend towards increased synchronization for much of the twentieth century that has occurred across diverse exchange rate regimes." Wyplosz (1998, p. 70) finds that "over the last two decades [global] financial crises have tended to occur increasingly frequently." Thus, contrary to Bernanke (2012a; 2012b) and to the expectations of most economists, the available evidence demonstrates that shocks and policies have been more likely to spread between countries under the Fed than they were during the era of the international gold standard.

3.5. Speculation and Collapse

"If not perfectly credible, a gold standard is subject to speculative attack and ultimate collapse as people try to exchange paper money for gold." - Bernanke (2012a, p. 25)

A final commonly-held problem of the gold standard is that speculation on the gold standard will lead to the potential collapse of the monetary system.¹⁰

¹⁰ Economists hold similar fears of speculation outside the context of currency (Hart and Kreps, 1986; Stein, 1987).

A complete analysis requires demonstrating not only that speculative attacks are economically costly on a gold standard but also that such attacks are less costly under central banking, neither of which are consistent with historical evidence. First, Bernanke (2012a; 2012b) assumes that exchange rate speculation is always bad. In fact, the reevaluation of a redemption rate that is out of alignment with underlying market fundamentals can be beneficial to an economy, despite any short-term reevaluation costs. Second, Bernanke implies that speculative attacks can only occur on a gold standard when, in fact, such attacks also occur under central banking.

To maintain stable exchange rates on a centrally-managed gold standard, a central bank must adjust exchange rates or adjust the redemption value of gold to currency, leading to, what Bernanke (2012a, p. 25) refers to as, the “collapse” of the centrally managed gold standard.¹¹ While the revaluation of a currency can clearly be problematic from the point of view of a central banker, and such an adjustment is likely to create some economic turmoil, a revaluation is likely to benefit the economy as a whole since it will move the currency closer to its true fundamental value (Zenker, 2014; Grubel, 1992, p. 34). White (2008, p. 6) writes that “what opens the door to speculative attacks is a weak commitment to the existing parity” on the part of the central bank. While it is possible in theory that a properly-valued exchange rate might be subject to a destabilizing speculative attack, Friedman (1953, p. 176) argues that such a fear “does not seem to be founded on any systematic analysis of the available empirical evidence.”¹²

George Soros’ speculation on the U.K. Pound sterling in 1992 highlights the positive role of speculation by forcing the government to return the pound to its proper market value (Duffie, 2010). Soros correctly anticipated the U.K.’s withdrawal from the European Exchange Rate Mechanism (ERM) and the subsequent devaluation. Soros’ gamble on the devaluation of the pound was based on the policy differences between Germany and Britain. Ultimately, Soros’ speculation exposed a weakness in the British monetary system. “All Soros did was to recognize that the situation was untenable. The Bank of England’s effort to support the pound was the equivalent to trying to fight gravity” (Schwager, 2012, p. 12). Soros explains that “The forced devaluation of sterling [...] actually had a very beneficial effect on the British economy [...] In fact Britain emerged from recession within months of the devaluation and then enjoyed its longest ever period of steady non-inflationary growth [...] my successful speculation had a clearly beneficial result” (Soros and Schmitz, 2014).

While Bernanke implies that speculative attacks are specific to the gold standard, such attacks can take place whenever a currency is pegged to another currency or commodity, especially if the central bank attempts to maintain an exchange rate that is out of line with market prices. Soros’ speculative attack on the Pound Sterling is a clear example of speculation under central banking that forced the revaluation of the exchange rate to a more appropriate level. In fact, the speculative attack cited by

¹¹ Bernanke (2012b) refers here to the example of Britain leaving the gold standard in 1931, but speculative attacks do not generally result in the collapse of the monetary standard. Many cases are resolved through a revaluation of the exchange rate as happened several times during Britain’s experience with the gold standard.

¹² Flood and Marion (2000) provide a theoretical model in which speculative attacks are driven by self-fulfilling private-sector speculative attacks rather than by deteriorating macroeconomic fundamentals. Their result, however, requires that the monetary authority be constrained by deficit financing and other domestic constraints that are applicable under central banking but may not be equally applicable to a gold standard.

Bernanke (2012b, p. 51) of Great Britain in 1931 is itself an example of a speculative attack that occurred under central banking. Contrary to Bernanke (2012a; 2012b), empirical evidence suggests that speculative attacks are possible—and common—with central banks (Lall, 1997; Eaton and Turnovsky, 1984; Rothig, 2012).

4. Conclusion

Bernanke (2012a; 2012b) surveys many widely-held problems with the gold standard that demonstrate the superiority of a central bank over the gold standard. According to this consensus, the gold standard leads to undesirable outcomes, including economic and price instability, financial panics, the transference of bad policies via the fixed exchange rate, and even speculation-induced collapse. While these problems represent arguments that must be factored into any comparison of alternative monetary institutions, they do not by themselves offer a complete demonstration for the superiority any one particular monetary regime, such as a central bank. The gold standard, with its defects, must be compared to a central bank, with all its defects.

This paper analyzes Bernanke's "problems with the gold standard" in light of this standard of comparison, using recent theoretical and empirical evidence. We find that the commonly-held problems of the gold standard do not represent definitive arguments for the superiority of the Fed over the gold standard because they do not hold up to a comparative institutional analysis. If anything, the evidence tends to favor the gold standard on most of the critiques surveyed by Bernanke. We hope that future research will de-romanticize central banks by incorporating comparative institutional analysis into the examination of alternative monetary institutions. A natural extension of this framework would be in making counterfactual comparisons, such as seeing how economic performance would have changed over the past century had the money supply been governed by a gold standard rather than a central bank.

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References

- Aligica P.D., Boettke P.J. (2009), *Challenging Institutional Analysis and Development*, Oxon and New York, Routledge.
- Amato M., Fantacci L. (2014), 'Back to Which Bretton Woods? Liquidity and Clearing as Alternative Principles for Reforming International Money', *Cambridge Journal of Economics*, 38(6), 1431–1452.
- Artis M., Choliarkis G., Harishandra P.K.G. (2011), 'Business Cycle Synchronization since 1800', *The Manchester School*, 79(2), 173–207.
- Ball L. (2016), 'The Fed and Lehman Brothers: Introduction and Summary', NBER Working Paper, 22410.
- Bernanke B.S. (2002), 'Remarks by Governor Ben S. Bernanke, On Milton Friedman's Ninetieth Birthday', Press Release, from University of Chicago, IL, November 8.
- Bernanke B.S. (2004), 'The Great Moderation.' Remarks at the meetings of the Eastern Economic Association, Washington, D.C.
- Bernanke B.S. (2010), 'Rebalancing the Global Recovery', Press Release, from Sixth European Central Bank Central Banking Conference, Frankfurt, Germany, November 19.
- Bernanke B.S. (2012a), 'Origins and Mission of the Federal Reserve', Lecture Series *The Federal Reserve and the Financial Crisis*, George Washington University School of Business, March 20, presentation.
- Bernanke B.S. (2012b), 'Origins and Mission of the Federal Reserve', Lecture series, *The Federal Reserve and the Financial Crisis*, George Washington University School of Business, March 20, transcript.
- Bernanke B.S. (2013), 'A Century of U.S. Central Banking: Goals, Frameworks, Accountability', Speech at the 'The First 100 Years of the Federal Reserve: The Policy Record, Lessons Learned, and Prospects for the Future', conference sponsored by the National Bureau of Economic Research, Cambridge, MA.
- Bernanke B.S. (2015), *The Courage to Act: A memoir of a Crisis and its Aftermath*, New York, NY, W.W. Norton and Company.
- Bernanke B.S., James H. (1991), 'The Gold Standard, Deflation and Financial Crisis in the Great Depression: An International Comparison', in, Hubbard R.G. (ed.), *Financial Markets and Financial Crises*, Chicago, IL: University of Chicago Press, 33–68.
- Binder S., Spindel M. (2017), *The Myth of Independence: How Congress Governs the Federal Reserve*, Princeton, NJ, Princeton University Press.
- Boettke P.J. (1998), 'James M. Buchanan and the Rebirth of Political Economy', in, Holt R., Pressman S. (eds.), *Economics and Its Discontents: Twentieth Century Dissenting Economists*, Cheltenham, UK and Northampton, MA, Edward Elgar Publishing, 21–39.
- Boettke P.J., Coyne C.J., Leeson P.T. (2007), 'Saving Government Failure Theory from Itself: Recasting Political Economy from an Austrian Perspective', *Constitutional Political Economy*, 18(2), 127–143.
- Boettke P.J., Smith D.J. (2013), 'Federal Reserve Independence: A Centennial Review', *The Journal of Prices & Markets*, 1(1), 31–48.
- Boettke P.J., Smith D.J. (2016), 'Evolving Views on Monetary Policy in the Thought of Hayek, Friedman, and Buchanan', *The Review of Austrian Economics*, 29(4), 351–370.
- Bordo M.D. (1981), 'The Classical Gold Standard: Some Lessons for Today', *Federal Reserve Bank of St. Louis Review*, May, 2–17.
- Bordo M.D. (1993), 'The Gold Standard, Bretton Woods, and Other Monetary Regimes: A Historical Appraisal', *Federal Reserve Bank of Saint Louis Review*, March–April, 123–91.

-
- Bordo M.D. *et al.* (2001), 'Is the Crisis Problem Growing More Severe?', *Economic Policy*, 16(32), 53–82.
- Bordo M.D., Dittmar R.T., Gavin W.T. (2007), 'Gold, Fiat Money, and Price Stability', *B.E. Journal of Macroeconomics: Topics in Macroeconomics*, 7(1), Article 26.
- Bordo M.D., Filardo A.J. (2005), 'Deflation in a Historical Perspective', *BIS Working Paper*, 186.
- Bordo M.D., Helbling T.F. (2011), 'International Business Cycle Synchronization in Historical Perspective', *The Manchester School*, 79(2), 208–238.
- Bordo M.D., Lane J.L., Redish A. (2004), 'Good versus Bad Deflation: Lessons from the Gold Standard Era', *NBER Working Paper Series*, 10329.
- Bordo M.D., Schwartz A.J. (1989), 'Transmission of Real and Monetary Disturbances under Fixed and Floating Exchange Rates', in Dorn J.A., Niskanen W.A. (eds.), *Dollars, Deficits & Trade*, Boston, Dordrecht, and London: Kluwer Academic Publishers, 237–258.
- Brennan J. (2014), *Why Not Capitalism?* New York and London, Routledge.
- Buchanan J.M. (1999[1979]), 'Politics without Romance: A Sketch of Positive Public Choice Theory and its Normative Implications', in *The Logical Foundations of Constitutional Liberty*. The Collected Works of James M. Buchanan, Volume 1, Indianapolis, IN, Liberty Fund, 45–59.
- Buchanan J.M. (2015), 'The Value of Money as a Constitutionalized Parameter', in White L.H., Vanberg V.J., Köhler E.A. (eds.), *Renewing the Search for a Monetary Constitution*, Washington, D.C., Cato Institute, 5–57.
- Burns A.F. (1957), *Prosperity without Inflation*, New York, NY, Fordham University Press.
- Carlino J. (2007), 'The Great Moderation in Economic Volatility: A View from the States', *Federal Reserve Bank of Philadelphia Business Review*, Q1, 11–20.
- Champ B., Smith B.D., Williamson S.D. (1996), 'Currency Elasticity and Banking Panics: Theory and Evidence', *Canadian Journal of Economics*, 29(4), 828–864.
- Clark T.E. (2009) 'Is the Great Moderation Over? An Empirical Analysis', *Federal Reserve Bank of Kansas City Economic Review*, Q4, 5–42.
- Conti-Brown P. (2016), *The Power and Independence of the Federal Reserve*, Princeton, NJ, Princeton University Press.
- Cowen D.J. (2000), 'The First Bank of the United States and the Securities Market Crash of 1792', *The Journal of Economic History*, 60(4), 1041–1060.
- Davis J.H. (2004), 'A Quantity-Based Annual Index of U.S. Industrial Production, 1790–1915', *Quarterly Journal of Economics*, 119(4), 1177–1215.
- Davis J.H. (2006), 'An Improved Annual Chronology of U.S. Business Cycles since the 1790s', *Journal of Economic History*, 66(1), 103–121.
- Demsetz H. (1969), 'Information and Efficiency: Another Viewpoint', *The Journal of Law & Economics*, 12(1), 1–22.
- Duffie D. (2010), 'In Defense of Financial Speculation', *Wall Street Journal*. February 24th.
- Eaton J., Turnovsky S.J. (1984), 'The Forward Exchange Market, Speculation, and Exchange Market Intervention', *The Quarterly Journal of Economics*, 99(1), 45–69.
- Eichengreen B. (1992), *Golden Fetters: The Gold Standard and the Great Depression, 1919-1939*, New York, NY, Oxford University Press.
- Eichengreen B. (2007), *Global Imbalances and the Lessons of Bretton Woods*, Cambridge, MA, MIT Press.
- Eskridge, Jr. W.N., (1988), 'Politics without Romance: Implications of Public Choice Theory for Statutory Interpretation', *Virginia Law Review*, 74(2), 275–338.
- Farber D.A. (1991), 'Free Speech without Romance: Public Choice and the First Amendment', *Harvard Law Review*, 105(2), 554–583.
-

-
- Federal Reserve Board (1976), *Banking and Monetary Statistics, 1914–1941*, Washington, DC, Board of Governors of the Federal Reserve System.
- Fenstermaker J.V. (1965), *The Development of American Commercial Banking: 1782–1837*, Kent, Ohio, Kent State University.
- Fisher D. (1989), ‘The Price Revolution: A Monetary Interpretation’, *Journal of Economic History*, 49(4), 883–902.
- Flood R.P., Marion N.P. (2000), ‘Self-Fulfilling Risk Predictions: An Application to Speculative Attacks’, *Journal of International Economics*, 50(1), 245–268.
- Fraietta P.L. (2013), ‘Contract & Conditional Zoning Without Romance: A Public Choice Analysis’, *Fordham Law Review*, 81(4), 1923–1963.
- Friedman M. (1947), ‘Lerner on the Economics of Control’, *Journal of Political Economy*, 55(5), 405–416.
- Friedman M. (1953), *Essays in Positive Economics*, Chicago and London, University of Chicago Press.
- Friedman M. (1994), *Money Mischief: Episodes in Monetary History*, San Diego, New York, and London, Harcourt Brace & Company.
- Grubel H.G. (1992), ‘Profitable Currency Speculation: Service to Users or Destabilizing?’, in Giersch H. (ed.), *Money, Trade, and Competition*, Springer-Verlag, 23–37.
- Hall R.E. (1982), ‘Explorations in the Gold Standard and Related Policies for Stabilizing the Dollar’, in Hall R.E. (ed.), *Inflation: Causes and Effects*, Chicago, IL, University of Chicago Press, 111–122.
- Hart O.D., Kreps D.M. (1986), ‘Price Destabilizing Speculation’, *Journal of Political Economy*, 94(5), 927–952.
- Hogan T.L. (2012), ‘Competition in Currency: The Potential for Private Money’, *CATO Policy Analysis*, 698.
- Hogan T.L. (2015), ‘Has the Fed Improved U.S. Economic Performance?’ *Journal of Macroeconomics*, 43(March), 257–266.
- Hogan T.L., Le L., Salter A.W. (2015), ‘Ben Bernanke and Bagehot’s Rules’, *Journal of Money, Credit and Banking*, 47(2–3), 333–348.
- Hogan T.L., Smith D.J. (2016), ‘War, Money, & Economy: Inflation and Production in the Fed and Pre-Fed Periods’, *SSRN Working Paper*.
- Horwitz P. (2013), ‘Freedom of the Church without Romance’, *Journal of Contemporary Legal Issues*, 21, 59–132.
- Horwitz S. (2000), *Microfoundations and Macroeconomics: An Austrian Perspective*, London and New York, Routledge.
- IGM Economic Panel of Experts (2012), ‘Gold Standard’, *IGM Economic Forum*, January 12.
- Irwin D.A. (2012), ‘The French Gold Sink and the Great Deflation of 1929–32’, *Cato Papers on Public Policy*, 2, 1–41.
- Irwin D.A. (2014), ‘Who Anticipated the Great Depression? Gustav Cassel versus Keynes and Hayek on the Interwar Gold Standard’, *Journal of Money, Credit and Banking*, 46(1), 199–227.
- Jalil A.J., (2015), ‘A New History of Banking Panics in the United States, 1825–1929: Construction and Implications’, *American Economic Journal: Macroeconomics*, 7(3), 295–330.
- Jenson H. *et al.* (2017), ‘Leverage and Deepening Business Cycle Skewness’, *SSRN Working Paper*.
- Johnson L., Williamson S.H. (2018), ‘What Was GDP Then?’ *Measuring Worth 2018*.
- Jorda O., Schularick M., Taylor A.M. (2016), ‘Macrofinancial History and the New Business Cycle Facts’, *Working Paper Series*, Federal Reserve Bank of San Francisco.

-
- Koppl R. (2014), *From Crisis to Confidence: Macroeconomics after the Crash*, London, England, Institute of Economic Affairs.
- Kydland F.E., Wynne M.A. (2002), 'Alternative Monetary Constitutions and the Quest for Price Stability', *Economic and Financial Policy Review*, 1(1), 1–19, Federal Reserve Bank of Dallas.
- Laidler D.E.W. (1993), *The Demand for Money: Theories, Evidence & Problems* (4th ed.), New York, NY, HarperCollins.
- Lall S. (1997), 'Speculative Attacks, Forward Market Intervention and the Classic Bear Squeeze', *IMF Working Paper*, 97/164.
- McCloskey D. (1972), 'Review of Peter H. Ramsey's (Ed.), *The Price Revolution in Sixteenth-Century England*', *The Journal of Political Economy*, 80(6), 1332–1336.
- Miles W., Vijverberg C.P. (2014), 'Did the Classical Gold Standard Lead to Greater Business Cycle Synchronization? Evidence from New Measures', *Kyklos*, 67(1), 93–115.
- Miron J., Romer C.D. (1990), 'A New Monthly Index of Industrial Production, 1884-1940', *Journal of Economic History*, 50(2), 321–337.
- O'Driscoll Jr. G. (2013), 'Debunking Myths about Central Banks', *The Wall Street Journal*, February 28th.
- Officer L.H., Williamson S.H. (2018) 'The Annual Consumer Price Index for the United States, 1774-Present', *Measuring Worth 2018*.
- Pennington M. (2011), *Robust Political Economy*, Cheltenham, UK and Northampton, MA, Edward Elgar.
- Ramsey P.H. (ed.) (1971), *The Price Revolution in Sixteenth-Century England*, London, Methuen & Co.
- Rawls J. (2001), *Justice as Fairness: A Restatement*, Cambridge, MA, Harvard University Press.
- Reznek S. (1933) 'The Depression of 1819-1822, A Social History', *American Historical Review*, 39(1), 28–47.
- Ritschl A., Sarferaz S., Uebele M. (2008), 'The U.S. Business Cycle, 1867-1995: Dynamic Factor Analysis vs. Reconstructed National Accounts', *SFB 649 Discussion Paper*, 2008–066, November.
- Rockoff H. (1984), 'Some Evidence on the Real Price of Gold, Its Costs of Production, and Commodity Prices', in Bordo M.D., Schwartz A.J. (eds.), *A Retrospective on the Classical Gold Standard, 1821-1931*, Chicago, IL, University of Chicago Press, 613–650.
- Romer C.D. (1986), 'Is the Stabilization of the Postwar Economy a Figment of the Data?' *American Economic Review*, 76(3), 314–334.
- Rothig A. (2012), 'Cross-Speculation in Currency Future Markets', *International Journal of Finance and Economics*, 17(3), 272–78.
- Roosevelt F.D. (1933a), *Executive Order 6073 – Reopening Banks*, March 10.
- Roosevelt F.D. (1933b), *Executive Order 6102 – Requiring Gold Coin, Gold Bullion and Gold Certificates to Be Delivered to the Government*, April 5.
- Salter A.W., Luther W.J. (2018), 'Adaption and Central Banking', *AIER Sound Money Project Working Paper*, 2018-01.
- Salter A.W., Smith D.J. (2017), 'What You Don't Know Can Hurt You: Knowledge Problems in Central Banking', *Contemporary Economic Policy*, 35(3), 505–517.
- Salter A.W., Smith D.J. (2018), 'Political Economists or Political Economists? The Role of Political Environments in the Formation of Fed Policy under Burns, Greenspan, and Bernanke', *Quarterly Review of Economics and Finance*, forthcoming.
- Schwager J.D. (2012), *Hedge Fund Market Wizards: How Winning Traders Win*, Hoboken, NJ, John Wiley & Sons, Inc.

-
- Schwartz A.J. (2008), 'Origins of the Financial Market Crisis of 2008', *Cato Journal*, 29(1), 19–23.
- Selgin G. (1997), *Less Than Zero: The Case for a Falling Price Level in a Growing Economy*, Westminster, London: Institute for Economic Affairs.
- Selgin G. (2013), 'The Rise and Fall of the Gold Standard in the United States', *Policy Analysis*, 729.
- Selgin G., Lastrapes W.D., White L.H. (2012), 'Has the Fed Been a Failure?' *Journal of Macroeconomics*, 34(3), 569–596.
- Selgin G., White L.H. (1994), 'How Would the Invisible Hand Handle Money?' *Journal of Economic Literature*, 32(4), 1718-1749.
- Sellers C. (1991), *The Market Revolution: Jacksonian America 1815-1846*, New York, Oxford University Press.
- Shapiro D. (2007), *Is the Welfare State Justified?* New York, NY, Cambridge University Press.
- Smith D.J., Boettke P.J. (2015), 'An Episodic History of Modern Federal Reserve Independence', *The Independent Review*, 20(1), 99–120.
- Soros G., Schmitz G.P. (2014), *The Tragedy of the European Union*, New York, NY, Public Affairs.
- Steil B. (2013), *The Battle of Bretton Woods*, Princeton, New Jersey, Princeton University Press.
- Stein J.C. (1987), 'Informational Externalities and Welfare-reducing Speculation', *Journal of Political Economy*, 95(6), 1123–1145.
- Stock J.H., Watson M.W. (2003), 'Has the Business Cycle Changed?' Paper presented at the Federal Reserve Bank of Kansas City 'Monetary Policy and Uncertainty: Adapting to a Changing Economy' symposium. Jackson Hole, WY, August 28-30.
- Summers P. (2005), 'What Caused The Great Moderation? Some Cross-Country Evidence', *Economic Review*, Q3, 5–32, Federal Reserve Bank of Kansas City.
- Sylla R., Wright R.E., Cowen D.J. (2009), 'Alexander Hamilton, Central Banker: Crisis Management during the U.S. Financial Panic of 1792', *Business History Review*, 83(1), 61–86.
- Taylor G.R. (1951), *The Transportation Revolution: 1815-1860*, New York, Evanston, and London, Harper & Row Publishers.
- Taylor J.B. (1999), 'A Historical Analysis of Monetary Policy Rules', in Taylor J.B. (ed.), *Monetary Policy Rules*, Chicago, IL, University of Chicago Press, 319–348.
- Taylor J.B. (2009), *Getting off Track: How Government Actions and Interventions Caused, Prolonged, and Worsened the Financial Crisis*, Stanford, CA, Hoover Institute.
- Timberlake R. (2005), 'Gold Standards and the Real Bills Doctrine in U.S. Monetary Policy', *Econ Journal Watch*, 2(2), 196–233.
- Weber W.E. (2012), 'Bank Liability Insurance Before 1865', *Working Paper*, 679, Federal Reserve Bank of Minneapolis.
- White L.H. (1999), *The Theory of Monetary Institutions*, Malden, MA, Blackwell Publishers, Inc.
- White L.H. (2005), 'The Federal Reserve System's Influence on Research in Monetary Economics', *Econ Journal Watch*, 2(2), 325–354.
- White L.H. (2008), 'Is the Gold Standard Still the Gold Standard among Monetary Systems?' *Cato Institute Briefing Papers*, 100.
- White L.H. (2009), 'Federal Reserve Policy and the Housing Bubble', *Cato Journal*, 29(1), 115–125.
- White L.H. (2013), 'Recent Arguments against the Gold Standard', *Policy Analysis*, 728.
- White L.H. (2015), 'The Merits and Feasibility of Returning to a Commodity Standard', *Journal of Financial Stability*, 17(April), 59–64.

- White L.J. (2009), 'A Brief History of Credit Rating Agencies: How Financial Regulation Entrenched the Industry's Role in the Subprime Mortgage Debacle of 2007-2008', *Mercatus on Policy*, October, 59.
- White W.R. (2013), 'Is Monetary Policy a Science? The Interaction of Theory and Practice Over the Last 50 Years', in, Balling M., Gnan E. (eds.), *50 Years of Money and Finance – Lessons and Challenges*, Vienna, Austria, SUERF, 73–115.
- Wicker E. (2000) *Banking Panics of the Gilded Age*, New York, NY, Cambridge University Press.
- Wyplosz C. (1998), 'Globalised Financial Markets and Financial Crises', in, Teunissen J.J. (ed.), *Regulatory and Supervisory Challenges in a New Era of Global Finance*, The Hague, NL, Forum on Debt and Development, 70–87.
- Zenker A. (2014), *Currency Speculation in Fixed Exchange Rate Regimes: Theory and Empirical Evidence*, Germany, Springer Gabler.