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Editor's Note

This issue of the *Cato Journal* is dedicated to Allan H. Meltzer who passed away on May 8, 2017. Allan spoke at the 1st Annual Monetary Conference in 1983 and many thereafter. He was a frequent contributor to the *Cato Journal*, a friend, and mentor. He will be sorely missed.

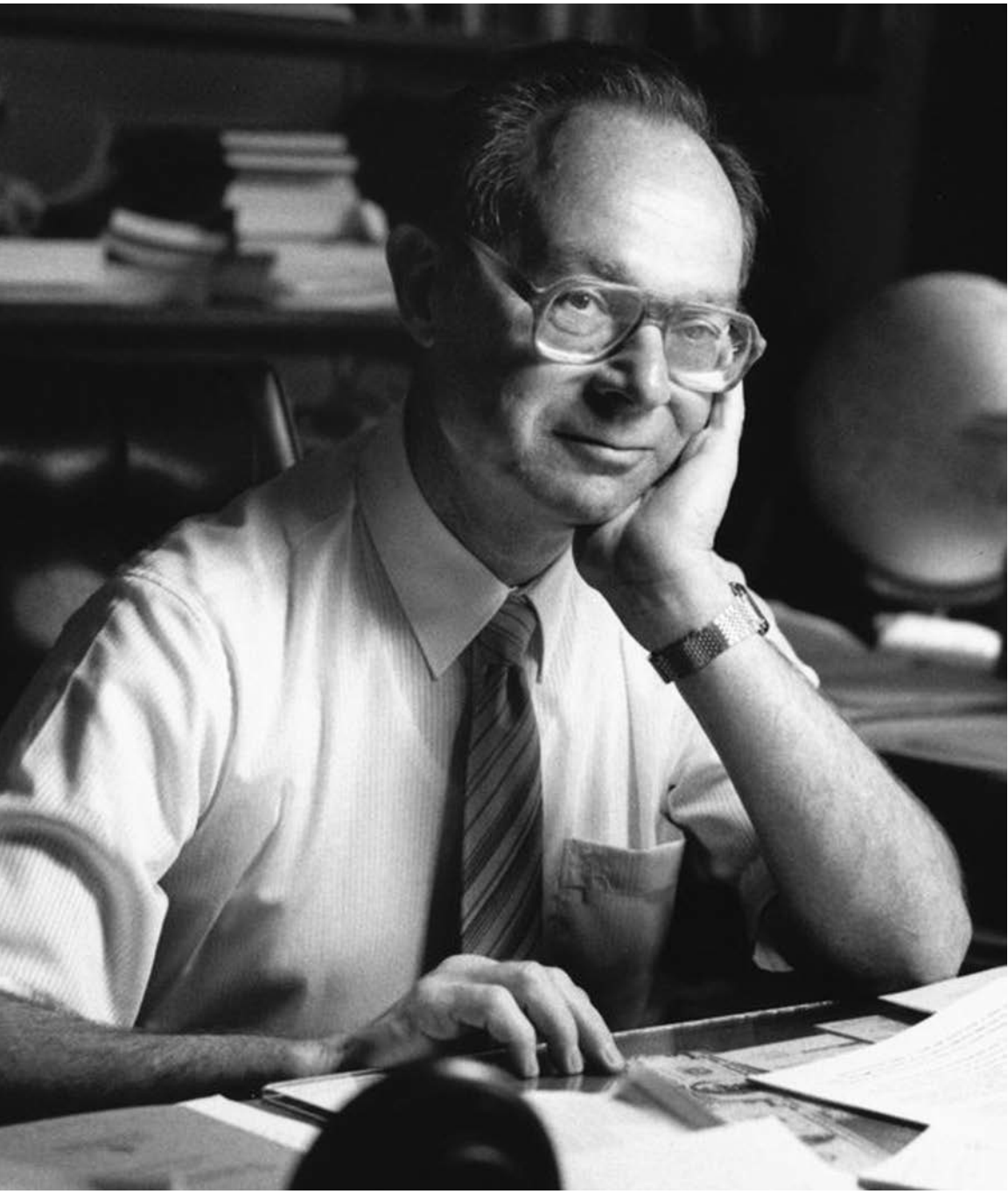
The 16 monetary articles in this issue were originally presented at the Cato Institute's 35th Annual Monetary Conference, "The Future of Monetary Policy," on November 16, 2017. The conference was hosted by Cato's Center for Monetary and Financial Alternatives and generously supported by a grant from the **George Edward Durell Foundation.** I thank the Durell board members for their continuing support of the Annual Monetary Conference and the authors for their assistance in preparing their papers for publication.

There will be many challenges as the Federal Reserve and other major central banks exit their unconventional monetary policies and normalize their balance sheets. Ultra-low interest rates, quantitative easing, and forward guidance have increased risk taking and pumped up asset prices. Rising volatility in global stock markets reflect, in part, the uncertainty of future monetary policy.

The authors in this volume focus on four major issues: (1) the case for a rules-based international monetary system, (2) normalizing monetary policy, (3) the future of currency, and (4) the future of China in the global monetary system.

In this time of great uncertainty, it is reassuring that dedicated scholars are providing the intellectual basis for improving monetary institutions that will help avoid future crises.

—J. A. Dorn



Allan H. Meltzer
1928–2017

Allan H. Meltzer: A Life Well Lived

James A. Dorn

The world lost a great champion of liberty with the passing of Allan Meltzer on May 8, 2017, at the age of 89. A longtime Professor of Political Economy at Carnegie Mellon University, Allan was a prodigious worker who wrote hundreds of articles and more than ten books, including his monumental *A History of the Federal Reserve* and more recently *Why Capitalism?* The latter provides a strong defense of limited government, the rule of law, private property, and free markets, which he saw as the surest means to increase the wealth of nations.

A Passion for Ideas and Policy

Allan had a passion for ideas and a desire to influence policy; he sought to make the world a better place by safeguarding economic and personal freedom. He became a major player in the marketplace for ideas—writing, teaching, advising policymakers, serving on editorial boards, cofounding the Shadow Open Market Committee and the Carnegie-Rochester Conference Series on Public Policy with his close colleague and lifelong friend Karl Brunner, acting as president of the Mont Pelerin Society founded by F. A. Hayek, serving on the Council of Economic Advisers, chairing the International Financial Institution Advisory Commission (also known as the

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"Meltzer Commission"), and participating in numerous conferences.[1] He continued working right up until his death.

A Giant in Monetary Economics

I first met Allan in the early 1980s, when he began to participate in Cato's Annual Monetary Conference. His paper "Monetary Reform in an Uncertain Environment" was delivered at the first conference, in January 1983, and published in the *Cato Journal* later that year; it was reprinted in *The Search for Stable Money* (University of Chicago Press, 1987), a book Anna J. Schwartz and I coedited.

In that article, Allan examined alternative monetary regimes and their implications for reducing risk and uncertainty. He sought a rules-based regime that would minimize uncertainty and best allow markets to flourish. He preferred, at the time, a quantity rule that would have the monetary base grow in line with the growth of real output adjusted for changes in the velocity of base money. Such a rule, he argued, would anchor expectations regarding the path of nominal income and achieve long-run price stability. However, the rule had to be credible and be supplemented with a fiscal rule that limited the taxing and spending powers of government. He did not want the Fed to finance government deficits or to allocate credit.

It is important to note that Allan was not opposed to private money. At the 1983 monetary conference, he argued:

> Individuals or groups should be permitted to issue and use privately produced money or monies. . . . The objective of policy rules is to reduce the uncertainty that the community must bear, not to prevent voluntary risk taking [Meltzer 1983: 109].

Allan was open-minded and was willing to change his policy advice based on logic and evidence.

He continued to participate in Cato's Annual Monetary Conference for many years and contributed 15 articles to the *Cato Journal* (Table 1). Although he was often critical of Fed policy, he thought Paul Volcker was correct in ending double-digit inflation by slowing the growth of money and credit, and that Alan Greenspan was correct in following an implicit monetary rule to prevent wide fluctuations in nominal income during the "Great Moderation."

[1]For an excellent summary of Meltzer's contributions to public policy, see Taylor (2017).

TABLE 1
Allan H. Meltzer's Articles in the *Cato Journal*

"Monetary Reform in an Uncertain Environment," *Cato Journal* 3 (1), Spring/Summer 1983. Reprinted in J. A. Dorn and A. J. Schwartz (eds.) *The Search for Stable Money*, University of Chicago Press (1987).

"The International Debt Problem," *Cato Journal* 4 (1), Spring/Summer 1984.

"Monetary and Exchange Rate Regimes: A Comparison of Japan and the United States," *Cato Journal* 6 (2), Fall 1986.

Comment on "Can Monetary Disequilibrium Be Eliminated?" *Cato Journal* 9 (2), Fall 1989.

"Some Empirical Findings on Differences between EMS and Non-EMS Regimes: Implications for Currency Blocs," *Cato Journal* 10 (2), Fall 1990.

"Karl Brunner: In Memoriam," *Cato Journal* 12 (1), Spring/Summer 1992.

"Benefits and Costs of Currency Boards," *Cato Journal* 12 (3), Winter 1993.

"Asian Problems and the IMF," *Cato Journal* 17 (3), Winter 1998.

"Monetary Policy in the New Global Economy: The Case of Japan," *Cato Journal* 20 (1),Spring/Summer 2000.

"Argentina 2002: A Case of Government Failure," *Cato Journal* 23 (1), Spring/Summer 2003.

"Monetary History as a Model for Historians," *Cato Journal* 23 (3), Winter 2004.

"New Mandates for the IMF and World Bank," *Cato Journal* 25 (1), Winter 2005.

"Learning about Policy from Federal Reserve History," *Cato Journal* 30 (2), Spring/Summer 2010.

"Federal Reserve Policy in the Recent Recession," *Cato Journal* 32 (2), Spring/Summer 2012.

"What's Wrong with the Fed? What Would Restore Independence?" *Cato Journal* 33 (3), Fall 2013.

Meltzer, however, was highly critical of the Fed's unconventional monetary policy and wrote in the Spring/Summer 2012 *Cato Journal*:

> Overresponse to short-run events and neglect of longer-term consequences of its actions is one of the main errors that the Federal Reserve makes repeatedly. The current recession offers many examples of actions that some characterize as bold and innovative. I regard many of these actions as inappropriate for an allegedly independent central bank because they involve credit allocation, fill the Fed's portfolio with an unprecedented volume of long-term assets, evade or neglect the dual mandate, distort the credit markets, and initiate other actions that are not the responsibility of a central bank [Meltzer 2012: 255].

He kept up his criticism until the end, writing articles for the Hoover Institution, where he was a Distinguished Senior Fellow,[2] with such titles as "Fed Up with the Fed" (February 17, 2016), "Fed Failures" (March 9, 2016), and "Reform the Federal Reserve" (October 12, 2016), all of which appeared in *Defining Ideas* (Hoover's online journal). His last article appeared on April 25, 2017, less than two weeks before he died.

The last time I saw Allan was in Zurich, in September 2016, to commemorate the 100th anniversary of Karl Brunner's birth at a conference organized by the Swiss National Bank. Allan discussed Karl's contributions to monetary theory as well as to political economy in general. In his paper, "Karl Brunner, Scholar: An Appreciation," he emphasized that Brunner

> highlighted information, institutions and uncertainty as well as the importance of microanalysis in macroeconomics. Karl Brunner explained that nominal monetary impulses changed real variables by changing the relative price of assets to output prices. And he concluded that economic fluctuations occurred because of an unstable public sector—especially the monetary sector—that disturbs a more stable private sector, a policy lesson forgotten or never learned by many central banks.[3]

[2]Before Meltzer moved to the Hoover Institution, he was a Visiting Scholar at the American Enterprise Institute in Washington, D.C., for many years.

[3]See Meltzer's "Abstract" in his Hoover Institution Economics Working Paper No. 15116 (October 2015).

Liberty Fund Seminar in San Francisco, October 1986, to discuss *Keynes's Monetary Theory* manuscript. Front row (left to right): Lindley Clark, Dub Hill, Milton Friedman, Karl Brunner, Allan Meltzer, Anna Schwartz, Larry White, Roger Garrison. Back row (left to right): Jim Dorn, James Meigs, Leland Yeager, Susan Howson, David Laidler, Peter Bernholz, Bill Niskanen, John Whittaker, Axel Leijonhuvud, Jerry O'Driscoll, Ed Crane, and Donald Moggridge.

Those ideas also were central to Allan's work—both with Karl and independently—and they are evident in his interpretation of Keynes's monetary theory.

John Maynard Keynes and Meltzer's Monetary Rule

In *Keynes's Monetary Theory: A Different Interpretation*, Meltzer (1988) argues that the vast literature on John Maynard Keynes neglected the importance he placed on credible rules, which he thought would reduce uncertainty and improve economic welfare.

In particular, Allan was influenced by Keynes's classic *A Tract on Monetary Reform* (1923), which discusses rules for domestic (internal) price stability and for international (external) price stability—that is, exchange rate stability. In thinking about a rule to reduce the variability of unanticipated changes in prices and outputs, Meltzer (1989: 78–81) draws on Keynes's distinction and his recognition of the benefits of reducing both internal and external instability. The problem, of course, is to choose the

appropriate institutional framework. Countries operating *independently* cannot achieve both internal and external stability, argued Keynes, unless a key country anchors its price level by enforcing a credible rule.

Building upon Keynes's insights, Meltzer (1989: 78) notes that if each major trading partner makes domestic price stability a priority, then uncertainty about the future path of prices will diminish and exchange rates among the partners will be more stable. To realize both internal and external stability, Meltzer proposes a simple rule: each major country should set "the rate of growth of the monetary base equal to the difference between the moving average of past real output growth and past growth in base velocity" (ibid., p. 83). If each country complies, the rule will reduce the "variability of exchange rates arising from differences in expected rates of inflation."[4]

Meltzer's proposed rule is "forecast free" and adaptable; it is mildly activist but nondiscretionary, similar to Bennett McCallum's (1984) monetary rule. By choosing to stabilize the *anticipated* price level rather than the actual price level, monetary authorities will not need "to reverse all changes in the price level," argues Meltzer (1989: 79). Instead, the actual price level is allowed "to adjust as part of the process by which the economy adjusts real values to unanticipated supply shocks." In particular, Meltzer's monetary rule "does not adjust to short-term, transitory changes in level, but it adjusts fully to permanent changes in growth rates of output and intermediation (or other changes in the growth rate of velocity) within the term chosen for the moving averages" (ibid., p. 81).

Under the Fed's current operating procedure, in which the Fed sets a federal funds rate target range with the rate of interest on excess reserves (IOER) as its upper limit and the Fed's overnight reverse repurchase (ON RRP) agreement rate as its lower limit, Meltzer's monetary rule could no longer work as he imagined it might.[5] Because the IOER rate is higher than comparable market rates, at least some banks now find it worthwhile to accumulate

[4]Meltzer's proposal is similar to Brunner's call for a "club of financial stability" (Brunner 1987: 50).

[5]For an analysis of the Fed's postcrisis operating system, see Ihrig, Meade, and Weinbach (2016); Selgin (2017, 2018).

excess reserves instead of trading them for other assets. The economy is, in other words, kept in a purpose-made "liquidity trap," so that the traditional monetary "transmission mechanism" linking increases in the monetary base to changes in bank lending, overall spending, and inflation, no longer functions as it once did. Instead, barring vast changes in the quantity of base money ("quantitative easing"), to alter its policy stance the Fed has to change its IOER and ON RRP rates, thereby influencing not the supply of but the overall demand for the Fed's deposit balances.

Before serious consideration can be given to implementing any rules-based monetary regime, the Fed needs to normalize monetary policy by ending interest on excess reserves and shrinking its balance sheet to restore a precrisis fed funds market. Once changes in base money can be effectively transmitted to changes in the money supply and nominal income, Meltzer's rule would reduce uncertainty and spur investment and growth.

The key point, however, is that Allan wanted to explore alternative monetary rules and select those he thought would work best to reduce the variability of prices and output. That comparative-institutions approach was evident in all his work. He recognized that, ultimately, the choice of a rule would be heavily influenced by the political economy. His careful scholarship was intended to help shape the climate of ideas and public policy in the direction of what Richard Epstein (1995) has called "simple rules for a complex world."

A Breadth of Knowledge

Although Allan was known primarily for his work on monetary theory and history, he was deeply interested in the role of government in a free society; the relation between institutions, incentives, and behavior; the determinants of economic growth; the theory of public choice; the damaging effects of official foreign aid; and the distribution of income.[6] He wrote many articles for the popular press, including the *Wall Street Journal, Los Angeles Times*, and

[6]Meltzer viewed economics as "a policy science, not a branch of applied mathematics." He argued that "economics will be poorer if it does not include institutions and the incentives embodied in the rules, institutions or arrangements that we call society" (Meltzer 1990: 27).

Financial Times, and he was always willing to help younger scholars and students understand the complexities of political economy.

A Man of Integrity

Allan Meltzer was a great scholar and teacher, a friend of liberty, a man of integrity who kept his word,[7] and a fine human being. He was persistent in his research and his life. Allan taught at Carnegie Mellon for 60 years and was married to his lovely wife Marilyn for 67 years.

When Allan was five years old, he lost his mother and went to live with his grandmother for several years until he moved to Los Angeles where his family ran a business. Reflecting on his early years with his grandmother, Allan said, "Her most important influence on my career and my outlook was her strongly held belief that, in America (and only in America), there were no real limits other than ability to what one could achieve by personal effort" (Meltzer 1990: 22).

In his many accomplishments and honors, Allan certainly realized the American Dream, and had a life well lived.[8] He will be sorely missed, but his work will live on.

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[7]In the foreword to volume 1 of Meltzer's *A History of the Federal Reserve*, Alan Greenspan wrote, "Allan Meltzer has spent a lifetime inquiring into monetary economics, and he calls the evidence as he sees it" (Greenspan 2003: x).

[8]Meltzer's many honors include: Distinguished Fellow, American Economic Association; Irving Kristol Award, American Enterprise Institute; Distinguished Professional Achievement Medal, UCLA; The Adam Smith Award, National Association for Business Economics; The Bradley Foundation Award; The Harry Truman Award for Public Policy; and the Distinguished Teacher Award, International Mensa Foundation.

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Toward a Rules-Based International Monetary System

John B. Taylor

Over the past few years I have been making the case for moving toward a more rules-based international monetary system (e.g., Taylor 2013, 2014, 2015, 2016a, 2016b, 2017). In fact, I made the case over 30 years ago in Taylor (1985), and the ideas go back over 30 years before that to Milton Friedman (1953). However, the case for such a system is now much stronger because the monetary system drifted away from a rules-based approach in the past dozen years and, as Paul Volcker (2014) reminds us, the absence of a rules-based monetary system "has not been a great success."

To bring recent experience to bear on the case, we must recognize that central banks have been using two separate monetary policy instruments in recent years: the policy interest rate and the size of the balance sheet, in which reserve balances play a key role. Any international monetary modeling framework used to assess or to make recommendations about international monetary policy must include both instruments in each country, the policy for changing the instruments, and the effect of these changes on exchange rates.

Using such a framework, I show that both policy instruments have deviated from rules-based policy in recent years. I then draw

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the policy implications for the international monetary system and suggest a way forward to implement the policy.

Regarding policy interest rates, there has clearly been an international contagion of deviations from monetary policy rules that have worked well in the past, as I argued in Taylor (2009, 2013).[1] This international contagion is due in part to a concern about exchange rates. If a foreign central bank with global financial influence cuts its interest rate by a large amount, then the currencies of other countries will tend to appreciate unless the other central banks react and adjust their interest rates. Central bank reactions may also include exchange market interventions, capital flow restrictions, or some form of macroprudential actions aimed at international capital flows. These actions and reactions accentuate the deviation of monetary policy from traditional policy rules. To be sure, the international contagion of policy interest rates may be due to omitted factors that push interest rates around for many central banks. However, there is considerable econometric evidence that the deviations from policy rules are caused by unusual interest rate changes in other countries. There is also direct evidence from many central bankers who admit to these reactions. Norges Bank reports on monetary policy, for example, show that its policy interest rate is adjusted in relation to interest rate decisions at the European Central Bank (ECB), as described in Taylor (2013).

Regarding central bank balance sheet operations, there has also been international contagion, and this is also likely due to exchange rate concerns. Here an important distinction must be made between the central banks in large open economies and central banks in small open economies. In large open economies, the effects of balance sheet operations on exchange rates have been harder to detect than for central banks in small open economies. However, as I show in this article, there is now empirical evidence provided in Taylor (2017) of statistically significant impacts on exchange rates of the balance sheet operations by the Federal Reserve, the Bank of Japan (BOJ), and the ECB. There are also exchange rate effects in the small open economies where explicit foreign exchange purchases are often financed by an expansion of reserve balances.

[1]See also Carstens (2015), Gray (2013), Hofmann and Bogdanova (2012).

A Framework and an International Policy Matrix

To investigate the international aspects of central bank interest rate and balance sheet policies, it is necessary to introduce a simple framework that captures key features of the recent economic policy environment. In the framework I use here, central banks have two separate policy instruments: the short-term interest rate and reserve balances. By paying interest (either positive or negative) on reserve balances, central banks can separately set the interest rate and reserve balances. This enables the central bank to intervene in other markets for a variety of reasons. In fact, in recent years, central banks in large open economies have purchased domestic securities denominated in their own currency through their quantitative easing (QE) programs. The stated aim has often been to raise the price and reduce the yield of these domestic securities, though there are sometimes references to exchange rates. In contrast, the central banks in smaller countries have purchased foreign securities denominated in foreign currency. The explicit aim of these foreign exchange purchases is to affect the exchange rate.

To operationalize this framework in Taylor (2017), I examined the balance sheets of three central banks in large open economies—the Fed, ECB, and BOJ—and a central bank in a relatively small open economy—the Swiss National Bank (SNB). Most of the purchases of assets by these banks are financed by increases in reserve balances. For the Fed, purchases of dollar-denominated bonds are financed by dollar reserve balances. For the Bank of Japan, purchases of yen-denominated securities are financed by yen-denominated reserve balances. For the ECB, purchases of euro-denominated securities are financed by euro-denominated reserve balances. For the SNB, purchases of euro- and dollar-denominated securities are financed by Swiss franc–denominated reserve balances. In addition, each of these central banks sets its short-term policy interest rate, which in the case of the Fed is the federal funds rate. The private sector holds securities and deposits funds (reserve balances) at the central bank. Prices and yields are determined by market forces. The exchange rates between the dollar, the yen, the euro, and the Swiss franc are determined in the markets just as is the price of other securities.

The framework thus includes eight different policy instruments for the four central banks: the balance sheet items (R for reserve balances) R_U, R_J, R_E, and R_S, and the short-term policy rates (I for

interest rate) I_U, I_J, I_E, and I_S, where the subscripts indicate the United States (U), Japan (J), Europe (E), and Switzerland (S). The actual data used in this article to compute international correlations and create time series charts were obtained directly from the central banks' databases.[2]

Table 1 is an international policy matrix that gives the cross correlations of the eight policy instruments in the four countries using monthly data for the dozen years from 2005 to 2017. Observe the strong positive correlation between the reserve balances in each country. This could indicate either a contagion of such policies or that they have been reacting to a common shock. Observe also the strong positive correlation between the interest rate instrument in each country, which is consistent with the recent literature on interest rate contagion. The most highly correlated of all the entries in the policy matrix in Table 1 is between the SNB policy rate and the ECB policy rate with a correlation coefficient of 0.93.

The international policy matrix also reveals a strong negative correlation between the two policy instruments *within* each central bank: when the interest rate is lower during this period, reserve balances are higher. This is likely due to the assumption at central banks that the impact of the two instruments is similar: a lower policy rate and an expanded balance sheet with higher reserve balances are assumed to increase aggregate demand, raise the inflation rate, and depreciate the currency.

Note also the negative correlation between reserve balances and the interest rates *across* countries. These are simple correlation coefficients, so the negative effect could be due to a negative correlation within each country coupled with a positive

[2]The specific data series are

R_U = total reserve balances maintained with Federal Reserve Banks (millions of dollars)

R_J = BOJ current account balances (100 millions of yen)

R_E = current accounts + deposit facility (millions of euros)

R_S = sight deposits of domestic banks + sight deposits of foreign banks and institutions + other sight liabilities (millions of Swiss francs)

I_U = effective federal funds rate

I_J = call rate, uncollateralized, overnight average

I_E = interest rate on deposit facility

I_S = Swiss Average Rate Overnight (SARON)

TABLE 1
International Monetary Policy Matrix

	R_U	R_J	R_E	R_S	I_U	I_J	I_E	I_S
R_U	1.00							
R_J	0.72	1.00						
R_E	0.49	0.64	1.00					
R_S	0.89	0.85	0.69	1.00				
I_U	−0.77	−0.36	−0.44	−0.58	1.00			
I_J	−0.53	−0.45	−0.37	−0.48	0.49	1.00		
I_E	−0.81	−0.57	−0.51	−0.71	0.76	0.87	1.00	
I_S	−0.81	−0.62	−0.57	−0.72	0.83	0.81	0.93	1.00

Note: Each entry in the matrix is the correlation coefficient between the policy instrument on the vertical axis and the policy instrument on the horizontal axis over the months from January 2005 through May 2017. The policy instruments for the central banks—United States (U), Japan (J), Europe (E), Switzerland (S)—are reserve balances R_U, R_J, R_E, R_S, and the policy interest rates I_U, I_J, I_E, I_S.

contagion effect of either the interest rate or reserve balances in each country.

The underlying reasons for the numerical correlations between reserve balances in the different countries can be better understood by studying the actual paths of reserve balances for the Fed, the BOJ, the ECB, and the SNB. During this period, the Fed was out in front with large-scale asset purchases of U.S. Treasuries and mortgage-backed securities in 2009 following the short-lived liquidity operations during the panic in 2008. These large-scale purchases, commonly called QE I, II, and III, were financed with the large increases in reserve balances. For the past few years, reserve balances have started to decline in the United States as securities purchases were reduced in size and then were ended. Currency demand has grown, also reducing the need for financing the stock of securities with reserve balances.

This expansion of reserve balances in the United States was followed by a similar move by the BOJ at the start of 2013. Soon thereafter the ECB started increasing reserve balances. Throughout the period the SNB was expanding reserves as it purchased euros and dollars to counter the appreciation of the Swiss

franc against these currencies. In other words, the positive correlations between reserve balances in the matrix are due to Japan's following the increase in reserve balances in the United States, the ECB's following Japan and the United States, and the SNB's responding to all three. In the end, the increase in global liquidity was much larger than if there had not been this contagion.[3]

The correlations between the interest rates in the matrix are similarly due to central banks' following each other as they make their policy decisions about their policy interest rate. This contagion has been documented with interest rate reaction functions in empirical work by Taylor (2009), Carstens (2015), and Gray (2013). With such functions, one can measure the reaction of central banks to other countries' interest rates by including the foreign central bank's interest rate in the reaction function. This is more difficult in the case where the balance sheet is the instrument.

Exchange Rate Effects

While the policy matrix shows a close association between the policies, there is a question about whether central banks were jointly trying to provide liquidity or whether the actions were part of a competitive devaluation process. As mentioned above and reported in Taylor (2017), I found statistically significant exchange rate effects in estimated regressions of exchange rates on reserve balances. To summarize, the regression equations showed that (1) an increase in reserve balances R_J by the Bank of Japan causes the yen to depreciate against the dollar and the euro, (2) an increase in reserve balances R_U by the Fed causes the dollar to depreciate against the yen and the euro, and (3) an increase in reserve balances R_E by the ECB causes the euro to depreciate against the yen and the dollar.

These results confirm the policy narrative presented in Taylor (2016b): Following the global financial crisis and the start of the U.S. recovery, the yen significantly appreciated against the dollar as the Fed extended its large-scale asset purchase program financed with increases in reserve balances. At first there was little or no response

[3]The paths of reserve balances described in this and the previous paragraph can be seen in the time series graphs in Figures 1, 2, and 3, where I examine the effects on the exchange rate.

from the BOJ, but the yen appreciation became a key issue in the 2012 Japanese election. When Shinzo Abe was elected, he appointed Haruhiko Kuroda under whom the BOJ implemented its own QE. A depreciation of the yen accompanied the change in monetary policy. The subsequent moves by the ECB toward QE were also due to concerns about an appreciating euro. At the Jackson Hole conference in August 2014, Mario Draghi spoke about these concerns and suggested QE, which soon followed. This shift in policy was followed by a weaker euro.

The timing of reserve balances and exchange rate movements is illustrated in Figures 1, 2, and 3. The top part of each figure shows the time series patterns of reserve balances for the three large central banks with scale on the right-hand vertical axis measured in units of the local currency—millions of dollars, hundreds of million yen, and millions of euros. The lowest line in the three figures shows the exchange rate between the dollar, the yen, and the euro using the scale on the left-hand vertical axis.

Figure 1 shows the dollar getting weaker against the yen following the increase in reserve balances in the United States, until the BOJ increased its own reserve balances and the dollar then strengthened against the yen. Figure 2 shows the yen getting weaker against the

FIGURE 1
Yen–Dollar Exchange Rate and Reserve Balances
(R_U, R_J, R_E), 2005–17

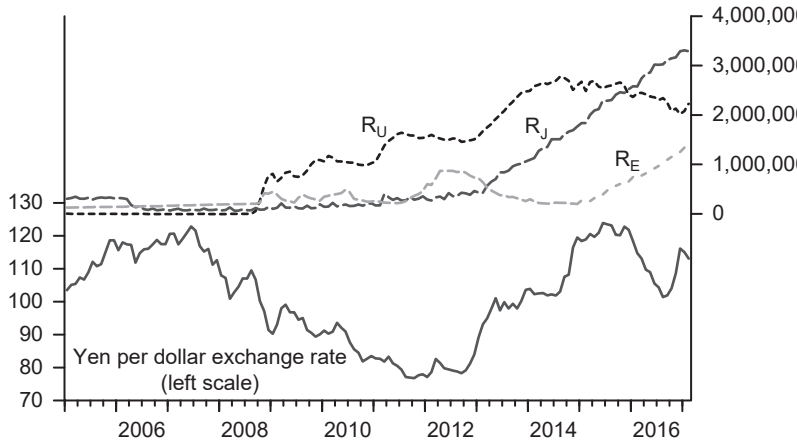


FIGURE 2
Dollar–Euro Exchange Rate and Reserve Balances
(R_U, R_J, R_E), 2005–17

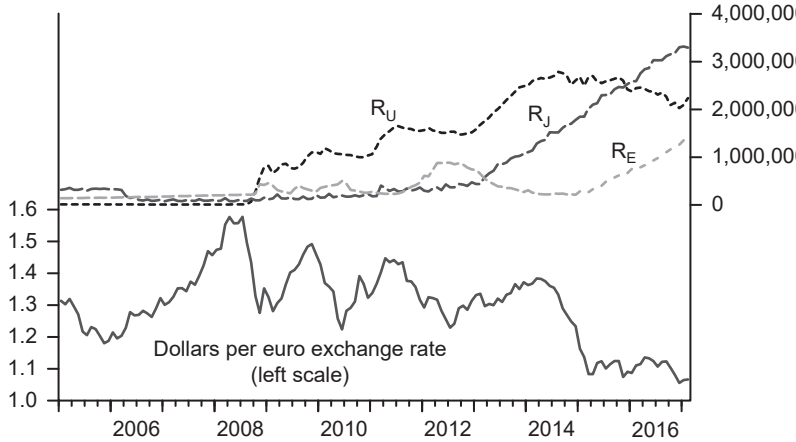
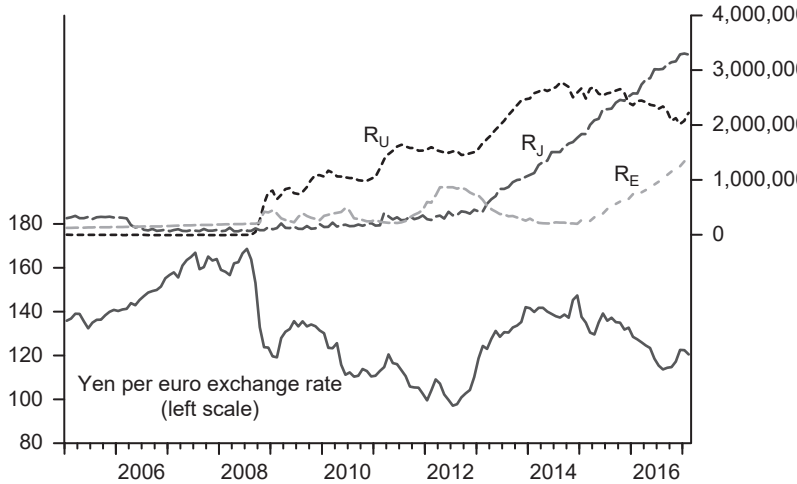


FIGURE 3
Yen–Euro Exchange Rate and Reserve Balances
(R_U, R_J, R_E), 2005–17



euro as reserve balances are increased in Japan and a reversal when reserve balances are increased by the ECB. Figure 3 shows the weakening of the euro against the dollar and the yen after the action by the ECB.

Note that the positive correlations between reserve balances over the whole period in the three central banks, which was reported in Table 1, is evident in these time series charts. The timing of reserve balance changes is also evident with the Fed going first, followed by the BOJ and the ECB.

Exchange rate effects of reserve balance changes can also occur for small open economies, but they are normally due to direct intervention on the currency markets. In the case of Switzerland, for example, reserve balances are used to finance direct interventions in foreign exchange markets. Vector autoregressions can then be used to examine the impacts. In fact, according to empirical results reported in Taylor (2017), there is significant two-way causality between the Swiss exchange rate and reserve balances. More specifically, the hypothesis that R_S does not Granger-cause the Swiss franc–euro exchange rate is rejected with an F-statistic of 4.74; the hypothesis that the Swiss franc–euro rate does not Granger-cause R_S is rejected with an F-statistic of 4.04. In other words, changes in the exchange rate Granger-cause an expansion of reserve balances, and the expansion of reserve balances Granger-causes a change in the exchange rate. In addition, I have found that a similar pattern of causality exists when the policy instrument is the interest rate rather than the balance sheet.

Policy Implications

For both policy instruments, the empirical results show that exchange rate considerations have helped cause deviations from rules-based policy in the international monetary system. To the extent that the deviations take policy away from the better performance observed in the 1980s and 1990s, they are a source of instability to the global economy. Moreover, there appears to be a "competitive devaluation" aspect to these actions as argued by Meltzer (2016). To the extent that the policies result in excess movements in exchange rates, they are another source of instability in the global economy as they affect the flow of goods and capital and interfere with their efficient allocation. They also are a source of political instability as they

raise concerns about currency manipulation. Moreover, as countries have used balance sheet operations to affect currency values, actual balance sheets have grown throughout the world, and this has raised concerns about the global impact of unwinding them.

A counterfactual exercise using the estimated regressions mentioned above shows that exchange rates would have been significantly less volatile without the balance sheet operations. For the yen/dollar equation, the standard error of the regression is 7.27 and the standard deviation of the dependent variable is 14.11, indicating that the movements in reserve balances have nearly doubled the volatility of the exchange rate. Using the yen/euro equation and euro/dollar equations in the same way shows that movements in reserve balances have increased the volatility of the yen–dollar exchange rate by 60 percent and the euro–dollar exchange rate by 40 percent.

There is other evidence that exchange rate volatility and capital flow volatility have increased in recent years. According to Rey (2013), Carstens (2015), Coeuré (2017), Taylor (2016b), and Ghosh, Ostry, and Qureshi (2017), exchange rate volatility and capital flow volatility have increased recently. Rey (2013) found that a global financial cycle, which was driven in part by monetary policy, affected credit flows in the international financial system. Carstens (2015) documented a marked increase in the volatility of capital flows to emerging markets in recent years. To be sure, there are other explanations for this increased volatility. Ghosh, Ostry, and Qureshi (2017) argue that the volatility has increased because of international externalities and market imperfections. Nevertheless, the evidence provided here and in other recent studies suggests that a deviation from rules-based monetary policy has been part of the problem.

The main policy implication is that the international economy would be more stable if policymakers could create a more rules-based international monetary system. The approach that I favor would be for each central bank to describe and commit to a monetary policy rule or strategy for setting the policy instruments. These rules-based commitments would reduce exchange rate volatility and uncertainty, and remove some of the reasons why central banks have followed each other in recent years. The strategy could include a specific inflation target, an estimate of the equilibrium interest rate, and a list of key variables to react to in certain specified ways. The process would not impinge on other countries' monetary strategies. It would

be a flexible exchange rate system between countries and between currency zones.

Each central bank would formulate and describe its strategy, so there would be no reduction in either national or international independence of central banks. The strategies could be changed or deviated from if the world changed or if there was an emergency, so a commonly understood procedure for describing the change and the reasons for it would be useful. It is possible that some central banks will include foreign interest rates in the list of variables they react to so long as it is transparently described. But when they see other central banks not doing so, they will likely do less of it, recognizing the amplification effects.

The process would be global, rather than for a small group of countries, though, as with the process that led to the Bretton Woods system in the 1940s, it could begin informally with a small group and then spread out. The international rules-based approach I suggest here is supported by research over many years, for example, in Taylor (1985). It is attractive because each country can choose its own independent strategy and simultaneously contribute to global stability.

The major central banks now have explicit inflation goals, and many use policy rules that can describe strategies for the policy instruments. Explicit statements about policy goals and strategies to achieve these goals are thus feasible. There is wide agreement that some form of international reform is needed. In any case, a clear commitment by the Federal Reserve to move in this rules-based direction would help. A prerequisite would be for the international monetary system to normalize. Getting back to balance sheets with reserve levels such that policy interest rates are determined by the supply and demand for reserves—rather than by paying interest on excess reserves—will facilitate a rules-based international system because the balance sheet decisions and interest rate decisions would be linked.

The biggest hurdle to achieving such a rules-based system is a disparity of views about the problem and the solution. Some are not convinced of the importance of rules-based monetary policy. Others may doubt that it would deal with the problems of volatile exchange rates and capital flows. Still others believe that the competitive depreciations of recent years are simply part of a necessary process of world monetary policy easing.

Such a disparity of views has existed for generations of economists and central bankers. Indeed, the current discussion of reforms in the international monetary system reminds one of the debate about exchange rates and capital flows that occurred in the 1940s and 1950s, which Eichengreen (2004) has written about. Nurkse (1944) argued that destabilizing speculation inherent in the market system was the cause of exchange rate and capital flow volatility; his solution was government controls on capital flows and fixed exchange rates. Friedman (1953) argued that monetary policy actions were the cause of the volatility; his solution was an open international monetary system with transparent monetary policy rules and flexible exchange rates. The experience over the years since that time—the improvements in economic models, the enormous volume of research on policy rules, and, especially, the poorer performance in the past dozen years as policy has deviated from a rules-based system—suggests that the answer is a more open, transparent, and rules-based international monetary system in the future.

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Milton Friedman and the Case for Flexible Exchange Rates and Monetary Rules

Harris Dellas and George S. Tavlas

> Managed currency without definite, stable, legislative rules is one of the most dangerous forms of "planning." A free enterprise economy can function only within a legal framework of rules; and no part of that framework is more important than the rules which define the monetary system. In the past those rules have been empty and inadequate; but there is no tolerable solution to be found in resort to the wisdom of "authorities." No liberal can contemplate with equanimity the prospect of an economy in which every investment and business venture is largely a speculation in the future actions of the Federal Reserve Board.
>
> Henry C. Simons (1935: 558)

The institutional arrangements that constitute the global monetary system have long occupied center stage of discussions in international economics. For many years, the discussions focused on the choice of exchange rate regime, especially the relative merits of

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fixed and floating exchange rates. Beginning in the 1980s, however, the focus of the discussions shifted from arrangements among countries to the appropriate framework for national monetary policies. With the widespread acceptance of monetary rules by the majority of the profession, the debate has shifted to the evaluation of alternate rules—most notably, the comparison between those that involve a fixed exchange rate regime and those that involve only domestic goals. Our objective is to contribute to this debate.

We pivot our discussion around the work of Milton Friedman, whose views on the viability of alternative exchange rate regimes and on national monetary rules in many ways presaged modern thinking on these issues. In common with much of modern thinking, Friedman favored a combination of flexible exchange rates and a domestic monetary rule. As we will demonstrate, two key factors underpinned Friedman's views. First, in common with John Taylor (2017), Friedman believed that this particular combination would deliver superior economic performance, helping to avoid the major policy mistakes of the past produced by fixed exchange rate regimes cum discretionary monetary policies. Second, Friedman also thought that the combination of flexible exchange rates and a domestic monetary rule was more consistent with democratic principles than a regime based on fixed exchange rates and discretionary monetary policy.[1]

The remainder of this article is structured as follows. First, we provide an overview of the three major international fixed exchange rate systems that existed in the 20th century: the classical gold standard (1880–1913), the interwar gold exchange standard (1924–1936), and the Bretton Woods System (1944–1973). We show that Friedman concluded that the classical gold standard, whatever its virtues—and Friedman thought that its virtues had been exaggerated by its adherents—would not be sustainable in the world of the mid-20th century and after. The circumstances that rendered the gold standard unsustainable, he believed, also applied to other fixed exchange rate arrangements. Next, we discuss

[1]Friedman (1953, 1960), of course, recognized that, in the absence of controls on capital flows, the stance of domestic monetary policy would be determined by the fixed exchange rate objective, especially for smaller countries. During the 1950s and 1960s, most countries maintained controls on capital movements, providing scope for nationally oriented monetary policies in the presence of fixed exchange rates.

Friedman's views on flexible exchange rates and the reasons underpinning his advocacy of a domestic monetary policy rule. We then consider the case for a Taylor rule.

Fixed Exchange Rate Regimes

The basic case for fixed exchange rates is that fixed rates eliminate exchange rate uncertainty, which is alleged to impede international trade and investment.[2] Monetary historians have argued that the exchange rate stability of the period of the classical gold standard helped create a global trade boom and increased investors' confidence in faraway places, giving rise to unprecedented levels of capital exports (Gallarotti 1995, Morys 2014).

Classical Gold Standard, 1880–1913

The classical gold standard was a rules-based monetary policy regime. The basic rule for each monetary authority was the commitment to convert its domestic (paper) currency into a fixed quantity of gold at a fixed nominal price. This rule required the subordination of domestic policy considerations to the external, fixed gold price, constraint.

Under the gold standard, if a country faced a balance-of-payments deficit—for example, capital account inflows that were not sufficient to finance a current account deficit—it needed an adjustment mechanism to reverse the resulting outflow of gold (O'Rourke and Taylor 2013: 172). The gold standard mechanism was essentially automatic. It included a reduction of the domestic money supply—because the money stock was tied directly to the quantity of domestic gold holdings—and the consequent reduction of prices of domestic goods and services relative to those of foreign goods and services. The resulting depreciation of the real exchange rate would help restore external balance.

Modern monetary historians, citing the durability of the system, have a benign view of the workings of the classical gold standard, at least for the countries at the system's core[3] (Eichengreen 1992,

[2]For a contrary argument, see Bailey, Tavlas, and Ulan (1987).

[3]The core countries were Belgium, France, Germany, the Netherlands, the United Kingdom, and the United States.

O'Rourke and Taylor 2013, Bordo and Schenk 2017). Friedman's view was more nuanced. He believed that if an automatic gold standard were feasible, "It would provide an excellent solution to the liberal's dilemma: a stable monetary framework without the danger of the irresponsible exercise of monetary powers" (Friedman 1962a: 40–41). Nevertheless, he noted that "even during the so-called great days of the gold standard in the nineteenth century, when the Bank of England was supposedly running the gold standard skilfully . . . it was a highly managed system" (p. 42). Underlying this circumstance was the fact that, historically, an automatic commodity system always tended to develop toward a mixed system, containing, in addition to the monetary commodity, fiduciary elements, such as bank notes and deposits, and government notes: "And once fiduciary elements have been introduced, it has proved difficult to avoid government control over them" (p. 41). For example, Friedman estimated that gold coins and gold certificates constituted only 10–20 percent of the money stock in the United States during the late 19th century (p. 42).

Friedman's assessment of the performance of the gold standard in the United States was as follows: "In retrospect, the system may seem to us to have worked reasonably well. To Americans of the time, it clearly did not" (p. 42). As an example, he pointed out that the "agitation" to monetize silver in the 1880s and 1890s, culminating in William Jennings Bryan's "Cross-of-Gold" speech during the 1896 presidential election "was one sign of dissatisfaction. In turn, the agitation was largely responsible for the [economically] depressed years of the early-1890s. . . . [The agitation] led to a flight from the dollar and a capital outflow that forced deflation at home" (pp. 42–43).

More importantly, Friedman did not believe that the gold standard, even if fully automatic, would be viable in the world of the mid-20th century and after. To the extent that the gold standard operated as intended, it did so because of special circumstances. First, the late 19th and early 20th centuries made up a world in which "the countries of the Western world placed much heavier emphasis on freedom from government interference at home . . . than on domestic stability; thus they were willing to allow domestic economic policy to be dominated by the requirements of fixed exchange rates" (Friedman 1953: 166–67). Second, wages and prices were relatively flexible during the gold standard period (pp. 172–73). As a result, the adjustment toward balance-of-payment equilibrium could

take place with relatively minor effects on domestic output and employment.

The world of the mid-20th century, Friedman observed, was very different from that of the gold standard period. The Great Depression of 1929 to 1933 encouraged the view that a capitalist economy is inherently unstable and that it is the government's responsibility to stabilize the economy.[4] As a result, the role of government in economic affairs expanded greatly, and the pursuit of full employment became the overriding goal of economic policy. The spread of unionization led to a more rigid wage and price structure, increasing the unemployment costs of deflationary policies. In these circumstances, Friedman believed that governments of democratic nations would no longer be willing to submit themselves to what he called "the harsh discipline of the gold standard" (Friedman 1953: 179).[5]

Interwar Gold Exchange Standard, 1924–36

The classical gold standard ended with the outbreak of World War I. In light of policymakers' high regard for the classical gold standard, after the war policymakers from the United Kingdom, France, the United States, and other countries sought to resurrect it, but failed to realize that its basic underpinnings were no longer present in the changed circumstances of the interwar period (Morys 2014: 730).[6]

[4]The view that a capitalist economy is inherently unstable is typically traced back to Keynes's (1936) *General Theory.* In fact, Keynes put forward that view earlier—in 1931 during his participation at a conference at the University of Chicago. In response to a question whether depressions are inevitable in a capitalist economy, Keynes replied: "I should agree that the capitalist society as we now run it is essentially unstable. The question in my mind is whether one could preserve the stability by the injection of a moderate degree of management; whether in practice it is beyond our power to do this, and that we will have to have some further plan of control" (Harris Foundation 1931: 93).

[5]Friedman (1962a: 40) was also critical of commodity standards because of the real resources required to add to the stock of money: "People must work hard to dig gold out of the ground in South Africa—in order to rebury it in Fort Knox or some similar place."

[6]Germany and Sweden returned to gold in 1924, and the United Kingdom returned to gold in 1925. With the departure of France, the last major country to cling to the gold standard, from gold in October 1936, the interwar gold standard came to an end.

Like its prewar predecessor, the interwar gold standard was based on a convertibility rule, but the rule was more susceptible to evasion. One key difference between the classical gold standard and the interwar gold standard was the change in domestic environments in which policymakers operated. As Friedman (1953) inferred, after the war the spread of unionization contributed to reduced wage and price flexibility, increasing the output costs of deflationary policies. The extension of voting rights and the growth of organized labor greatly loosened governments' commitment to subordinate domestic economic objectives to the fixed exchange rate rule. This circumstance can be clearly seen in the pivotal case of the United Kingdom, the "center country" in the prewar system. As Crafts (2014: 717) reported, the electorate in the 1910 election numbered 7.7 million; in the 1929 election, when the Labor Party won 47 percent of the seats in parliament, the electorate numbered 29 million; the extension of voting rights made political parties increasingly sensitive to domestic economic conditions.

Concerned that the existing global gold stock would produce deflation, policymakers actively encouraged the use of key currencies—the pound sterling, the U.S. dollar, and the French franc—as international reserves (Morys 2014: 731), loosening the link between gold flows and domestic monetary conditions. Friedman's assessment of the interwar gold standard was as follows:

> Already during the 1920s, the United States . . . refused to allow its [balance-of-payments] surplus, which took the form of gold imports, to raise domestic prices in the way the supposed rules of the gold standard demanded; instead, it "sterilized" gold imports. Especially after the Great Depression completed the elevation of full employment to the primary goal of economic policy, nations have been unwilling to allow deficits to exert any deflationary effect [Friedman 1953: 171].

In light of the above factors, considerable central bank coordination was required to maintain the system (Bordo and Schenk 2017: 221). Much of that cooperation centered on the personal relationships among Montagu Norman, governor of the Bank of England; Benjamin Strong, governor of the Federal Reserve Bank of New York; Hjalmar Schacht, president of the Reichsbank; and Emile

Moreau, governor of the Banque de France (Ahamed 2009, James 2016, Bordo and Schenk 2017). Bordo and Schenk (2017: 215) argued that the coordination of monetary policies "contributed to the interwar gold standard's problems by propping up a flawed system and possibly even helping to fuel the 1920s asset price boom." The cooperation ultimately failed, and the gold exchange standard collapsed. Some historians (Temin 1989, Eichengreen 1992) argued that the gold standard constraint caused the Great Depression because national monetary authorities were not allowed to follow lender-of-last-resort policies. Friedman and Schwartz (1963) pointed out that the gold standard's fixed exchange rate served as the key channel through which a decline in the U.S. money supply, a result of the Fed's tightening in 1928 and 1929—aimed at stemming the boom in stock prices—was transmitted to the rest of the world. Friedman's assessment of the cooperation among the central bankers was highly critical:

> The impression left with me . . . is that Norman and Schacht were contemptuous both of the masses—of "vulgar" democracy—and of the classes—of the, to them, equally vulgar plutocracy. They viewed themselves as exercising control in the interests of both groups but free from the pressures of either. In Norman's view, if the major central bankers of the world would only cooperate with one another—and he had in mind not only himself and Schacht but also Moreau and Benjamin Strong—they could jointly wield enough power to control the basic economic destinies of the Western world in accordance with rational ends and objectives rather than with the irrational processes of either parliamentary democracy or laissez-faire capitalism. Though of course stated in obviously benevolent terms of doing the "right thing" and avoiding distrust and uncertainty, the implicit doctrine is clearly thoroughly dictatorial and totalitarian [Friedman 1962b: 181–82].

Bretton Woods System, 1944–73

The Bretton Woods Agreement of 1944 reestablished a system of pegged exchange rates. The gold convertibility rule was preserved with the U.S. Treasury, which entered the Bretton Woods period holding three-fourths of the global monetary gold stock, pegging the

price of the dollar at $35 per ounce of gold by freely buying and selling gold to foreign official bodies at that price. Other countries intervened to keep their currencies within 1 percent of parity against the dollar by buying and selling dollars (Bordo 1993: 35). Convertibility of major European currencies on current-account transactions was not put in place until the end of 1958.[7] Under certain conditions, countries had access to International Monetary Fund (IMF) credit to cover temporary balance-of-payments deficits. A key objective of the system was to create a framework for cooperation and coordination underpinned by credible rules (Giovannini 1993).

Two key innovations were introduced to make the system durable. First, controls on short-term capital flows were permitted to provide domestic monetary policy sovereignty. Second, the system was an adjustable peg, meaning that occasional, discrete changes in exchange rates were permitted to help attain equilibrium in countries' balance of payments and to discourage destabilizing speculation in foreign exchange markets. Parities could be changed with IMF approval if a member faced a "fundamental disequilibrium" on its external accounts.[8]

During the heyday of Bretton Woods, Friedman accurately presaged both the frailty of the capital controls and the destabilizing properties of the fixed-but-adjustable regime. Regarding capital controls, he stated: "There are political and administrative limits to the extent to which it is possible to impose and enforce such controls. These limits are narrower in some countries than in others, but they are present in all. Given sufficient incentive to do so, ways will be found to evade or avoid the controls" (Friedman 1953: 169). And, with regard to the durability of the adjustable-peg system, he argued:

> This system practically insures the maximum of destabilizing speculation. Because the exchange rate is changed infrequently and only to meet substantial difficulties, a change tends to come well after the onset of difficulty, to be postponed as long as possible, and to be made only after

[7]The Japanese yen became convertible on current account in 1964.

[8]The term "fundamental equilibrium" was never defined. The IMF could not disapprove a change in parity, however, if the change was less than 10 percent (Bordo 1993: 35).

> substantial pressure on the exchange rate has accumulated. In consequence, there is seldom any doubt about the direction in which exchange rate will be changed [Friedman 1953: 164].

And so it turned out. The Bretton Woods years became increasingly characterized by the evasion of capital controls, and the credibility of the system was undermined by a series of speculative attacks against nondollar currencies, and repeated parity adjustments against the dollar throughout the 1950s and 1960s. By the late 1960s, the attacks had spread to the U.S. dollar, the center of the system, as the United States undertook inflationary policies to finance the Vietnam War and the Great Society program of the Johnson administration (Bordo and Schenk 2017: 224). Following a series of measures in the late 1960s and early 1970s that loosened the link between the dollar and gold, the effect of which was essentially to demonetize gold, and several ad hoc arrangements that aimed to sustain the system, most countries abandoned their dollar pegs in the early 1970s, beginning with the floating of sterling in June 1972, followed by the floating of the deutsche mark and yen in early 1973.

Flexible Exchange Rates and Domestic Rules

As a classical liberal, Friedman (1962a: 38–39) was fearful of concentrated power. He was suspicious of assigning any functions that could be performed through the market to government because doing so would substitute coercion for voluntary cooperation and because, by giving the government an increased role, it would threaten freedom in other areas. Power, he believed, needed to be dispersed. But the need of dispersal of power raised an especially difficult problem in the field of money. Since money can be a powerful force for controlling and shaping the economy, Friedman believed that the government needed to have some responsibility in monetary matters. Too much control over money, however, could be dangerous; Friedman (1962a: 39) quoted Lenin's famous dictum that the most effective way to destroy a society is to destroy its money.

In Friedman's view, one of the great attractions of a floating exchange rate system is that it decentralizes policymaking to the national level, allowing each country's policymakers to take

responsibility for managing their own economy. Floating exchange rates, he argued, would help insulate the domestic economy from external shocks and would provide national policy authorities the ability to satisfy domestic goals (Friedman 1953).[9] Consequently, national authorities could be held democratically accountable to their citizens (Friedman 1962a).[10] Flexible exchange rates, he believed, would be stable exchange rates provided that the underlying economic structure, including policy structure, was stable.

Two key arguments underpinned Friedman's belief that flexible exchange rates need to be accompanied by domestic monetary rules. First, a system based on discretion would be inconsistent with democratic principles: "Any system which gives so much power and so much discretion to a few men . . . is a bad system to believers in freedom just because it gives a few men such power without any effective check by the body politic . . . this is *the key political argument*" against discretionary monetary policy[11] (Friedman 1962a: 50, italics added).

Second, the power given to monetary authorities under a discretionary regime subjects policy actions to political pressures and to the accidents of personality and fads in economic thinking. Friedman (1962a) saw this as "the key technical argument" against such discretion. With regard to susceptibility of central banks to political pressures, Friedman (1967: 277) believed that even supposedly independent central banks would be subjected to such pressures: "Truly independent central banks are fair-weather institutions. When there is any serious conflict between the policies they favor and policies strongly favored by the central political authorities—generally reflected through Treasury policy—the political authorities have inevitably had their way, though at times only after some delay." For this reason, Friedman favored monetary rules

[9]Recently, Rey (2016) has argued that a floating exchange rate does not secure monetary policy autonomy for inflation-targeting countries. Nelson (2017b) provides a forceful critique of Rey's thesis.

[10]Friedman's argument that a floating exchange rate system allows national policymakers to be democratically accountable is almost always overlooked in the literature on exchange rate regimes. A major exception is Frankel (2016: 16).

[11]In the above quotation, Friedman referred to the case of an independent central bank, operating under discretion, that was not subject to legislative rules.

embedded in legislation so that central bankers could be held accountable for their actions.

With regard to personal attributes, Friedman's research during the 1950s, especially that with Anna Schwartz, culminating in their *A Monetary History of the United States* (1963) convinced him that such attributes, including ethnic prejudices, had contributed to the Great Depression in two ways.[12] First, Fed officials, aiming to stem speculation in the stock market, had inappropriately tightened monetary policy in 1928 and 1929, thereby initiating a decline in economic activity. Second, in late 1930, a private bank called the Bank of United States, with over 400,000 depositors—more than any other bank in the country—found itself in trouble as depositors rushed to convert their deposits into currency. It was a sound bank; its troubles stemmed from rumors that produced a run on it. Friedman and Schwartz believed that in a financial crisis the monetary authorities should follow a well-established rule: if a bank was sound, but was facing a run on deposits, the monetary authorities needed to lend freely to the bank in order to quench the panic. New York State banking officials, however, refused to provide liquidity to the financial institution, and in December 1930, the bank was forced to close. That single event dramatically changed the character of the downturn, converting a rather normal cyclical contraction into what has become known as the Great Depression.

Friedman and Schwartz (1963) asserted that there were two reasons for this turn of events. First, the Bank of United States was the largest U.S. commercial bank ever to have failed at that time. Second, although it was an ordinary commercial bank, its name had led many at home and abroad to regard it as an official bank. Hence, its failure undermined confidence more than the fall of a bank with a less distinctive name. They also hinted that anti-Semitism may have played a role in the failure to provide liquidity to the bank; its stakeholders and officers were mainly Jewish. Subsequently, Friedman (1974) confirmed that he believed that anti-Semitism among some New York state officials played a role in the closing of the bank.

[12]Nelson (2017a) and Lothian and Tavlas (2018) provide discussions of Friedman and Schwartz's research.

What Kind of Rule?

Friedman's research led him to favor a rule under which the M2 (currency plus demand and time deposits) measure of money supply would grow in the range of 3 to 5 percent annually. That research included empirical estimations showing that the demand for M2 was stable (Friedman 1959), a key requirement for effective monetary targeting. In proposing the rule, he noted: "I do not regard my particular proposal as a be-all and end-all of monetary management, as a rule which is somehow to be written in tablets of gold and enshrined for all future time. . . . I would hope that . . . we might be able to devise still better rules" (Friedman 1962a: 55).[13]

During the 1980s, a consensus emerged within the profession about the superiority of a domestic monetary rule.[14] Several contributions led to this consensus. First, Friedman (1968) and Phelps (1968) showed that, analytically, the steady-state unemployment rate is not related to the steady-state inflation rate when the long-run Phillips curve relationship is augmented with a variable representing the expected inflation rate. An implication of the natural-rate hypothesis is that the best that macroeconomic policy can hope to achieve is price stability in the medium term. Second, Kydland and Prescott (1977) showed that attempts to "reoptimize" (i.e., renege on previous commitments) by authorities under a discretionary regime are likely to lead to worse outcomes than those in which the authorities are constrained to follow through on previous commitments.

The experience of the past 40 years has confirmed the superiority of domestic rules-based regimes. The decade of the 1970s featured discretionary policies accompanied by high unemployment in association with rising inflation. The period from the mid-1980s until the early 2000s, under which monetary policy was well characterized by a Taylor rule, produced the Great Moderation of low unemployment and low inflation.

[13]Beginning in the 1970s, most empirical money demand functions exhibited instability in light of financial innovation and deregulation of the financial system. In the 1980s, Friedman changed his preferred aggregate from M2 to M1 (currency plus demand deposits). Toward the latter part of his life, he expressed admiration of the conduct of monetary policy during the period from the mid-1980s to the late1990s, a period during which the Fed's policy was well represented by the Taylor rule. On these issues, see Nelson (2008).

[14]Dorn (2018) provides a thorough analysis of the case for monetary rules.

The Taylor rule, under which the monetary authorities target the short-term policy rate so that it responds to divergences of actual inflation rates from target inflation rates, and to deviations of actual gross domestic product (GDP) from potential GDP, and Friedman's money-supply growth rule share several important attributes.

1. Both rules are simple and easy to understand. Therefore, they make monetary policy transparent and predictable.
2. Both rules prescribe a path for a policy instrument. For Friedman, the path of the money supply is set exogenously—it does not depend on economic conditions. For Taylor, the path of the policy interest rate is endogenous—it responds to inflation and the output gap.
3. In marked contrast to discretion, both the Friedman rule and the original version of the Taylor rule exclude reliance on perceptions and interpretations about future economic variables to shape the conduct of monetary policy. By excluding such perceptions and interpretations about future variables from policy formation, both rules further limit discretion.
4. By limiting the amount of discretion, both rules also contain the potential political influence that can be exerted on monetary authorities;[15] it is easier to influence policy formation if the monetary authorities exercise judgment than it is if they are bound by a rule.
5. Both rules limit the possibility that monetary policy may fall prey to the influence of fads in economic thinking.
6. Both rules draw a clear separation of monetary policy from fiscal policy, thus further insulating the monetary authorities from political pressures.
7. Both rules clearly place price stability at the heart of monetary policy. Friedman (1960: 91) specifically proposed his rule for the following reason: "a rate of increase [of the money supply] of 3 to 5 percent per year might be expected to correspond with a roughly stable price level." The Taylor rule explicitly targets a low and stable inflation rate.

[15]Friedman (1960: 85) argued that reliance on discretion leads to "continual exposure of the authorities to political and economic pressures." Taylor (2012: 1024) argued that "[rules] help policymakers avoid pressures from special interest groups and instead take actions consistent with long-run goals."

In addition, both Friedman and Taylor specified that their respective rules should be embodied in legislation in order to ensure accountability of the monetary authorities in line with democratic principles.

In today's world, the Taylor rule, which has been shown to be robust to widely different views about how monetary policy works (Taylor and Williams 2011), would help produce the goals that Friedman wanted to achieve while not having to confront the instability exhibited by monetary aggregates. As Taylor (2017) argued, an international setting, in which the major countries followed Taylor rules geared to their specific setting, would provide harmonization of policies and optimal economic conditions domestically.

While we see substantial merits in a Taylor-type rule, our view is tempered with the following cautionary observations. First, the Taylor rule has been formulated so that it operates in normal circumstances in which the natural rate of interest is positive. What happens when normal circumstances do not apply and the natural rate is close to zero (as it apparently was in recent years)? Correspondingly, how is harmonization measured when interest rates are near the zero bound? The point is that, when interest rates are near the zero bound, even if the authorities aim to follow a Taylor rule they will be unable to do so. And harmonization of policies will therefore not be measurable.[16] Second, in periods of crisis, such as during 2007–08, monetary authorities will be tempted to resort to unorthodox policies, deviating sharply from rules-based policies, as evidenced during and after that crisis. In the late 1980s and the 1990s, by contrast, the Taylor rule characterized the Fed's behavior well because there was no conflict between its domestic objectives and the outcome that would prevail through the rule. These episodes lead to the question: Under a rules-based policy, when the going gets tough will the authorities stick to the rule? Third, Taylor, as mentioned, suggests that each country specify its own, individualized, Taylor-type rule. What happens if some countries (e.g., China) include an exchange rate objective in their policy rule while others (e.g., the United States) do not? Will the differentiated rules be consistent with harmonization of policies? Or will they lead to accusations of currency manipulation?

[16]For example, how is harmonization measured when quantitative easing operations have increased central banks' balance sheets by vastly different percentages?

Conclusion

To conclude, the Taylor rule has proved to be both a practical and a preferable alternative to Friedman's constant money-growth rule. If embedded in legislation, and if it can address the above-mentioned issues, the Taylor rule would be a worthy successor to Friedman's search for a rule that simultaneous achieves full employment, price stability, and democratic accountability.

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The Case for a New International Monetary System

Judy Shelton

How often do we hear references to the notion that we live in a rules-based global trading system? Addressing the World Economic Forum at Davos in January 2017, British Prime Minister Theresa May praised liberalism, free trade, and globalization as "the forces that underpin the rules-based international system that is key to our global prosperity and security" (Martin 2017). Chinese President Xi Jinping likewise extolled the virtues of a rules-based economic order at Davos, winning widespread praise for defending free trade and globalization (Fidler, Chen, and Wei 2017).

But could someone please explain: What exactly are those rules? Because if we are going to invoke the sentimentality of Bretton Woods by suggesting that the world has remained true to its precepts, we are ignoring geopolitical reality. Moreover, we are denying the warped economic consequences of global trade conducted in the absence of orderly currency arrangements. We have not had a rules-based international monetary system since President Nixon ended the Bretton Woods agreement in August 1971. Today there are compelling reasons—political, economic, and strategic—for President Trump to initiate the establishment of a new international monetary system.

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An Inspiring Vision of Future Prosperity

To fully appreciate how far we have strayed from the high-minded objectives that motivated the 1944 multilateral currency accord forged at Bretton Woods, New Hampshire, it's useful to reflect on the fundamental principles that defined its purpose and to consider the historical context for its acceptance.

The United States had been attacked at Pearl Harbor scarcely a week before Treasury Secretary Henry Morgenthau asked his deputy, Harry Dexter White, to prepare a paper outlining the possibilities for coordinated monetary arrangements among the United States and its allies. The primary goal was to provide the means, the instrument, and the procedure to stabilize foreign exchange rates and strengthen the internal monetary systems of the Allied countries (Horsefield 1969a: 12).

Why was it deemed so important to ensure stable exchange rates at a time of war when the very survival of Allied nations was at stake? The answer: struggling nations required assurances that a more prosperous economic future was in store if they could summon the will to prevail over Axis powers. During the 1930s, countries had engaged in competitive devaluations to gain an export advantage over their trade partners. As the gold standard was serially abandoned, international trade succumbed to the vicissitudes of unpredictable changes in exchange rates and retaliatory tariffs. Global depression had followed.

But now the United States was suggesting that something new would be done in the sphere of international economic relations—something "powerful enough and comprehensive enough to give expectation of successfully filling a world need" (White 1942, in Horsefield 1969b: 46). By establishing new rules to ensure a level monetary playing field as the logical foundation for expanded free trade and the optimal use of financial capital, America would be providing those needed assurances that would "unify and encourage the anti-Axis forces, to greatly strengthen their will and effort to win" (ibid., pp. 38–39).

Did it work? Less than four weeks after Allied forces landed at Normandy on June 6, 1944, the Bretton Woods conference was convened. Representatives from 44 Allied nations hammered out rules for participating in an international monetary system based on fixed exchange rates anchored by a U.S. dollar convertible into gold. The Axis powers surrendered the following year.

Did adoption of a stable monetary platform deliver as promised? The Bretton Woods era would be characterized by remarkable economic growth rates, extraordinary productivity gains, and decreased inequality of wealth.

Losing the Dream

The period of exceptional world economic performance was ended in 1971. Some blame the closing of the gold window on American domestic budget exigencies. Others attribute the collapse of Bretton Woods to the "Triffin dilemma"—a failing inherent in its dependence on a single reserve currency country. In any case, the vision of providing a solid monetary foundation for global free trade was shattered by Nixon's decision to suspend gold convertibility of the dollar.

Paul Volcker, serving as undersecretary for monetary affairs at the Treasury department, felt anguished at the time. He was concerned that the initiative would be seen as a humiliating change in U.S. domestic policy and a derogation of duty in the international monetary arena (Volcker and Gyohten 1992: 78–79). Volcker had advised Nixon to make the move as a temporary decision to redress the flaws of Bretton Woods. Nixon himself had told the American people in his televised speech on August 15: "We will press for the necessary reforms to set up an urgently needed new international monetary system" (Nixon 1971).

But a novel theory was being promoted by members of the emerging group of monetarist economists associated with the Chicago School—led by Milton Friedman—arguing that floating exchange rates were preferable to the fixed-rate Bretton Woods system. Keynesians quickly seized the opportunity to pursue fiscal activism without the constraints imposed by balanced budgets and the discipline of gold convertibility.

The new approach that emerged in the vacuum left by the dissolution of Bretton Woods was to have *no* international monetary system—that is, no rules or coherent mechanism for maintaining exchange-rate stability among national currencies.

The free-for-all approach to determining exchange rates is sometimes promoted as a "free market" solution. However, if exchange rates are truly determined by market forces alone—not subject to government intervention or manipulation—why are governments

allowed to build up massive foreign currency reserves? Theoretically, the exchange rate between a nation's currency and other currencies should be determined at any given moment by the forces of demand and supply. Instead, governments not only accumulate reserves as a bulwark for thwarting market forces, but also use monetary policy to deliberately manipulate their currencies to gain an advantage over trade partners.

The currency disorder that reigns today is anathema to any notion of free and fair trade. Nations can blatantly target the exchange rate they desire—in pursuit of strategic objectives. Deliberate depreciation is used to boost exports; it's the customary definition of currency manipulation. However, financial capital flows may figure more importantly for some nations, in which case they may instead choose to manipulate their currencies upward to attract foreign investment. Deliberate appreciation also enables a nation to maximize the purchasing power of its currency for purposes of obtaining strategically important assets abroad.

Central banks play a major role in either case. They are the main players when it comes to currency manipulation, even when monetary officials claim that the exchange rate consequences of their policies are merely incidental to achieving domestic economic objectives.

The lack of any kind of rules-based monetary system to uphold the legitimacy of global free trade is provoking economic tensions among powerful nations. It is fueling the fundamental dissonance between monetary policy and the credit demands of the real economy.

In short, we have the worst of all worlds in the currency arena. It should not require the threat of war this time to spur an American initiative for international monetary reform.

The Imperative of U.S. Leadership

Just as the United States rose to the challenge of providing inspiration to desperate nations with a promise to establish stable and trustworthy monetary rules to undergird international commerce in compliance with free trade principles, the needed initiative falls once again to America. And just as then, the advantages of a sound money approach to ensure a level playing field that maximizes the rewards from true competition—by preventing currency manipulation through government intervention—will serve our own best interests.

It's a pivotal moment. The challenge these days is to inspire struggling nations to continue to believe in the advantages of democratic capitalism, to embrace free market ideas and support entrepreneurial endeavor. The United States is the only country that can meaningfully address the status quo disarray in monetary arrangements. According to Jacques de Larosiere (2014), former managing director of the International Monetary Fund, what we have today amounts to an "anti-system."

The current monetary regime permits governments to knowingly distort exchange rates under the guise of national monetary autonomy while paying lip service to avoiding trade protectionism. It empowers central banks to channel the benefits of monetary policy decisions to some people at the expense of others, pitting wealthy investors against average savers. It facilitates cheap government borrowing. The shift toward increasing government influence over economic outcomes is anathema to the free market doctrines propounded by Friedman.

If the United States does nothing to restore a rules-based approach to international monetary relations, our values come into question. We lose credibility by failing to challenge an international monetary anti-system that condones cheating by governments and central banks. We acquiesce to the fiction that enforceable rules exist to ensure against currency manipulation—even as we complain about trade imbalances contrived through exchange-rate targeting.

Dangerously, we pretend that today's speculative gaming in foreign exchange markets by the world's largest banks somehow validates the casino of floating rates—as if the $5.1 trillion daily turnover does not vastly exceed the amounts necessary to finance international trade and finance. The U.S. dollar is involved in 88 percent of the trades (BIS 2016: 3) in a currency market exhibiting "rising instances of volatility outbursts and flash events" (Murphy 2016).

Preemptive International Monetary Reform

America has long had the luxury of issuing the world's most dominant currency without having to guarantee its integrity. But with the dollar's popularity come financial risks: Widespread use of our nation's money for structuring complex derivatives, or for denominating debt to foreign borrowers, sets up America's economy for unanticipated repercussions. Financial fallout from regional defaults

triggered by a surge in the value of the dollar against other currencies would impact bank and nonbank institutions, and in turn constrain the availability of credit to domestic borrowers.

More concerning is the exposure to a broader global financial crisis brought on by liquidity pressures in the foreign exchange market due to the sheer volume of dollar-denominated currency swaps and related contracts. Staggering levels of such instruments—some $58 trillion, according to the Bank for International Settlements—are not recorded on balance sheets even though they function as debt-like obligations (Borio, McCauley, and McGuire 2017).

President Trump has demonstrated his resolve to meaningfully address the problems caused by currency disorder. Early in his campaign he called attention to the unfairness of currency manipulation by governments. He defined himself as a "free trader" while nevertheless insisting that trade had to be conducted on a level playing field. He denounced currency depreciation as cheating and vowed to punish offenders for "stealing" American manufacturing jobs (Holland and Lawder 2017).

Now he has an opportunity to restructure existing international monetary arrangements—to implement a rules-based approach—through decisive action.

The political imperative for President Trump derives from both his criticism of domestic monetary policy and his identification of currency manipulation as a violation of free trade principles. As a candidate, he acknowledged that the extraordinarily low interest rates of accommodative monetary policy were punitive for ordinary savers—they were "getting creamed"—even as developers such as himself had access to extremely low-cost funding from banks (Davidson and Taylor 2016). As an experienced businessman, Trump also expressed disapproval of the Federal Reserve for fueling "a big fat ugly bubble" in financial markets through low interest rates (Crutsinger 2017).

On the international front, besides identifying the distorting impact on trade and economic performance caused by currency manipulation, Trump has publicly expressed concern over whether government policies were supportive of the dollar as a trustworthy currency and reliable measure of value. In September 2011 he accepted gold bars in lieu of payment in dollars as a security deposit on commercial space in one of his properties, publicly stating: "Obama's not protecting the dollar at all." Trump has expressed positive views on the gold standard, noting during a 2015 televised

town hall that there was something "solid" about the United States when its currency was linked to gold—though he conceded that restoring it would be difficult (McElveen 2015).

Still, when asked by *GQ* magazine to give his spontaneous reaction to the notion of a gold standard, Trump responded: "Bringing back the gold standard would be very hard to do, but boy, would it be wonderful. We'd have a standard on which to base our money."[1]

Trump's views on monetary policy and his concern for the integrity of the dollar clearly resonated with American voters; accusations that he was "politicizing" the Fed by criticizing the negative aspects of low rates did not seem to hurt his political popularity, nor did the usual "goldbug" epithets. Economic forces had combined with social tensions in the aftermath of the 2008 financial crisis to incite people on both the right and the left over the perception that a "rigged" system had bailed out the perpetrators at their expense. From the Tea Party movement to Occupy Wall Street, long-simmering grievances over economic inequities came to a head in the 2016 election.

President Trump's economic imperative now is to initiate reform both at the Federal Reserve and in conjunction with the international community to redefine monetary relations. The extraordinary measures of accommodative interest rate policy enacted by the Fed over an extended period have exacerbated income inequality, an issue to which Federal Reserve Governor Lael Brainard recently alluded (Torry 2017). The task for the next Fed chairman to be nominated by Trump is to craft an interest rate glide path that will soothe markets while supporting a pro-growth economic agenda. At the same time, given that economic and financial outcomes are highly vulnerable to currency shifts, such finesse in formulating monetary policy must include direct consideration of the dollar's value relative to other currencies.

What's needed is a comprehensive approach for linking the money supply to increases in productive output—the restoration of sound money principles for economic growth. It's time to reassert the primary functions of money as (1) a medium of exchange, (2) a unit of account, and (3) a store of value. Workers hurt by the consequences

[1]See the GQ website at https://thescene.com/watch/gq/donald-trump-weighs-in-on-marijuana-hillary-clinton-and-man-buns?mbid=marketing_paid_cne_social_facebook_scene_gq_dp_28.

of the 2008 financial market meltdown need to be assured that they will not be punished by a future bubble; no more monetary favoritism. It is also imperative that global monetary turmoil not undermine what currently passes for economic recovery.

Ultimately, the compelling reason for the Trump administration to undertake the challenge of structuring a new international monetary system is that democratic capitalism is unlikely to survive another blow on the scale of what has been endured this past decade. And having been so critical of currency manipulation and its deleterious impact on trade flows, it is incumbent on President Trump to propose what would constitute a better approach to exchange rate relations. The United States cannot point an accusing finger without defining the ameliorating change in behavior—or better yet, the set of new rules—it would require trade partners to accept.

The role of the dollar as the world's dominant reserve currency is a matter of national strategic importance: it is the strongest tool in our soft power arsenal. Yet the dollar's vulnerability to uncontrollable developments in foreign exchange markets is a potential weakness; it could perversely become a deterrent to effective domestic monetary policy. It would be negligent to permit currency shifts to undermine the hard-sought growth benefits of tax and trade reform.

Thus it falls to the United States under President Trump to champion the noble cause of restoring order to international monetary relations—so that free trade does not fall victim to the demoralizing effects of having economic and financial outcomes altered through exchange rate machinations.

Playing to Our Strengths

Proposing a new approach in keeping with the Trump administration's emerging national security strategy doctrine, which emphasizes the primacy of national sovereignty, engages our strong suit of financial supremacy to good purpose in the international economic arena.

Timing is important to ensure that a future monetary system is not governed by a global body; such a development would be distinctly at odds with Trump administration objectives. The International Monetary Fund long ago abandoned its responsibility for maintaining a stable international exchange rate system anchored by a gold-convertible dollar. Yet today it flirts with the notion of serving as the main platform for regulating cryptocurrencies. Citing the

organization's "mandate for economic and financial stability" as rationale, IMF Managing Director Christine Lagarde (2017) proposed recently that the IMF take a strong role in overseeing the advent of virtual currencies and also move forward toward creating a digital version of the SDR.

Such a bold move to assert control over monetary policy at the global level would constitute a challenge to the continued reign of the U.S. dollar and undermine our own nation's sovereign power and influence in global financial markets. America needs to have a better idea—one that readily accommodates and creatively uses evolving advances in fintech capabilities.

If the appeal of cryptocurrencies is their capacity to provide a common currency, and to maintain a uniform value for every issued unit, we need only consult historical experience to ascertain that these same qualities were achieved through the classical international gold standard without sacrificing the sovereignty of individual nations. To the contrary: gold standard rules permit nations to participate voluntarily by operating in accordance with the discipline of gold convertibility of their own currencies.

A modern version of this approach—one that permits the issuance of virtual currencies in tandem with government-issued currencies, adapting legal tender laws to permit healthy currency competition—should be put forward.

Golden Opportunity

The United States is the world's largest holder of official gold reserves. Comprising 8,311.5 tonnes or 261 million troy ounces, those reserves are carried at a book value of roughly $11 billion. Notably, the market value is significantly higher at $345 billion (based on the London Gold Fixing for September 30, 2016) as cited in the Treasury's report filed June 30, 2017 (U.S. Department of the Treasury 2017).

In proposing a new international monetary system linked in some way to gold, America has an opportunity to secure continued prominence in global monetary affairs while also promoting genuine free trade based on a solid monetary foundation. Gold has historically provided a common denominator for measuring value; widely accepted at all income levels of society, it is universally acknowledged as a monetary surrogate with intrinsic value.

Speaking in February 2017, former Federal Reserve Chairman Alan Greenspan defined gold as the "primary global currency" and further added, "We would never have reached this position of extreme indebtedness were we on the gold standard, because the gold standard is a way of ensuring that fiscal policy never gets out of line" (Oyedele 2017). To confront U.S. indebtedness, we need to restore fiscal discipline and sound money through gold convertibility.

We make America great again by making America's money great again.

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Some Thoughts on International Monetary Policy Coordination

Charles I. Plosser

It is a pleasure to be back here at Cato and to be invited to speak once again at this annual conference. This is one of the premier ongoing monetary policy conferences, and the participants, both at the podium and in the audience, attest to its prominence.

This is a session on international monetary arrangements, and there has already been an interesting discussion. I find myself in substantial agreement with the comments of John Taylor, so I do not wish to repeat his points. What I will try to do is put the rules-based approach to international monetary policy coordination in a context that I hope will help us understand some of the past failures so we might avoid them in the future. In many ways, I will simply be reminding us of some principles we all have known for some time, yet which we seem to forget all too frequently.

A Little History of Efforts at International Central Bank Coordination

The dream of international coordination or cooperation among central banks is not new. Through much of the late 19th and early 20th centuries, we witnessed an international rules-based effort grounded in the classical gold standard. The idea was that each

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country was expected to maintain convertibility of its paper currency into gold at an agreed-upon nominal rate. The foundation of the system was grounded in the parities agreed upon by the countries involved. These parities amounted to the specification of a fixed exchange rate regime among the participating countries. Of course, like any fixed exchange rate regime, it meant that pressures arising from the external balance could put limits on domestic monetary policy and fiscal policy options. This reality ultimately proved to be the regime's undoing.

The arrangement mostly worked during the early 20th century. The outbreak of World War I, however, placed enormous strains on the finances of the warring countries. The European nations had to finance large deficits through a combination of external borrowing and inflation. In most cases, the countries suspended convertibility to prevent large gold outflows. Following the war there was a strong interest in Europe to restore the prewar parities. Unfortunately, external debt and high inflation made this virtually impossible. Despite years of effort, including meetings (public and private), and conferences among central bankers attempting to coordinate actions, misalignments persisted, requiring massive gold flows, particularly from Great Britain to France and the United States. This undermined the credibility of the regime, and it never fully regained the success or stability it once enjoyed. By 1933, the entire system had collapsed. The United States abandoned its peg to gold in April 1933 because of the constraints it placed on domestic monetary and fiscal policies seeking to address the Great Depression.

Later, following World War II, world leaders again sought to create a new framework for international financial coordination. The Bretton Woods system laid out rules to bring stability to exchange rates and international capital flows. The new system once again attempted to establish an essentially fixed exchange rate regime by requiring that each country commit to maintaining a targeted exchange rate within a narrow band. It also created the International Monetary Fund to help nations borrow to ease balance of payment problems in the short run. It took a long time, but the Bretton Woods system was finally fully implemented in 1958.

Despite the apparent different words and institutional arrangements, the Bretton Woods regime sought to control exchange rates in order to manage international capital flows and current account fluctuations much like the old gold standard era. Gold convertibility

continued to play a role but only internationally, not domestically. The flaw was that the new arrangements still demanded that domestic monetary and fiscal policies take a back seat to the exchange rate regime. One might have guessed that, like the international gold standard regime, Bretton Woods would fail for the same reason, that being that the fixed regime was incompatible with the incentives of sovereign nations to have their own independent monetary and fiscal policies—and, of course, it did. The pegged exchange rate regime faced pressures that resulted in large but infrequent adjustments in the rates. These adjustments encouraged speculative attacks on some currencies as the credibility and the commitment of participants to follow through with the necessary policy actions was undermined. As a result, credibility of the entire regime came into question. The system was abandoned after about 15 years, shortly after the United States abandoned convertibility.

The Importance of Credibility and Commitment

A major challenge for any rules-based regime is attaining and preserving the credibility and commitment of all parties to follow the rules. In establishing a rule, it is desirable to ensure that it is one that is incentive compatible. The international arrangements discussed above were not well designed in the sense that targeting a fixed exchange rate is fundamentally inconsistent with a nation's retaining full sovereignty with respect to domestic monetary and fiscal policy. It was this inconsistency that undermined credibility and doomed both the gold standard and the Bretton Woods system's attempts to coordinate international monetary policy. Put slightly differently, a challenge for rules-based systems is how to enforce a commitment to the rule. In these previous efforts there was no mechanism to enforce the rules, particularly when they ran strongly counter to the self-interest of an individual country. This suggests that we must think carefully about the scope of what we can expect to achieve from such coordination efforts. To be effective, the institutional arrangements and the incentives they create must be understood when considering any rule or set of agreements among central bankers.

At Cato's 31st Annual Monetary Conference, in November 2013, I spoke to some related issues in a paper entitled "A Limited Central Bank" (Plosser 2014). I stressed that there were ways to increase the chances of achieving commitment with the right institutional design,

and to some degree we see such efforts in practice. For example, many central banks around the world face constraints on what types of assets they can buy and hold. The Fed is generally limited to holding only assets that are guaranteed by the federal government, although there are many loopholes. For example, during the financial crisis the Fed exploited Section 13(3) of the Federal Reserve Act to purchase private sector securities (e.g., enabling the rescue of Bear Stearns and AIG). Such purchases constitute a form of off-budget fiscal policy and proved highly controversial. The consequence was that the Dodd-Frank legislation imposed additional limits on what the Fed could do under Section13(3). I have argued that the Fed should be limited to an all-Treasuries portfolio to restrain its discretion to conduct credit policy through asset purchases.

Another way of constraining options is to provide more narrow and clear objectives that are achievable and clearly measurable. Discretion and multiple objectives permit central banks to pursue varying goals at different times. Broad objectives often allow for great discretion to address one goal or another depending on economic conditions or political pressures. This can undermine the credibility and commitment to achieve specific tasks, such as employment, price stability, or exchange rate targets. By narrowing an institution's objective function, it is easier to demonstrate and maintain commitment and achieve credibility. It also improves the accountability of the institution. In the case of the Fed, I argued that a narrow mandate focused on price stability was desirable. It is a narrow and achievable objective that is directly observable making accountability more effective.

A Brief Refresher on Fixed vs. Flexible Exchange Rates

As I have noted, the historical efforts at international coordination have generally focused on achieving exchange rate "stability," often a code word for fixed exchange rates. The argument for fixed rates usually follows from the advantages of a common currency. A common currency promotes trade across regions of a nation as well as efficient competition and integration of markets, both product markets and the markets for factors of production such as labor and capital. The case for fixed exchange rates, by analogy, is that they promote the integration of markets internationally with similar benefits. Such arguments were made repeatedly in support of the creation of the euro.

Yet the analogy has serious limitations. A major defect is the analogy fails to consider the important role played by the mobility of both products and factors of production. In order to achieve the market efficiencies of a common currency, goods, services, labor, and capital must be free to move throughout the market area. In the international context such free movement is rarely the case. On the product side, tariffs and other constraints are often present. In the case of labor, barriers are even more serious, including immigration policies, language, culture, and other domestic laws and practices. National policies also inhibit capital movements much like labor. So one of the prerequisites for gaining the benefits of a common currency is often absent in the international setting.

The benefits of a common currency domestically are also made possible by the existence of a common fiscal framework. This means that there is a fiscal means of addressing regional imbalances through transfers (for better or worse). A currency union of sovereign countries rarely has such mechanisms. In an international context, the failure of the gold standard and Bretton Woods highlighted all these weaknesses. In each case, the arrangements failed to adequately address the issue of mobility of either products or factors of production. Moreover, these systems did not address the fundamental challenge that each nation continued to want to conduct independent monetary and fiscal policy.

Economists have been aware of these points for a long time. Many economists voiced skepticism regarding the prospects for the euro for many of these reasons. While the euro did create a common central bank, it failed to adequately address the free movement of labor and capital. It also failed to develop an adequate fiscal mechanism to address national shocks and imbalances. The current troubles in the eurozone were largely predictable and mirrored many of the failures of previous attempts to fix exchange rates.

Recent Efforts to Coordinate International Central Banks

The recent calls for international coordination among central banks are somewhat different from the past, yet somewhat the same. On the one hand, the calls from some sectors in the global economy are not, on their face, calls for fixed exchange rates. It seems likely that the weight of experience and empirical evidence is beginning to have an impact on international policymakers. The attention is mostly

focused on the volatility of capital flows that may be a consequence of surprise or unusual changes in monetary policy. The source of the frustration stems from two factors. The first is that the Fed is arguably the most important central bank in the world and its decisions can have important effects, "spillovers" they are often called, on the exchange rate and trade balances with other countries. The second factor is that the severity of these "spillovers" for individual countries is often a consequence of the country's own choice of policies and institutional arrangements.

Countries with large fiscal deficits, heavy external debt, and high inflation likely will have more trouble contending with spillovers and thus complain about a U.S. policy decision. They then press for greater consideration of their circumstances in U.S. monetary policy decisions. Countries maintaining sound fiscal policies, low inflation, and a commitment to flexible exchange rates are less affected.

While calls for coordination on interest rate decisions from some countries do not explicitly argue for fixed exchange rates, that seems mostly what they long for—they just don't say it. On the other hand, the major central banks were playing a somewhat different tune. The sequential adoption of quantitative easing (QE) by one major country after another was mostly cited as a domestic policy action, yet the undercurrent was about exchange rate effects. They didn't call it a currency war, or even competitive devaluations, because everyone understood such strategies are ineffective and undesirable. Nonetheless, it seems to have been the unspoken strategy that no one wanted to admit.

These different strategies highlight the underappreciated challenge to the case for international coordination among central banks. Our models usually don't deal with a world in which there are many different exchange rate regimes or many different fiscal regimes. How should the United States coordinate monetary policy in a world in which different countries experience differential impacts from a given monetary policy decision by the Fed? Which countries' outcomes matter, and which do not? For example, the Fed's response to an inflation shock in the United States can have different impacts on a country that ties its currency to the dollar and has a balanced current account than on a country that operates a floating exchange to a broad basket of foreign currencies but runs a persistent current account deficit and imposes capital controls. Which countries should be taken into account in the Fed's decision, and which should not?

Should U.S. monetary policy play favorites? How should it decide which countries' consequences demand consideration and which do not?

So, from my perspective, the concept of coordinated monetary policy is deeply problematic. Moreover, as I argued at the outset, any regime that attempts to target exchange rates among sovereign countries is most likely to fail if those countries desire an independent monetary policy.

Conclusion

I agree with John Taylor that the best results are likely to arise in more rule-like regimes with flexible exchange rates and capital mobility (Taylor 2018). With regard to monetary policy, the rule matters. Rules that require multiparty coordination to "stabilize" exchange rates are likely to fail and cause more problems than they solve. Rules that are incentive compatible with independent monetary and fiscal policy are more likely to be followed, and further reducing the discretionary options permitted monetary policymakers would enhance the commitment and credibility of the rule-like behavior.

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Demographics and Their Implications for the Economy and Policy

Loretta J. Mester

I thank the organizers for inviting me to speak at the Cato Institute's 35th Annual Monetary Conference. To some of us, 35 seems relatively young, but for a conference series it is a ripe old age. The series' longevity underscores the important contributions it has made over the years to the public discourse on monetary economics and policy. Whether you interpret 35 as young or old depends on the context, which brings me to my topic today: demographics and their implications for the economy and policy. This might seem like an unusual topic for a Cato conference, but demographics have been on my mind, and not just because I had a birthday last month.

The word "demographics" comes from the Ancient Greek: "demo" meaning people and "graphics" meaning measurement. There is a strong tradition of studying demography as part of economics. Malthus's writings on population growth are a part of many history-of-thought courses in economics. More recently, as the economy has moved from financial crisis and the Great Recession to sustainable expansion, attention has shifted from cyclical aspects of the economy to structural factors. In addition, as policy has

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begun to normalize, the question has been raised: What is normal? To answer such a question, we need to understand how the underlying fundamentals of the economy are evolving. A critical factor is demographics.

Demographic change can influence the underlying growth rate of the economy, structural productivity growth, living standards, savings rates, consumption, and investment; it can influence the long-run unemployment rate and equilibrium interest rate, housing market trends, and the demand for financial assets. Moreover, differences in demographic trends across countries can be expected to influence current account balances and exchange rates. So to understand the global economy, it helps to understand changing demographics and the challenges they pose for monetary and fiscal policymakers.

Today I will talk about some of these demographic trends and their policy implications. Of course, the views I'll present are my own and not necessarily those of the Federal Reserve System or of my colleagues on the Federal Open Market Committee (FOMC).

Demographic Trends

Until the early 18th century, world population grew little because high mortality rates offset high fertility rates.[1] But increased knowledge and technological change in the form of advances in medicine, public health, and nutrition began to lower mortality rates. Fertility rates also began to decline. In the United States there were shifting preferences for smaller families because of the rising opportunity costs of having children and the higher costs of raising and educating them. The shift in population from rural to urban areas reduced the need for large families to run farms. There were changes in social norms regarding the use and availability of birth control. The baby boom in the United States after World War II, and the subsequent echo when the baby boom generation began having their own children, were exceptions to a generally downward trend in the birth rate. Today, the U.S. fertility rate is 1.88 births per woman (United Nations 2017: 807). This is less than the United Nations' estimated 2.1 replacement rate needed to keep the population

[1]Two useful survey articles on the demographic change are Lee (2003) and Bloom and Canning (2004).

stable, and it is considerably less than the fertility rate in 1900, which was over 3.[2]

As these demographic changes have played out, the average life expectancy in the United States has risen and the population has aged. Average life expectancy at birth is now nearly 80 years old, 30 years higher than it was in 1900.[3] The median age of the U.S. population is approaching 38 years old, nearly 10 years older than in 1970.[4] The United Nations projects that by 2050, the median age in the United States will be 42 years old and that the number of people age 65 or older per 100 of working-age people, those age 15 to 64, will be more than double what it was in 1970.[5]

Reflecting projections of relatively stable fertility rates and continued aging of the population, world population growth is expected to slow.[6] It averaged around 2 percent per year in the latter half of the 1960s and slowed to 1.2 percent per year over 2010–15 (United Nations 2017: 3). U.S. population growth, including net international migration, is expected to slow from about 0.8 percent in recent years to under 0.5 percent in 2050, with nearly two-thirds of that growth coming from net migration.[7]

A number of advanced economies are further along in this demographic transition than the United States is, and the process of population aging is accelerating worldwide (Bloom and Canning 2004: 18). In Japan, the population has been shrinking over the

[2]For the replacement rate, see United Nations (2017: xxvii). However, Espenshade, Guzman, and Westoff (2003) point out that there is considerable variation in replacement rates across countries. Haines (1998: Table 7–2) reports that, in 1900, the fertility rate was 3.56 for whites and 5.61 for black and other populations.

[3]Life expectancy at birth in the United States over 2010–15 was 78.9 (United Nations 2017: 805). The life expectancy at birth in the United States in 1900 was 47.3 (National Research Council 2012: 32).

[4]According to the United Nations (2017: 807), the median age in the United States was 28.4 in 1970, 37.6 in 2015, and is estimated to be 38.3 in 2020.

[5]According to the United Nations (2017: 807), this old-age dependency ratio was 16.3 in 1970, 22.1 in 2015, and is expected to rise to 36.4 by 2050.

[6]The United Nations (2017: 807) projects that the U.S. fertility rate will vary between 1.88 and 1.92 between 2015 and 2100. The Congressional Budget Office projects that the U.S. fertility rate will be 1.9 children per woman over 2017–47 (CBO 2017a: 30).

[7]For population growth projections, including projections for natural increases and net international migration, see U.S. Census Bureau (2014). Also see population growth projections in United Nations (2017: 807) and CBO (2017a: 30).

past five years, the ratio of older people to working-age people is the highest in the world, and the median age is almost 47 years old (United Nations 2017: 415).[8] Across Europe, fertility rates have been below the replacement level for some time (United Nations 2017: xxvii). In China, the growth rate of the working-age population has slowed since the late 1980s, and, partly because of its previous one-child policy, China's population is also rapidly aging (United Nations 2017: 191; Peng 2011). The median age in China has increased from around 19 years in 1970 to 37 years in 2015.

On the other hand, many low- and middle-income countries are at a considerably earlier phase in the demographic transition, with young and faster-growing populations, and rising labor force participation rates. In India, the median age is around 27 years and the annualized growth rate of the population from 2010 to 2015 has been 1.2 percent (United Nations 2017: 383). The United Nations projects that, in seven years, the population of India will surpass that of China, currently the most populous country, and that India's population will continue to grow through 2050. Much of the increase in world population between now and 2050 is projected to be in Africa, where fertility rates remain high.

The implications of these global demographic patterns for the future of the U.S. economy are worth considering because they pose some challenges for policymakers. Indeed, the magnitude of the effects will depend on policy responses. The remainder of my talk will discuss some of the ways these changing demographics could influence the U.S. economy, in particular, labor markets and economic growth. Then I will turn to considerations for monetary, fiscal, and other government policies.

Demographic Implications for Labor Markets

Demographics influence the supply of labor. Typically, as mortality rates decline and people live longer, the supply of labor increases. We saw this pattern begin in the United States in the late 1960s and the 1970s, especially as women and the baby boomers began entering the workforce. The result was an increase in the available supply of prime-age workers, both females

[8]The United Nations defines this potential support ratio as the number of persons age 20 to 64 divided by the number age 65 or over (United Nations 2017: xxxiii).

and males, and potential growth rates in the 3 to 4 percent range (CBO 2017b).

Even though increased life expectancy means individuals will need to work longer in order to save more for retirement, usually population aging eventually leads to a downward trend in labor force participation in the aggregate.[9] This is already happening in the United States. Labor force participation peaked at 67.3 percent in early 2000 and fell to 66.0 percent in December 2007, as the Great Recession was beginning. Since then, it has fallen further, to 62.7 percent as of October. While some of the decline represents cyclical factors, research suggests that most of the fall in the overall participation rate can be attributed to demographics: the combination of an aging population and reduced participation rates at older ages (see Aaronson et al. 2006, 2014).

As a result of lower population growth and labor force participation, the growth of the U.S. labor force has slowed considerably, from 2.5 percent per year, on average, in the 1970s, to around 0.5 percent per year over 2010–2016. It is expected to remain near that level over the next decade.[10]

The changing age distribution of workers can affect not only labor force growth and participation but also the longer-run natural rate of unemployment. Older workers typically have lower unemployment rates than other age groups, and they tend to change jobs less frequently (see Bean 2004, Cairó and Cajner 2014).[11] Young people now make up a smaller share of the labor force. All else equal, the combination of lower quit rates for older workers and lower numbers of

[9]Note that, so far, we have not seen much shift in the retirement age in the United States. In fact, since the 1970s, the average retirement age has been little changed even as life expectancies have continued to rise. This means people are spending more time in retirement and a smaller share of their lives working, which will put pressure on pension plans and savings. According to OECD estimates, the average retirement age for men in the United States was 65.9 between 1980 and 1985 and 66.8 between 2011 and 2016. Life expectancy at age 65 has increased from 14.8 years in 1970 to 19.4 years in 2015 (United Nations 2017: 807). Data from the Social Security Administration (2016) indicate that the average age of claims for retired workers has been little changed since 1970.

[10]According to the latest available projections, the U.S. Bureau of Labor Statistics estimates that annual growth in the labor force over 2016–2026 will average 0.6 percent (U.S. Bureau of Labor Statistics 2017: 2.).

[11]Tasci (2012) documents that the job separation rate was rising through the early 1980s and then declining thereafter, likely due to demographic changes.

younger workers should imply a lower natural rate of unemployment compared to the 1990s.[12] Of course, the timing and magnitude of this demographic effect are not certain because there are some counterbalancing factors, including the fact that, so far, contrary to expectations, the retirement age for older workers hasn't changed much, the productivity of a worker varies with age, and policies such as unemployment and retirement benefits can affect labor market choices.

Demographic Implications for Economic Growth

The expected slowdown in population growth and labor force participation rates will have implications for long-run economic growth and the composition of growth. The key determinants of the economy's longer-run growth rate are labor force growth and structural productivity growth—how effectively the economy combines its labor and capital inputs to create output. Demographics suggest that labor force growth will be considerably slower than it has been in recent decades, and this will weigh on long-run economic growth.

In addition, in theory, the aging of the population may also have a negative effect on structural productivity growth. Over the past five years, labor productivity, measured by output per hour worked in the nonfarm business sector, has grown at an annual rate of only about a half of a percent; over the entire expansion, it has averaged 1 percent. While some part of the slowdown is likely cyclical, reflecting persistent effects of the Great Recession on investment spending, structural factors are also weighing on productivity growth. Older workers tend to stay longer in their jobs than younger workers, who are more likely to change jobs and employers. This allows older workers to gain deeper experience, which can be positive for productivity growth. At the same time, lower labor mobility means workers may remain in jobs that are not the best match to their skill sets. This would be a negative for productivity growth. Indeed, one study finds that both short tenures and long tenures adversely affect productivity growth

[12]Estimates of the natural rate of unemployment vary depending on what one assumes about the labor force participation rate. The FOMC participants' projections of the longer-run unemployment rate range from 4.4 to 5.0 percent (see FOMC 2017). Aaronson et al. (2015) estimate that changes in the age and gender composition of the labor force will mean that the natural rate of unemployment will be two-tenths of a percentage point lower by 2020, with a similar-size decline attributed to higher educational attainment.

(see Auer, Berg, and Coulibaly 2005). And historical evidence suggests a hump-shaped relationship between age and productivity, with productivity increasing when a person enters the workforce, stabilizing, and then declining toward the end of a person's work life (see Skirbekk 2008, National Research Council 2012: chap. 6). Research also indicates that an individual's innovative activity and scientific output peak between the ages of 30 and 40, although that age profile has been shifting older over time.[13]

Labor mobility and business dynamism, including the number of start-ups in key innovative sectors like high tech, have been declining for some time (see Haltiwanger 2015). Whether dynamism will remain low is an open question, but the aging of the population is here to stay. So far, the magnitude of the negative effect of the aging workforce on productivity growth appears to be quite small.[14] Even so, the demographics-induced slower growth of the labor force and the possible dampening effect on productivity growth suggest that longer-run output growth will likely remain below the 3 to 3.5 percent rate seen over the 1980s and 1990s, unless there is some effective countervailing policy response.[15]

In addition to affecting the economy's trend growth rate, demographics will likely affect the composition of growth by shaping aggregate consumption, saving, and investment decisions. Increased longevity means that people will need to save more over their

[13]One study showed that the median age of Nobel Prize winners in physics, chemistry, and medicine has increased about two years per century and the mean age has risen by eight years (National Research Council 2012: chap. 6).

[14]For example, the National Research Council's (2012: chap. 6) review of the literature showed that a changing age distribution had little effect on the distribution of earnings, a proxy for productivity. Its estimation of the effect for OECD countries indicates that productivity increases and then decreases with age, with a maximum reached at about 40 years. Using projections of the age distribution and its preferred quadratic specification, it estimates that changes in the age distribution will subtract only about 0.1 percentage point per year from aggregate productivity growth over the next 20 years (National Research Council 2012: 119, Table 6–2). Note that Feyrer (2007) finds that differences in demographics could explain as much as a quarter of the gap in productivity between OECD countries and low-income countries. However, the National Research Council suggests that sampling error may explain the large magnitude of that finding.

[15]The Congressional Budget Office currently estimates that potential GDP growth averaged 3.4 percent per year over 1982–90 and 3.3 percent per year over 1991–2001; it projects that potential growth will average 1.8 percent per year over 2017–27 (see CBO 2017b).

working life to fund a longer retirement period. This is especially true given the degree of underfunding of public pension plans at the state and federal levels. Demand for health care will continue to rise, and an aging population will place different demands on the housing sector than a younger population, affecting the demand for single versus multifamily properties, for owning versus renting, and for residential improvements that allow older adults to age in place.[16] By affecting the composition of output, changes in the age distribution have the potential to affect the business cycle. Because of its cyclical and structural implications, demographic change also has implications for monetary policy. Let me talk about three.

Demographic Implications for Monetary Policy

First, although monetary policy cannot affect the growth rate of potential output or the long-run natural rate of unemployment, it needs to take these into account as part of the economic environment, and to consider the downward pressure demographics put on both relative to their historical levels.

Second, changes in demographics could also affect the transmission mechanism of monetary policy to the economy, in particular, the strength of wealth effects versus income effects. Older people tend to hold more assets than the young and tend to be creditors while drawing down their assets to fund their consumption during retirement. Younger people tend to be borrowers but face tighter credit constraints than the old because they hold fewer assets. As the share of the population shifts from young to old, the propagation of an interest rate change through the economy is likely to change. There will be a smaller share of young borrowers able to take advantage of a decrease in interest rates but a larger share of older people who benefit from higher asset prices; similar reasoning applies for an increase in interest rates. Demographic change may mean that wealth effects become a more important channel through which monetary policy affects the economy (Bean 2004, Imam 2013).

A third important implication of demographic change for monetary policy is through its effect on the equilibrium long-term interest rate. FOMC participants have been lowering their estimates of the fed funds rate that will be consistent with maximum employment

[16]See Joint Center for Housing Studies of Harvard University (2014).

and price stability over the longer run. The median estimate has decreased from 4 percent in March 2014 to 2.8 percent today. And empirical estimates of the equilibrium real fed funds rate, so-called *r*-star, while highly uncertain, are lower than in the past.[17]

Demographic change may be a factor in this decline to the extent that it results in a lower long-run growth rate of consumption and, therefore, of output, which is a key determinant of the longer-run equilibrium interest rate. The magnitude of any effect is difficult to determine because complicated dynamics are at work. Static analysis might suggest that as longevity increases, people will want to accumulate more assets to fund their retirements and this would put upward pressure on asset prices and, therefore, downward pressure on returns. Moreover, because people prefer to reduce their exposure to risk as they age, we might expect to see a shift toward assets with fixed returns, putting upward pressure on risk premia and downward pressure on risk-free rates.[18] However, older people also tend to save less because, once people reach retirement age, they need to draw down their savings and perhaps sell assets to fund their retirement. This countervailing effect from dissaving, as well as public spending on retiree benefits, would tend to put upward pressure on interest rates.[19] Thus, the magnitude and even the sign of the effect of demographic change on interest rates are empirical questions.

So far, there is little evidence that demographic trends are driving large-scale shifts into fixed-income investments that would depress returns; indeed, the evidence suggests that people are undersaving for retirement (see National Research Council 2012: chap. 7). Historically, there appears to be only a weak correlation between age structure in the United States and asset returns.[20]

[17]For FOMC projections, see FOMC (2014) and FOMC (2017). For a review of the literature on the equilibrium interest rate, see Hamilton et al. (2015).

[18]Bernanke (2005) discusses how a global savings glut could push down longer-term interest rates.

[19]The simulation results in Fehr, Jokisch, and Kotlikoff (2008) show an increase in interest rates along the baseline path of demographic change projected for the United States, the European Union, and Japan. Goodhart and Pradhan (2017) argue that demographic change will lead to increases in the equilibrium interest rate.

[20]Poterba (2004) finds only a weak correlation between the age structure in the United States over the past 70 years and asset returns on stocks, bonds, and Treasury bills.

Ultimately, how demographics affect economic outcomes will also depend on how governments respond, so, in the remainder of my time, let me discuss the implications of demographic change for fiscal and other government policies.

Demographic Implications for Fiscal and Other Government Policies

The rising share of older people will put significant pressure on Social Security and Medicare in the United States, which are structured as pay-as-you-go programs, with current workers providing support for current retirees. Other developed countries' government pension and health care funds will also be stressed. Projected longer-run fiscal imbalances are unlikely to be sustainable, and it seems likely that governments will need to respond with some combination of increased borrowing, reduced benefits, increased taxes, program restructuring, and policies intended to stem the growth rate of health care costs.[21] Longer-run fiscal sustainability will depend on what combination is used, and how effective the actions are.

According to Congressional Budget Office projections, under current policy, the federal deficit as a share of GDP will more than triple over the next 30 years, from 2.9 percent in 2017 to 9.8 percent in 2047 (CBO 2017a). During this time period, outlays for Social Security and Medicare are projected to rise from 8 percent to 12.4 percent of GDP. As a result, the federal debt-to-GDP ratio rises dramatically, from 77 percent in 2017 to 150 percent in 2047. This increase dwarfs the run-up in debt to fund World War II. The extent to which such an increase, per se, will crowd out productive investments and lower economic growth is debatable.[22] But the sovereign debt crisis in Europe over 2009–12 shows that high debt levels can pose severe problems if investors lose faith in the ability of governments to service their debts, generating spikes in what had previously been viewed as risk-free rates.

[21]Auerbach (2016) points out that rising health care costs, and not aging alone, explain some of the difference in projected fiscal gaps across countries.

[22]For discussions, see Cecchetti, Mohanty, and Zampolli (2011); Auerbach and Gorodnichenko (2017); and Reinhart and Rogoff (2010).

If financing the funding shortfall through increased government borrowing is undesirable, raising taxes and reducing benefits or other expenditures are not very appealing either. Depending on how such policies are implemented, they could ultimately hurt the economy's longer-run growth prospects, leaving the fiscal outlook even worse. Moreover, in a world where countercyclical fiscal policy is constrained, business cycle volatility could rise, and monetary policy could find itself near the zero lower bound more often, potentially requiring the use of nontraditional policy tools such as asset purchases and forward guidance in order to meet monetary policymakers' economic objectives (see Kiley and Roberts 2017).

More effective policies to overcome the effects of the aging population on fiscal imbalances would focus on reducing the rising costs of health care, not just on health insurance. In addition, policies that increase the growth and productivity of the workforce would address not only fiscal imbalances but also the downward pressure on longer-run growth from demographics or other sources. Policies that increase immigration, not reduce it, that support continuing education, that encourage research and development and innovation, and that provide incentives so people work longer should receive attention.

Conclusion

In conclusion, demographic change will result in a slower-growing and older population. This transition will likely put downward pressure on the growth rate of potential output, the natural rate of unemployment, and the long-term equilibrium interest rate. The magnitude of these effects and the timing are uncertain because they depend on complicated dynamics and the behavior of consumers and businesses. Demographic change may also affect the business cycle and the monetary policy transmission mechanism. Monetary policymakers will need to continually evaluate these structural and cyclical effects in determining appropriate policy. Demographic trends present challenges for fiscal policymakers as well. Rising fiscal imbalances are projected to lead to higher government debt-to-GDP levels, potentially putting upward pressure on interest rates, and crowding out productive investment. But steps can be taken to offset some of the negative consequences of

demographic change for the economy. These include policies that focus on increasing productivity and labor force growth and that address growing fiscal imbalances.

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Normalizing Monetary Policy

Martin Feldstein

The current focus of Federal Reserve policy is on "normalization" of monetary policy—that is, on increasing short-term interest rates and shrinking the size of the Fed's balance sheet. Short-term interest rates are exceptionally low, and the Fed's balance sheet has exploded from $800 billion in 2008 to $4.4 trillion now.

At the September 2017 meeting of the Federal Open Market Committee (FOMC), the Fed indicated its long-term goal for the federal funds rate and its near-term goal for shrinking the size of its balance sheet. In my judgment, the Fed's plan is too little, too late. I also believe the Fed's underlying goal is to increase inflation above its 2 percent target and that such a policy is wrong.

I think the Fed should have begun raising interest rates and reducing its balance sheet back in 2013 or 2014. I think the current goal of raising the federal funds rate from 1.4 percent now to 2.1 percent at the end of 2018 (when it would be a 0.1 percent real rate using the Fed's median inflation forecast) is just too slow and will continue to encourage a dangerous bidding up of asset prices.

In this article, I will begin by discussing the Fed's shift to the easy money policy. I will then turn to the adverse side effects of the quantitative easing (QE) policy, particularly the increases in asset prices that create a risk of financial instability. The next section considers the reasons that the FOMC members have continued to pursue the policy of excessively easy money. There is a brief concluding section.

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The Shift to Quantitative Easing

As we all know, Ben Bernanke introduced quantitative easing as a way to stimulate economic activity at a time when the unemployment rate was very high and the recovery was very slow. Conventional monetary policy had failed to stimulate the economy even after the federal funds interest rate was cut to zero in 2008. The fiscal stimulus legislation enacted in 2009 also failed to raise real GDP growth because it was so badly designed.

Bernanke explained that a Fed policy of buying long-term bonds and promising to keep the federal funds rate low for a long time would cause a significant decline in long-term interest rates. That would raise the price of equities and of homes. The resulting increase in household wealth would then lead to increased consumer spending and therefore to faster GDP growth.

Bernanke explained that this would be reinforced by what he called the "asset substitution effect" in which the reduced availability of bonds in which to invest would cause households to shift their portfolios to equities.

Not everyone was convinced by Bernanke's analysis. Why would investors buy equities that were made artificially high since they would know that those share prices would eventually decline? And how important could the asset substitution effect be when the household sector's holding of Treasury bonds was less than 10 percent of its investment in equities?

Moreover, the federal government deficits were pouring substantially more bonds into the market than the Fed was buying. The Fed's balance sheet grew by less than $2.5 trillion between the beginning of the large-scale asset purchase (LSAP) program and the end of 2011 while the government debt had grown nearly twice that amount.

The skeptics were initially correct. The value of equities owned by the household sector increased by less than 20 percent between 2009 and 2011. The unemployment rate continued to increase until October 2009 when it reached 10 percent and declined very little during the next two years to 8.8 percent in October 2011. Real GDP rose only 6 percent in the three years from the first quarter of 2009 to the first quarter of 2012.

But the volume of bond purchases then increased to $800 billion a year in 2013 and 2014 while the fiscal deficit fell to less than

$700 billion in 2013 and less than $500 billion in 2014. At last the Fed was buying more long-term assets than the Treasury was creating.

The shift in the Fed's net purchases and the strengthened commitment to keep short rates low caused equity prices to accelerate in 2012 and 2013. The value of equities owned by households rose 47 percent between 2011 and 2013. Overall household net worth increased nearly $10 trillion in 2013 alone.

Although Bernanke could feel vindicated by this increased value of net worth and the resulting 5.5 percent rise in real GDP between the beginning of 2013 and the beginning of 2015, he warned that the QE strategy could have adverse effects as well as the desired rise in aggregate demand. He identified those adverse effects of the extremely low interest rates as (1) excessive risk taking as investors and lenders reached for yield and (2) an unwanted acceleration of inflation.

The Adverse Effects of Quantitative Easing

The most obvious indicator of excessive risk taking is the rapid rise in share prices. The price–earnings ratio of the S&P 500 index rose from an average of 18.9 in the three years before the downturn to 25.6 now, an increase of 35 percent. The current price–earnings ratio is 63 percent higher than its historic average and higher than all but three years in the 20th century.

Robert Shiller's cyclically adjusted price–earnings ratio, which is based on average inflation-adjusted earnings from the previous 10 years, is now 31.5 and therefore 87 percent above it historic average and at a level exceeded in the past 100 years only during the period from 1998 through 2001.

While higher share prices no doubt make investors happy and contribute to aggregate consumer spending, there is obviously now an increased risk that share prices will decline. If the price–earnings ratio declines to the historic average, the implied fall of 39 percent would reduce the value of household equities held directly and through mutual funds by $9.5 trillion.[1] If every dollar of decline in

[1]The Flow of Funds data for the second quarter of 2017 put household sector ownership of equities at $24.9 trillion. The equity value of noncorporate businesses is estimated in the Flow of Funds data to be an additional $11.8 trillion.

wealth reduces spending by 4 cents, that would cut spending by $475 billion or more than 2 percent of GDP.

Bond prices are also out of line. With the consumer price index rising at about 2 percent and expected to continue at that pace, the yield on 10-year Treasury bonds would be expected to be about 4 percent or even a bit higher. In fact, it is now only about 2.25 percent. If the yield on a 10-year bond rises from 2.25 percent to 4 percent, the price of the bond would fall substantially. The lower price of bonds and other fixed income securities held by banks and insurance companies as well as by households could have a substantial destabilizing effect.

Commercial real estate prices have also risen in response to the lower cost of capital. Since these assets are often held in a significantly leveraged way, a decline in the asset prices would have a disproportionately large impact on the net value of the assets.

Banks and other lenders have also been responding to the very low level of interest rates by making riskier loans in order to get higher rates of return. Some of this reaching for yield involves lending to lower-quality borrowers. It also takes the form of lending with weaker conditions on the loans (i.e., covenant light loans). For both reasons, any weakness in the economy could be magnified by loan defaults that weaken the capital of the lending institutions.

Loans to consumers have also become more risky. The economic downturn that began in 2007 was increased by the widespread defaults on residential mortgages that happened as falling house prices caused loan-to-value ratios to rise well above 100 percent. After the downturn there was a general agreement that the loan-to-value ratio on new mortgages should be limited to 80 percent or less and that lenders should be required to keep a portion of the loans that they originate. Both of these conditions have been dropped in recent years as lenders seek ways to increase the yield on their portfolios.

In summary, the excessively easy monetary policy of the past decade has increased the fragility of the financial sector and therefore of the economy. Although the Fed has used its regulatory powers to strengthen the banks, it has not sought the power to limit the loan-to-value ratio on residential mortgages as other central banks have done.

More generally, Janet Yellen made it clear in a 2014 speech at the International Monetary Fund that the Federal Reserve does not believe that it should take into account the impact of its monetary

policy on financial stability. She emphasized that the Fed has only two goals for monetary policy—price stability and maximum employment—and that macroprudential policies should be the responsibility of other agencies (Yellen 2014). Unfortunately it is not clear what those agencies are.

The excessively low interest rates that resulted from the Fed's monetary policy also increase the risk that the inflation rate will rise rapidly at some point in the future. Although the inflation rate has remained surprisingly low until now, the current unemployment rate of 4.1 percent is much lower than the Fed's own estimate of the sustainable level of unemployment. The September 2017 projections by the members of the Federal Reserve's Open Market Committee point to a range for the unemployment rate in the long run of between 4.4 percent and 5.0 percent with a median projected value of 4.6 percent. If inflation starts to rise rapidly at some point in the future, the Fed will be forced to increase the fed funds rate more rapidly, potentially causing a downturn of asset prices and economic activity.

Why Does the Fed Continue with Excessively Easy Monetary Policy?

The Federal Reserve justifies its continued low interest policies by noting that the core personal consumption expenditure measure of inflation is still below its target of 2 percent and that the excessively high asset prices are not a responsibility of the Fed even if they contribute to financial instability.

The Fed goes further and argues that the "equilibrium real interest rate" that is consistent with stable inflation and employment has been declining over the past years. According to the "Economic Projections" released after the September 2017 FOMC meeting, the "appropriate" projected long-run federal funds rate has declined to 2.8 percent even though the projected inflation is 2.0 percent, implying an equilibrium real rate of just 0.8 percent (Federal Reserve 2017).

My judgment is that the reasons given for a decline in the equilibrium real rate are too weak to support changing the Fed's target interest rate. I suspect that the claim of a declining equilibrium real rate is a reflection of the analysts' preferences rather than of hard evidence.

The primary reason given for a decline of the equilibrium real interest rate is the assertion of a rise in the saving rate, lowering the interest rate at which savings can be absorbed at full employment. It is hard to see evidence to support a rising saving rate. Between 1960 and 1980 the personal saving rate varied above 10 percent of disposable income, reaching a peak of 15 percent in the second quarter of 1975. After that it has been drifting lower and is now at 3.1 percent.

During the same years, the federal budget has moved from near balance to very large deficits that absorb household saving and reduce the national saving rate.

China's current account surplus adds to the funds available for investors worldwide. The current account surplus rose dramatically from 2000 to 2008, supporting Bernanke's comments about a savings glut. But in the decade since then, China's current account surplus has fallen sharply, from $420 billion in 2008 to $196 billion in 2016, back to its level in 2006. So the decline of China's surplus means that China has not been a source of downward pressure on global interest rates.

The other major source of current account surpluses has come from the oil-producing countries. But the price of oil has fallen from over $100 a barrel between 2011 and 2014 to about $60 a barrel now. Even a very low cost producer like Saudi Arabia has gone from significant current account surpluses before 2015 to current account deficits in recent years.

Putting all these pieces together implies that there is no increase in savings either in the United States or in the international economy to cause a fall in the equilibrium rate of interest.

A simpler explanation for the low global level of interest rates is that all of the major central banks have been keeping rates low by a combination of asset purchases and open market operations. This includes not only the Fed but also the European Central Bank and the Bank of Japan.

There are several reasons why the Federal Reserve has moved so slowly to raise interest rates. Different FOMC members no doubt have different reasons for their reluctance to raise rates, but the following three reasons probably capture all of the different opinions.

First, a more rapid increase in the federal funds rate could increase the risk of a sharp decline in asset prices. An asset price correction could of course happen even without a rise in the interest rate

caused by the central bank, but the Fed would be severely criticized if it is seen as raising rates less cautiously.

Second, continuing the low interest rate environment helps to increase employment. Although the current 4.1 percent unemployment rate is very low, those who want easy money to stimulate employment point to the decline in the labor force participation rate and the large number of workers who are involuntarily working less than full time as indicating that a stronger expansion supported by low interest rates could increase employment further.

There are also those FOMC members who would welcome a rise of the inflation rate, not just to the 2 percent target level but to an even higher level. Some members would justify this goal by noting that the 2 percent target is not a ceiling but the midpoint of a desirable range. Since the actual inflation has been below 2 percent for an extended period, they would justify an inflation rate that is temporarily above 2 percent as a way of demonstrating that the 2 percent target is to be interpreted as the midpoint of an acceptable range.

Some FOMC members want a higher inflation rate for a different reason. They worry that the Fed lacks the ability to cut interest rates significantly when the next downturn occurs. A higher rate of inflation would allow the Fed to raise the nominal federal funds rate by a substantial amount without raising the real federal funds rate. That would put the Fed in a position to cut rates if necessary to deal with the next downturn.

My reaction to this clever argument is that little ability to deal with the next recession would be gained by an increase in the inflation rate to 3 percent and that the public's confidence in the Fed's attachment to a 2 percent inflation goal would be substantially weakened if the Fed allowed the inflation rate to rise to three percent and to remain at that level. If the Fed allowed the inflation rate to rise to 5 percent and then increased the federal funds rate to 6 percent, it would have acquired the ability to deal with the next downturn. But a 5 percent inflation rate would greatly undermine the Fed's credibility.

Conclusion

The Fed could reduce the risk of a financial correction by raising interest rates more quickly than it currently projects, reaching a federal funds rate of 4 percent by the end of 2019 or 2020 and aiming

for a real federal funds rate of 2 percent. This could be achieved by increasing the pace of shrinking its balance sheet and by the way that it manages the overnight reverse repo policy.

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Priorities on the Path to Normalization

Kevin Warsh

I was honored to serve as a governor of the Federal Reserve System during the financial crisis. The times were tough, but the institution was strong—sustained by a Fed staff that was tired and tireless, hopeful and humble, brilliant without bravado. The internal battles among its leaders were consumed by big policy questions. We were sometimes divided in our assessments. And our proffered prescriptions.

We offered differing judgments in real time and in real candor. We had contrasting views on the origins of the turmoil, the wherewithal of the government-sponsored entities, the solvency of our banking system, the appropriate burden-sharing among actors in our government, the efficacy and limitations of quantitative easing (QE), the reliability of the Fed's dominant economic models, and the uncertainty around estimates for output and prices.

Our best days included our darkest hours. But complacency was set aside, owing to the exigencies of the circumstances. The search was for truth (as best we could measure it), not victory. And the quality and depth of debate were as large as the perils we faced.

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Present Challenges

Today, the challenges to our central bank may be less urgent. But its task is no less large. So we should resist allowing the policy debate to be small or push aside ideas that depart from the prevailing consensus. The Fed's job is not easier today, and its conclusions are not obvious.

In recent, fiercely fought public debates, inflation hawks and doves are cast into ideological corners spoiling for a fight. The political class, especially in this season, emboldens factions to caricature the opposition and reduce policy prescriptions into simplistic, sloppy slogans. Those in the community of central banks should be wary of this affront. We should not respond in kind, but rather in the spirit of that which sets these institutions apart.

A robust debate between rules and discretion has marked the monetary policy literature for generations. It should not turn into an expedient means of back-solving for a preferred policy outcome.

In recent years, some commentators and academics seek to follow fixed monetary policy rules. The dominant view, however, purports to criticize adherence to preset policy rules. Most favor reliance on policymakers' discretion. I find it a bit puzzling, then, how to reconcile the widespread preference for policymaker discretion with the eagerness to follow a single, precise, unyielding inflation target as a key policy determinant.

The Knowledge Problem and Fed Policy

Our understanding of the macroeconomy, and the effects of extraordinary monetary policy, is decidedly imperfect. Modesty about what we know—and humility about what we do—have long shaped my views. I do not favor conducting monetary policy by fidelity to a fixed policy rule. Nor do I find a single, overly precise inflation measure to be the defining measure of price stability.

So, allow me to pose a question: Should the Fed's overriding policy objective be to lift the measure of the core personal consumption expenditure (PCE) inflation index, as calculated by the Bureau of Economic Analysis of the U.S. Department of Commerce, from 1.3 to 2.0 percent?

Inflation targeting frameworks represent an important advance in the consideration and conduct of monetary policy. If it were costless

to move to a 2.0 percent target, and we were confident that the target was a well-measured and durable inflation indicator, then its achievement could be useful, not least because it would demonstrate the Fed delivering on its oft-repeated promise. But that should not preclude current practice from robust review.[1]

An inflation target of 2.0 percent is tantamount to price stability. But price stability does not always and everywhere require hitting a central bank–sanctioned, inflation target of 2.0 percent. There may be a sound argument for maintaining significant Fed accommodation, but the measured inflation shortfall is insufficient.

If, today, policymakers judge with perfect clarity and certainty the economy's post-2010 performance to be strong, cross-border trade and capital flows sustainable, financial assets prices in durable equilibrium, the future unwind of QE uneventful, the Fed well equipped to respond to the next shock, the financial regulatory system fixed, the too-big-to-fail problem solved, the macroprudential policy tool kit poised for prime time, and financial stability achieved, then I would suggest the Fed's fine-tuning around its inflation target is unobjectionable.

We would then have the luxury of debating the distance between current inflation readings and a professed, perfected inflation target. Absent that, I'd commend a more discerning discussion about Fed policy. And suggest that caricatured, confused commentary about hawks and doves be forgone.

We know far less than we purport about the price formation process; still less about the economy's resilience to economic and financial shocks; and less still about the current constellation of loose monetary policy, stagnant wages, and elevated financial asset prices. We should not allow an imperfect inflation measure to prevent consideration of other critical issues of inquiry. So, might the eagerness to lift core PCE to 2.0 percent be misplaced?

Reasons Why a Precise Inflation Target Is Misplaced

First, inflation is increasingly difficult to measure given mix changes in the economy, changing global trade flows, positive

[1]Chairman Bernanke (2017) recently proposed an alternative to existing practice.

supply shocks, and stale national accounts that make assigning price and quality changes difficult. Research by Marty Feldstein (2017) has ably demonstrated the imprecision of output and inflation estimates.

Second, measured inflation is taken by most as the dominant signal by which output is judged to approach its potential. When potential and actual output converge, it is presumed that the observed interest rate equals the natural rate, and the inflation gap is closed. Policymakers may take comfort in exploiting the theoretical relationship. But any tradeoff between prices and employment and ouput is, at best, temporary; yet the prevailing policy prescription appears permanent.

To mark the 50th anniversary of Milton Friedman's presidential address to the American Economic Association, Mankiw and Reis seek to reconcile the more recent contributions of monetarists and Keynesians. They remind us that "[a]s a scatterplot, [the Phillips curve] has shifted so often that no one takes it to be anything other than a transitory, reduced-form empirical relation" (Mankiw and Reis 2018: 92). More reliable, definitive models for predicting inflation, ouput, and interest rates are taking shape, and are worthy of considerable central bank attention. Until new models supplant those in practice, it's not obvious whether the Fed's new, permanently lower policy rate forecast is correct, coincident, or a contrivance with the Wicksellian natural rate.

Third, the natural rate needed to stabilize inflation and output is highly dependent on the conduct of both monetary and nonmonetary policy, here and abroad. If the current measured low inflation is a global phenomenon, is it the result of global supply or global demand shock? If it's a function of a positive supply shock with new impetus for labor and capital, is it temporary or permanent? If QE and forward guidance are powerful new tools for monetary policy, how "natural" is the rate being observed? And if domestic regulatory and tax policy changes are important determinants of potential output for the year or two ahead, might the natural rate reverse its recent fall with improved policies?

Fourth, the heated inflation rhetoric notwithstanding, the Fed sets the fed funds rates, not interest rates. If the Fed, belatedly, follows through on its promise to unwind QE—and that direction is matched by other large central banks—the Fed's influence on the medium and longer end of the treasury curve will be more limited in

the next couple years. Policymakers have been price-making instead of price-taking for so long that they might be surprised by their own diminishing influence on prices.

Fifth, the inflation gap tells us little about financial stability. A separation principle works in theory—the Fed's interest policies are designed to satisfy the Fed's modal monetary mandate; micro- and macroprudential policy are said to suffice to deal with other risks. I am not at all persuaded that the separation principle works in practice.

Low growth, low rates, low inflation, and low market volatility have proven to be the ideal backdrop for large holders of wealth, explaining well the Fed's popularity among those on Wall Street. But we have little experience with the current policy mix. It may induce behavior that masks market signals, misallocates capital, and creates imbalances that ultimately undermine financial and price stability. If significant tail risks materialize, it is not obvious that markets will be ready, the central bank will be prepared, or the broader economy will be resilient.

The Role of the Fed in the Government

Central bankers themselves are more recognizable public figures than ever, which makes their profiles unrecognizable to their predecessors. The Fed rightfully played an outsized role in the crisis. The trend continues. The Fed is involved more directly in fiscal policy, credit allocation, and management of banking and finance than we would have expected or countenanced years ago.

If the Fed's imprint in the government, economy, and financial sector remains large and permanent, then it strikes me as imprudent to solve for a broader remit by subjecting policy to a single, precise, unyielding, inflation target.

Efforts to expand the Fed's powers and responsibilities in peace time have largely proven popular in the central bank community. Monetary and fiscal policies interact. So some believe that the central bank's modern Wilsonianism is necessary in light of the void left by warring legislators and government dysfunction. But we should be discomfited if important questions about the proper role of the Fed in our government and a balanced assessment of its objectives are reduced and caricatured into a fabled fight between hawks and doves—and somehow resolved by the achievement of a precise inflation target.

Conclusion

My hope is to reorient the discussion from a narrow target to the more difficult, important priorities on the Fed's path to normalization. With new leadership coming to the Fed, there is new opportunity to think more broadly about the challenges ahead. And I am hopeful that the Fed will do so.

Final judgments are likely to be quite different from the dominant narratives currently on offer. Remember that our understanding of the Great Depression did not crystalize until Milton Friedman and Anna Schwartz and Ben Bernanke, among others, wrote their definite accounts many decades later.

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The Optimum Quantity of Money and the Zero Lower Bound

J. Huston McCulloch

Since 2008, the monetary base has more than quadrupled through the Federal Reserve's quantitative easing (QE) programs, and yet inflation has shown no signs of accelerating. In fact, inflation has not even met the Fed's announced 2 percent target, despite an essentially zero fed funds rate from 2009 to 2015. This is quite puzzling, both in terms of the traditional quantity theory of money and in terms of the Taylor rule approach to monetary policy.

Before 2008, the Fed could accelerate or decelerate inflation by expanding or contracting the monetary base and therefore bank reserves with open market operations and repo loans to dealers. Since 2008, however, the Fed has paid interest on excess reserves (IOER) equal to or even higher than the effective federal funds rate. As a result, the banks are awash with excess reserves that have zero opportunity cost, and the Fed has lost its primary mode of control over the price level and inflation.

In order to restore the Fed's control over inflation, it is necessary that IOER be abolished. In doing so, however, it is also necessary to undo the post-2008 explosion of the base in order to prevent massive inflation.

Fed economists have recently invoked Milton Friedman's 1969 essay, "The Optimum Quantity of Money" as providing justification

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for the Fed's IOER policy. However, I shall show that strict application of this rule would leave the price level indeterminate in a fiat money world, and hence that it cannot be taken seriously as a monetary policy.

The zero lower bound (ZLB) issue has been used to justify many of the extraordinary measures the Fed has taken since 2008 as well as its interpretation of price stability as 2 percent inflation. This article shows that problem can be solved by temporarily targeting interest rates on loans with maturities longer than the six weeks implicit in the Fed's current operating procedures, even with a 0 percent inflation target.

The Pre-2008 Regime

Prior to October of 2008, bank reserve deposits paid zero interest.[1] Banks normally held only a tiny inventory of excess reserves to meet withdrawals and adverse clearings, typically well under 0.5 percent of checkable deposits. The federal funds market efficiently allowed banks with surplus reserves and no immediate borrowing partner to lend them to banks that were short on reserves or were able to expand loans. The fed funds rate that banks charge one another for one-day use of reserves was typically well below the *average* rate banks got on somewhat risky customer loans that required close supervision, but represented the risk-adjusted opportunity cost to banks of *marginal* excess reserves.

Under this regime, if the Fed expanded the base and therefore excess reserves, banks would scramble to lend out any excess reserves beyond this small inventory to business or consumers who wanted the loans to make purchases they could not otherwise make, thereby driving up prices and at the same time temporarily driving down the fed funds rate.

Similarly, it could decelerate inflation by contracting the base, leaving banks with either precariously small excess reserves or an outright reserve shortfall. As banks contracted loans and thereby

[1]The following two sections draw heavily on McCulloch (2017a). See also Selgin (2017).

deposits to restore their reserves, businesses and consumers would spend less. At the same time, banks would temporarily bid the fed funds rate up.

Interest on Excess Reserves since 2008

Since October of 2008, the Fed has paid IOER at or slightly above the fed funds rate. During the same period, the Fed has more than quadrupled the monetary base though its QE I–III acquisitions of mortgage-backed securities (MBS) and Treasury securities. These acquisitions were financed mostly through the creation of new excess reserve balances. Thanks to IOER, however, banks have been in no rush to lend these funds out, and instead are content to just sit on them. The Fed in effect is now acting as a huge financial intermediary, borrowing reserve deposits from the banks at interest and lending them back to homeowners as mortgages or by transforming the maturity of the national debt.

This intermediation activity on the part of the Fed is not without adverse consequences, but has not in itself been inflationary, since IOER ensures that it is being financed with deposits that are savings instruments at the margin, rather than money per se. Thanks to IOER, the Fed is therefore essentially "rudderless" and unable to exert either inflationary or deflationary pressure on the economy.

When banks are awash with interest-bearing excess reserves, as they have been since 2008, there is little if any need for a federal funds market, since banks can earn interest simply by depositing surplus reserves with the Fed, and can obtain funds simply by withdrawing these deposits. To the extent there is a federal funds market, the fed funds rate should be essentially equal to the IOER rate. Indeed, the federal funds market has shrunk from over $300 billion in 2007 to barely $50 or $60 billion in recent years.

From late 2008 through November 2015, the IOER rate was only 0.25 percent and the fed funds rate itself was a little under 0.2 percent, neither of which is much different from zero—recall that the Federal Open Market Committee (FOMC) typically moves its fed funds target in multiples of 0.25 percent, which is therefore its estimate of the smallest perceptible increment to the rate. However, the Fed's IOER policy in fact made a difference for banks' willingness to hold reserves, since they could be confident

that when market rates rose, IOER would rise with them, so that there *never* would be an opportunity cost to holding excess reserves. Since late 2015, the IOER and fed funds rate have indeed risen together, to 1.25 percent and 1.16 percent, respectively, by October of 2017.

The Fed's Reckless Maturity Gambles

The Fed's large-scale asset purchases represent financial intermediation rather than central banking—since they are being financed mostly by interest-bearing liabilities of the Fed that provide few if any monetary services at the margin.

Since the national debt is unlikely to be paid off any time soon, the Treasury prudently finances a large portion of it with long-term bonds, so as to lock in current long-term rates and protect taxpayers from even higher future interest rates. Moreover, because the Fed turns the bulk of its profits (or losses) over to the Treasury, its nonmonetary liabilities are essentially liabilities of the Treasury. The Fed's purchases of long-term Treasury bonds with interest-bearing zero-maturity excess reserves therefore have essentially second guessed the Treasury's prudent decision to borrow long with its own gamble to finance this substantial portion of the national debt with short-term borrowing instead. This is a decision that properly is the Treasury's, not the Fed's, and in any event the Fed is making the wrong decision.

Furthermore, by financing long-term mortgages with interest-bearing excess reserves, the Fed has taken the same reckless gamble that savings and loan associations (S&Ls) did in the 1960s and 1970s, and that led to the demise of most of the industry, not to mention the Federal Savings and Loan Insurance Corporation, during the 1980s. Long-term mortgages are a sound way to finance durable housing but should be financed by private intermediaries that issue long-term debt of comparable maturity. For all their faults, Fannie Mae and Freddie Mac have at least generally financed their mortgage portfolios with bonds of comparable maturity rather than with zero maturity savings accounts as did the now largely defunct S&Ls, and as now is being done by the Fed. In McCulloch (1981), I show that maturity transformation by financial intermediaries, or "misintermediation" as I call it, can upset the intertemporal equilibrium of the macroeconomy.

Unwinding IOER and the Fed's Balance Sheet

Unfortunately, abruptly restoring IOER to zero would potentially be very inflationary, given the Fed's bloated balance sheet, since it would be equivalent to suddenly quadrupling the base under the pre-2008 regime.

I have no easy solution to this predicament but recommend that the Fed immediately begin reversing its QE I–III acquisitions until the base is approximately back to its 2007 level, adjusted for nominal GDP growth, to approximately $1,130 billion. Treasuries have a very liquid market and can be sold as quickly as the Fed acquired them. Mortgage-backed securities are much less liquid, but at a minimum the Fed should immediately begin allowing them to run down to zero by not reinvesting in mortgages any interest or return of principal it gets from its mortgage portfolio. As it does this, I recommend that it should temporarily hold IOER at its present level, thereby gradually creating an opportunity cost to excess reserves as the base contracts and the fed funds rate eventually lift off above IOER. Then, when it has restored control of the base, it can lower IOER to zero and resume control of the fed funds rate by restoring a $10 billion to $50 billion repo loan balance with dealers as prior to 2008.

So long as currency pays zero interest, it has a clear opportunity cost (at least since early 2016 as nominal rates return to normal positive levels). Ultimately, the price level must equate the demand and supply of every monetary component, including currency. However, when banks are awash with zero-opportunity-cost excess reserves as at present, the Fed has no control over how much base drains from bank reserves into currency in circulation. This currency drain has been lethargic but steady, so that currency in circulation has almost doubled since 2007, while the nominal economy has grown only about 33 percent. While it is undoubtedly true that currency demand has been greatly increased since 2008 as a result of zero or near-zero interest rates, this situation cannot be expected to continue forever. This currency overhang should be cause for great concern.

Interest on Required Reserves

Interest on required reserves (IORR) is an entirely different matter than IOER. Before 2008, when IORR was zero along with IOER, reserve requirements acted as a modest excise tax on transactions deposits, and therefore gave banks a strong incentive to game them

through the introduction of negotiable order of withdrawal (NOW) accounts, money market deposit accounts, and retail sweep accounts. These "near money" de facto transactions accounts have left the concept of M1 narrow money hopelessly muddled.

However, there is no particular reason to have a special excise tax on transactions deposits, aside from the Federal Deposit Insurance Corporation's user fee for deposit insurance, since banks already pay income taxes on the income generated by their deposit-creation activities. I therefore recommend retaining IORR, setting it at, say, the average of the fed funds rate over the previous two weeks, or slightly lower.

One beneficial but little-noticed provision of Dodd-Frank is that it rolled back the anti-competitive 1933 prohibition of interest on demand deposits. Retaining IORR would therefore permit the consolidation of NOW accounts and money market deposit accounts, and therefore sweep accounts into a single interest-bearing demand deposit category, thereby greatly simplifying monetary statistics.

In order to give small banks relief from the implicit tax of zero-interest reserve requirements, Congress has mandated a 0 percent reserve requirement for the first $15.5 million of transactions accounts in any one bank, and only 3 percent for further transactions accounts up to $115.1 million. As a result, the average reserve requirement falls short of the 10 percent required for accounts in excess of $115.1 million, and depends on the accidental distribution of deposits between small and large banks. This uncertainty makes the bank expansion multiplier harder to predict than it otherwise would be. IORR makes this wild card in monetary policy obsolete, so that there now can be no objection to abolishing it.

Friedman's Optimum Quantity of Money

Fed economists defending interest on reserves have recently made appeal to an unexpected quarter, namely Milton Friedman's 1969 essay, "The Optimum Quantity of Money."[2] As Ben Bernanke and Don Kohn (2016) put it, "Before the Fed paid interest on reserves, banks engaged in wasteful and inefficient efforts to avoid holding non-interest-bearing reserves instead of interest-bearing assets, such as loans." New York Fed economists Laura Lipscomb, Antoine

[2]This section is based on McCulloch (2017b).

Martin, and Heather Wiggins (2017a, 2017b) make essentially the same argument, with explicit reference to Friedman's essay.

This discussion takes me back to my graduate student days at Chicago, when Friedman's essay had just come out, and one witty student had nicknamed it the "optiquan model." "Optiquan" was written shortly after Friedman's December 1967 American Economic Association presidential address, "The Role of Monetary Policy" (1968), in which he had refuted the notion, popularized by the Keynesians Paul Samuelson and Robert Solow, that positive inflation was beneficial to the extent that it reduced unemployment along a stationary Phillips Curve. He had convincingly argued instead that the Phillips Curve shifts up and down with expected inflation, so that the same "natural rate of unemployment" would arise at any sustained inflation rate.

But that left open the question: What inflation rate really is theoretically optimal under a pure fiat money regime in which the central bank is not constrained by a parity to gold or silver? (Recall that 1968–71 was precisely when the U.S. government, with Friedman's approval, finally severed the dollar's external link to gold.)

In "Optiquan," Friedman argued that since fiat money is socially costless to produce, and since optimal inventory management induces money holders to incur real costs to keep down the forgone interest on their money balances, the first best optimum is to pick an inflation rate that drives the opportunity cost of money balances down to zero. One conceivable way this could be achieved would be by paying interest on *all* forms of money—both currency and demand deposits—at the same rate that could be earned on nonmonetary assets. A second conceivable method would be to engineer negative inflation just equal to minus the real interest rate that equated the nonmonetary demand and supply for credit, so that the nominal interest rate would be zero. In either case, agents would in theory hold such large money balances that at the margin they would be savings instruments and provide zero purely monetary services.

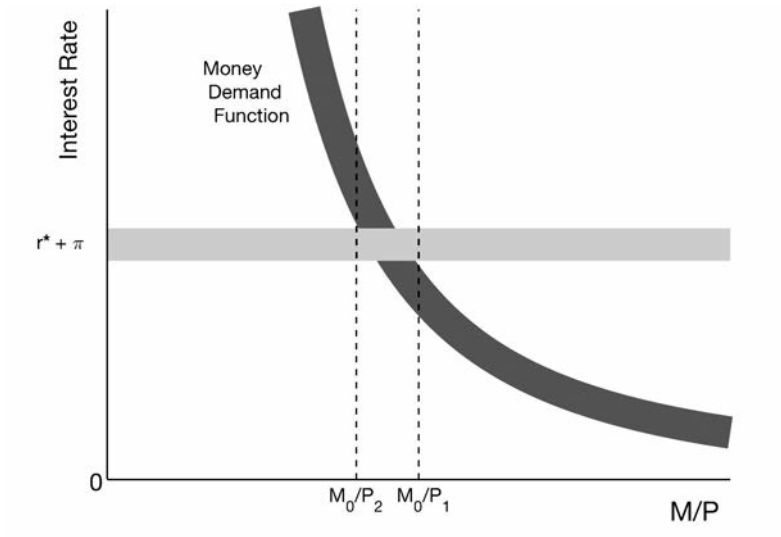
However, one big practical problem with the "optiquan model" that bothered me at the time and still does today is that it would leave the price level indeterminate: Friedman's quantity theory of money predicts that the price level will gravitate to the level that equates the real value of the nominal money stock to the economy's real demand for it. This requires (1) that there be a predictable real demand for an appropriately defined monetary aggregate and (2) that the central bank be able to control its quantity.

Friedman recognized that real money demand responds negatively to its opportunity cost, which, assuming money pays zero interest (as was the case for currency and all checking accounts outside New England before the 1980 Depository Institutions Deregulation and Monetary Control Act), would be the nominal interest rate on safe nonmonetary alternatives. He recognized that nominal rates fluctuate because of natural changes in real interest rates and also because of changes in expected inflation. However, inventory models of money demand predict that the money demand schedule is inelastic and therefore relatively steep at moderate nominal interest rates (when i is on the vertical axis and M/P is on the horizontal axis). Real interest rates are normally positive at all maturities, and must be positive at most maturities to prevent the price of land from being infinite. While inflationary finance is always fiscally tempting, deflation is fiscally unattractive, and therefore not an important long-run concern under fiat money, even by accident under a zero-inflation target. The demand for zero-interest money is therefore reasonably predictable as long as nominal rates are positive and inflationary expectations don't drive them excessively high.

However, if the opportunity cost of money actually falls to zero, inventory models such as the famous Allais-Baumol-Tobin model (Baumol and Tobin 1989) predict that real money demand will be literally unbounded. Of course the resources of the economy are finite and money is not entirely costless—due to the risk of theft, loss, bank failures, or unanticipated inflation—so that money demand will never actually reach infinity, but the point remains that it becomes virtually indistinguishable from the horizontal axis over a wide range of values. This implies that an equally wide range of price levels will equate the supply and demand for money, and the quantity theory no longer predicts the price level, within this range.

Figure 1 illustrates the classical quantity theory of money when money pays zero interest, with moderate uncertainty as to the relevant parameters. The demand curve (dark gray) shows the inventory demand for real money balances M/P, with M/P on the horizontal axis and the nominal interest rate on the vertical axis. Because the money demand function is only known approximately, it is shown as a thick line. In equilibrium, the *nominal* interest rate will average out to the equilibrium real interest rate (r^*) plus the inflation (π) that results from the central bank's money growth policy. Since neither r^* nor π is known with perfect certainty, their sum is depicted as a thick

FIGURE 1
The Quantity Theory of Money

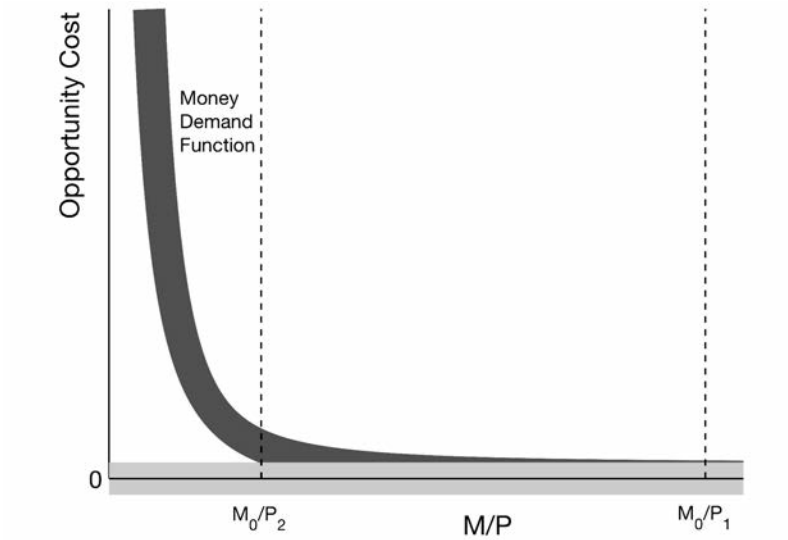


horizontal line (light gray). The intersection of the two curves determines real money balances and therefore the price level, but only imperfectly: given a nominal money stock M_0, the price level could be as high as P_2 or as low as P_1. So the price level is not determined precisely, but at least it's reasonably bounded.

Figure 2 illustrates the inventory demand for money (dark gray) as a function of its net opportunity cost, net of any interest paid on money or real return from deflation. As the opportunity cost approaches zero, this schedule coincides with the horizontal axis, for all practical purposes. The thick horizontal line (light gray) depicts the approximately zero opportunity cost under the Friedman Optiquan deflation rule. Because the neutral real rate r* is uncertain and because the central bank cannot precisely control any deflation it engineers, this line again incorporates some uncertainty. Given a nominal money stock M_0, the price level is now indeterminate at any level between P_2 and P_1, and could be even lower than P_1.

In order for the value of a fiat money to be determinate, therefore, an appropriate monetary aggregate must have a clear and positive opportunity cost relative to nonmonetary assets. With all due respect to Friedman, his "optiquan model" is therefore just an interesting academic exercise that is in fact incompatible with the quantity

FIGURE 2
Price Level Uncertainty



theory. Its reasoning does argue against high-inflation policies, and does make a case for reducing the opportunity cost of at least the deposit component of M1 through interest on checking accounts. However, in order for the quantity theory to function, there must be a substantial aggregate controlled by the central bank that pays zero or at least greatly reduced interest.

The Zero Lower Bound Issue

The extraordinary measures the Fed has taken since 2008 have tied in with the ZLB issue as it affects the Taylor rule.[3] This is an equation relating the FOMC's federal funds rate target i^* to a measure of anticipated inflation, $E\pi$, and, in its original formulation, the estimated percentage deviation of real output from its trend, *ygap*. The benchmark version of the equation, with coefficients as estimated by John Taylor (1993) on the basis of the Fed's behavior in the 1980s and early 1990s, is

$$(1)\ i^* = 1.0 + 1.5\,E\pi + 0.5\,ygap.$$

[3]The following three sections correct certain errors in McCulloch (2015). The present article therefore supplants the corresponding sections in that article.

There is widespread agreement among economists that weak (i.e., less than 100 percent) feedback from expected inflation to i^* was responsible for accelerating inflation prior to 1979, while strong (i.e., greater than 100 percent) feedback was responsible for bringing inflation down from double digits at the beginning of the 1980s to approximately 2 percent since 1990 (Clarida, Galí, and Gertler 2000). The actual coefficients depend on the Fed's inflation target, on its estimate of the equilibrium real interest rate, and on how aggressively it wants to fight inflation and/or the output gap. Furthermore, the coefficients the Fed is using appear to have varied over time (Clarida, Galí, and Gertler 2000; McCulloch 2007). I shall use the above benchmark coefficients for the sake of illustration, with the understanding that the Fed may in fact choose to modify these coefficients. The output gap variable is problematic, but by definition averages out to zero, so that the long-run inflation implications of the Taylor rule lie entirely in the first two terms.

If inflation has been running at the Fed's announced target of 2 percent and is expected to continue at this level, the above rule calls for a "normal" level of i^* of 4 percent. This will be neutral with respect to inflation if the equilibrium or "natural" short-term real interest rate r^* is 2 percent.[4] If inflation falls to 0 percent and is expected from the time-series evidence to stay there while the estimated output gap is 0, the benchmark rule calls for an i^* of 1 percent. This implies a real rate of 1 percent, which is less than its assumed equilibrium level of 2 percent, and hence would put upward pressure on inflation, driving it back toward the Fed's announced target of 2 percent.

But if inflation falls to 0 percent and at the same time the estimated output gap is -4 percent, the benchmark rule calls for an impossibly negative i^* of -1 percent, corresponding to a very stimulative real rate of -1 percent . Because of the ZLB on *nominal* interest rates, the lowest i^* can ordinarily go is 0 percent. This would imply a real rate of only 0 percent, which would not be as stimulative as desired. This supposed ZLB threat has been used as a rationale for deliberately targeting a positive inflation rate in order to give the Fed some additional space to reduce nominal rates before hitting the

[4]The equilibrium real interest rate is that determined in the absence of a monetary disequilibrium by the supply and demand for saving, as in the "loanable funds model" of Irving Fisher ([1930] 1974). This is equivalent to Knut Wicksell's "natural rate of interest," as discussed by Friedman (1968).

ZLB, in spite of the Fed's legislative mandate to stabilize prices. In 2012, the Fed in fact announced its intention to target 2 percent inflation, in part for this very reason.

We will see that this fear is unwarranted. But first, let us consider how the Taylor rule may be expected to operate when the ZLB is not binding.

The Taylor Rule When the ZLB Is Not Binding

Lowering the nominal interest rate $y(m_0)$ on loans of maturity m_0 by Δi, while holding forward rates beyond m_0 constant, reduces the cost of borrowing to any maturity beyond m_0 by $m_0 \Delta i$.[5] Holding the public's inflationary expectations constant, this makes current consumption less expensive relative to consumption at any maturity beyond m_0, thereby creating a proportionate excess demand for current output, financed by an equal and opposite temporary excess supply of money created by the Fed and the banks (see McCulloch 2012). This excess demand for current output generates proportionate inflationary pressure over and above expectations. The opposite is true for an increase in interest rates.

The federal funds rate itself is overnight ($m_0 = 1/365$), and so in itself has only negligible effect on the cost of credit or inflationary pressure. However, the FOMC meets only eight times a year, so that the effective m_0 of the Fed's i^* is 1/8 year on average, or about six weeks.[6] The Fed typically (or at least prior to 2008) manipulates short-term rates through overnight loans to dealers via the repo market.[7] However, if dealers can count on a particular value of i^*

[5]If $y(m)$ is the continuously compounded nominal zero-coupon yield to maturity m, the discount factor $\delta(m) = \exp(-m\, y(m))$ is the current price of \$1 payable at maturity m, and $f(m) = -d/dm \log \delta(m) = y(m) + m\, y'(m)$ is the instantaneous forward interest rate at maturity m. Changing $y(m_0)$ by Δi while holding $f(m)$ unchanged for all $m > m_0$ will change $\log \delta(m)$ by $-m_0\, \Delta i$ for all $m \geq m_0$.

[6]The FOMC has occasionally changed its fed funds target between regular meetings, via an emergency conference call meeting, but such events are rare enough to ignore for present purposes.

[7]A repurchase agreement, or repo for short, is in effect a short-term loan secured with Treasury securities. Legally, the effective borrower sells a security to the effective lender, and at the same time agrees to buy it back in the near future at a slightly higher price, reflecting the effective interest rate. In practice, "triparty" repos are often used, in which a custodial third party bank is the legal owner of the collateral securities throughout.

continuing for the next six weeks, they can make a virtually riskless arbitrage profit by buying six-week Treasury bills and using them as collateral for a series of overnight loans, until the six-week T-bill rate equals i^*. The Fed could achieve a very similar result without the intermediation of dealers by directly pegging the rate on T-bills maturing on or before the next FOMC meeting to i^*.[8] Since there is no reason for the credit premium on private loans to have changed, private loan rates will be similarly reduced, unless the Fed ends up holding a dominant fraction of all the maturing T-bills.

The direct effect of say a 100 basis point (1 percentage point) reduction in rates at even a 1/8 year maturity is still too subtle to create much inflationary pressure. However, if the market realizes this, it will recognize that conditions will most likely be similar to the present at the next FOMC meeting, and therefore that the FOMC will mostly likely choose a similar i^*. This will create speculative demand for longer-term Treasury securities, financed by further short-term borrowing from the Fed at i^*, until forward rates beyond 1/8 year on Treasury debt, and therefore private debt, reflect the probable trajectory of i^*, as adjusted for the empirical term premium (see McCulloch 1975).[9] This speculative demand for short-term loans from the Fed will magnify the direct and arbitrage demand, and can greatly increase the inflationary pressure of the low interest rate policy.

So long as the market is confident that the Fed will continue to fight high inflation (or below target inflation) with continuing tight (or easy) interest rate policy until inflation is back on target, there is therefore no need for the Fed to use "forward guidance" by announcing in advance a specific future interest rate target trajectory. Doing so is in fact counterproductive, because it may lead the Fed to feel bound to retain its promised interest rate trajectory despite conditions that in all likelihood will have changed somewhat, one way or

[8]Historically, maturing Treasury bills typically yield approximately 90 percent of the effective federal funds rate. This is presumably due to their exemption from state and local income taxes, in addition to their greater freedom from default risk. The fed might therefore in practice target a T-bill rate equal to about 90 percent of its fed funds target. In the text I have abstracted from this minor technicality.

[9]The present article abstracts from the term premium and assumes that the (log) expectations hypothesis is valid.

the other. It is sufficient for the market simply to expect the Fed to aggressively follow a policy that will stabilize inflation as well as may be expected under a Taylor-type rule, with hands untied by the past.

Unexpected changes in interest rates on the part of the Fed necessarily generate unexpected capital gains or losses on loans of all maturities. However, the FOMC does well ordinarily not to directly intervene in forward rates beyond the date of its next meeting, since otherwise the decisions at the next meeting may generate capital gains or losses in the opposite direction. Only in the case when the zero lower bound (or a self-imposed above-zero lower bound) is binding should it venture into maturities beyond its next meeting.

The Taylor rule approach to monetary policy has the advantage over a money growth rule motivated by the quantity theory of money because it does not rely on knowledge or stability of the demand for real money balances. Yet it has the disadvantage, even in the absence of the ZLB issue, that it relies instead on the knowledge and stability of the equilibrium real interest rate r^*. In practice, neither is fully known or stable, so that the monetary policymaker's choice is between the less imperfect of two options.[10]

The Taylor Rule When the ZLB Is Binding

Now suppose that the ZLB on i^* is binding. To take our earlier hypothetical example, suppose that experience with inflation and/or other variables would lead one to expect inflation to continue at 0 percent while *ygap* is −4 percent, so that the benchmark Taylor rule calls for $i^* = -1$ percent, and the corresponding desired real rate of −1 percent is 3 percent below the natural real rate $r^* = 2$ percent. However, the most it can lower the real rate before hitting the ZLB is by 2 percent, which would be only 2/3 of the desired stimulus. Nevertheless, it can still achieve the equivalent of a 3 percent reduction out to a six-week maturity, simply by lowering nominal rates to 0 percent and, therefore, the real rate to 0 percent out to nine weeks (3/2 of the six-week meeting interval) instead.

Doing this with no direct disturbance to forward rates beyond nine weeks would require the Open Market Desk to peg the interest

[10]In an open economy with a fiat currency, a third option is to fix the exchange rate to a foreign fiat currency. However, this is superior only if the foreign country has solved the problem of stabilizing the value of its own currency.

rate on T-bills maturing within nine weeks of the current FOMC meeting to 0 percent, and to hold them there until the next FOMC meeting. At that time, the FOMC would then be free to continue the stimulus by moving the peg out another six weeks, or to alter the strength of the stimulus in either direction.

If the Fed, in our example, ends up holding a dominant share of all the outstanding T-bills maturing within nine weeks of the current meeting, it may have to supplement T-bill purchases with term repurchase agreements or term discount loans to insured commercial banks up to the same maturity date, in order to appropriately impact rates on private loans that compete with Treasuries.

If the Fed wished to avoid potential complications of 0 percent interest rates, it could alternatively achieve the same stimulus, in our example, by pegging rates at say 1 percent (a "unit lower bound," so to speak), so that the real rate is 1 percent below the natural rate of 2 percent rather than the desired 3 percent, out to 18 weeks (6 weeks $\times$ 3 percent / 1 percent) from the current meeting.

Thus, although the ZLB may require some adjustment of procedures, it does not in itself prevent the functioning of the Taylor Rule. In particular it does not justify the adoption of a positive inflation target in lieu of price stability. For example, if the Fed chose to target 0 percent inflation while retaining the 1.5 coefficient on expected inflation, the 0.5 coefficient on *ygap*, and the 2 percent assumption on r^*, it would have to raise the intercept in the Taylor rule to 2.0. Then if accidental deflation led the public to expect inflation to be -1 percent, while *ygap* was -4 percent, the rule would call for $i^* = -3$ percent, or 4 percent below r*. An equivalent stimulus could be achieved with a real rate of 1 percent (1 percent below r^*), at a maturity of $4 \times 1/8$ year, or 1/2 year. A "unit lower bound" as discussed in the preceding paragraph would not give the Fed much room to maneuver, but if it chose a 0.25 percent minimum Fed funds rate, which would correspond to a real rate of 1.25 percent with 1 percent expected deflation, or 0.75 percent below r^*, it could achieve the desired stimulus with $m_0 = 2/3$ year.

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Exit Strategies from Monetary Expansion and Financial Repression

Gunther Schnabl

The world has moved into a low-interest rate trap. Since the mid-1980s, asymmetric monetary policy patterns—that is, sharp interest rate cuts during crises and hesitant interest rate increases during the post-crisis recoveries—have pushed interest rates toward zero (Hoffmann and Schnabl 2011) (see Figure 1).[1] With short-term interest rates having reached the zero bound, unconventional monetary policies (i.e., extensive government and corporate bond purchases) have nudged long-term interest rates further downward.

The ultra-low interest rate policies encouraged financial market exuberance, which led to painful financial meltdowns, during which exploding debt of financial institutions was transformed into public debt to ensure financial stability. By pushing long-term interest rates downward, central banks are keeping growing general government debt levels (see Figure 1) sustainable and are discouraging efforts to reduce government spending. Inflated central bank balance sheets,

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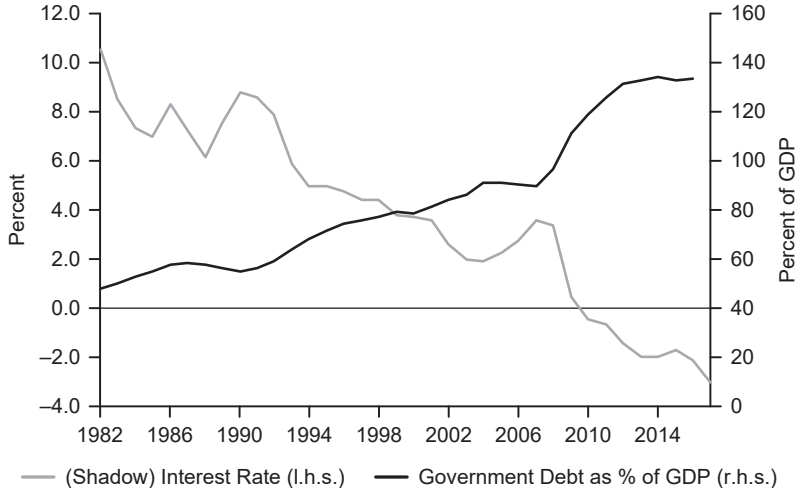
[1]In Figure 1, unconventional monetary policy measures are converted into implied interest rate cuts. This leads to negative "shadow" interest rates in a close-to-zero interest rate environment. Implied ("shadow") interest rates come from Leo Krippner. See www.rbnz.govt.nz/research-and-publications/research-programme/additional-research/measures-of-the-stance-of-united-states-monetary-policy/comparison-of-international-monetary-policy-measures.

which contain growing amounts of government bonds, erode the credibility of central banks.

Meanwhile, the exit from the low, zero, and negative interest rate policies is strongly dependent on the public debt levels, because every increase in interest rates threatens to cause a meltdown in the financial system and (thereby) to block the budgets of highly indebted countries (see Figure 1). For this very reason—while pretending to pursue inflation targets—the central banks in the core of the international monetary system either continue their extensive bond purchase programs (Bank of Japan, European Central Bank) or have moved very hesitantly toward the exit from ultra-loose monetary policies and financial repression (U.S. Fed, Bank of England).

The literature on the exit from the low interest rate environment is scarce. Summers (2014) argues that, given aging societies and a

FIGURE 1
Central Bank Interest Rates and General Government Debt in G4 Countries



Notes: Arithmetic average for United States, Japan, Germany/eurozone, and United Kingdom. Debt on the right axis equals the arithmetic averages of the euro area (represented by Germany, France, Spain, and Italy), Japan, United Kingdom, and United States.
Sources: Thomson Reuters Datastream, Federal Reserve Bank of St. Louis, IMF, and Krippner (see footnote 1).

declining marginal efficiency of investment, the key interest rates set by the central banks reflect the gradual decline of the equilibrium interest rate in the industrialized countries. Given these assumptions an exit from the ultra-expansionary monetary policies is not necessary.

Reinhart and Sbrancia (2015) argue on the basis of historical experience that low nominal interest rates help to contain debt servicing costs and to reduce the real value of government debt. Thus, financial repression is seen as a pre-step for the exit from excessive monetary expansion. McKinnon (1993) has developed a blueprint for the exit from financial repression in emerging market economies based on the reconstitution of market forces, which has proven to be highly successful in many East Asian as well as Central and Eastern European countries, and in particular in China.

Low-Growth Effects of Financial Repression

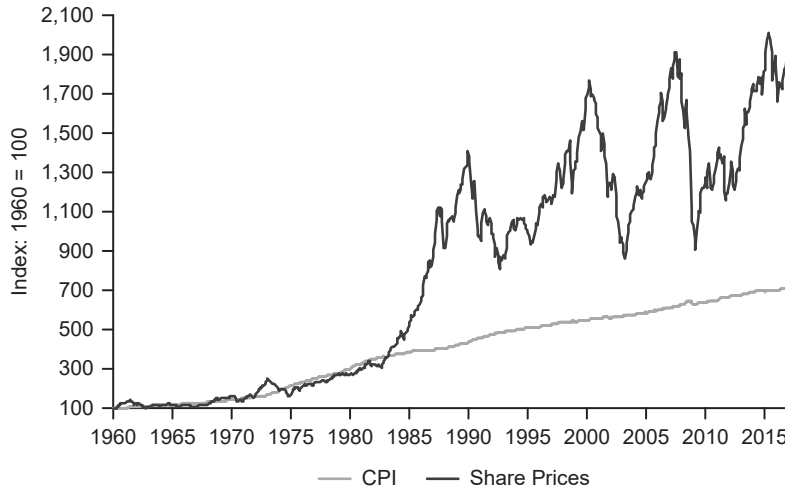
McKinnon (1973) showed the negative growth effects of the financial repression imposed on the capital markets of emerging market economies in the 1950s and 1960s.[2] Uncontrolled government expenditure financed by the expansion of the real stock of money undermined via repressed financial markets the efficiency of investment. With state-controlled interest rates the allocation of capital had become disconnected from market principles.[3] Similarly, since the mid-1980s the asymmetric monetary policy patterns of the large central banks have disturbed the allocation function of capital markets by driving a wedge between the returns of financial assets and physical capital stock.

Since the mid-1980s asymmetric monetary policies have subsidized investment in financial assets. During upswings, low central bank interest rates have inflated asset prices, whereas during crises the decline of asset prices has been countered with even further

[2]See also Shaw (1973). Financial repression was defined as a set of policy measures that constitute the transfer of wealth from the private to the public sector. The measures include interest rate controls, including low government bond yields, other price controls, state control of banks, and restrictions to international goods and capital flows.

[3]Whereas neoclassical theory regards real money balances and physical capital as substitutes, McKinnon (1973) stressed the complementarity.

FIGURE 2
Development of Stock and Consumer Prices in G4 Countries



Sources: IMF and OECD.
Notes: Arithmetic averages for the United States, United Kingdom, Japan, and Germany. After 1999, the CPI for the euro area replaces Germany.

interest rate cuts and unconventional monetary policy measures (Hoffmann and Schnabl 2011).[4] As a result, since the mid-1980s asset prices—as represented in Figure 2 by the share prices in the four largest industrialized countries—have increased dramatically, leading to substantial speculation gains. Since 1985—despite

[4]The increasing cyclicality of financial markets can be explained using the monetary overinvestment theories of Mises (1912) and Hayek (1931), which attribute overinvestment and exuberance in financial markets during the upswing to too low central bank interest rates. In crisis, central banks keep interest rates too high, thereby aggravating the crisis. In contrast to the monetary overinvestment theories, the monetary policy mistakes during the last three decades tended to be asymmetric: interest rates tended to be kept too low during the upswing, but were kept too high during the downswing. In Hayek (1931) the economy is in equilibrium when the central bank sets the central bank interest rate close to the natural interest rate. The natural interest rate is the interest rate that aligns saving and consumption preferences with the production structure over time. A fall in the central bank interest rate (capital market interest rate) below the natural interest rate causes a cumulative inflationary process, creating distortions in the production structure that later make an adjustment necessary (unless the central bank keeps on inflating credit at an ever-increasing pace and thereby artificially prolongs the credit boom). See also Hoffmann and Schnabl (2011).

substantial swings—the average increase in share prices per year has been close to 7 percent.

In contrast, investment in physical capital was discouraged because no public insurance mechanism was provided for risk linked to investment in innovation and attempts to increase the efficiency of the production process. The ultra-expansionary monetary policies have disturbed—like in the emerging market economies formerly plagued by financial repression—the adoption of best-practice technologies[5] by undermining the allocation function of interest rates, which separates between investment projects with high and low expected returns. This has clouded growth perspectives and therefore profit opportunities of most enterprises.

Whereas interest rate cuts during boom phases encouraged investment projects with lower returns, during the crisis further interest rate cuts prevented the dismantling of investment projects with low marginal efficiency.[6] On the global level, this resulted in an increasing number of zombie enterprises and zombie banks, which are kept alive by the low-cost liquidity provision of central banks (see Peek and Rosengreen 2005 as well as Cabellero, Hoshi, and Kashyap 2008 on Japan).[7] Kornai (1986) dubbed this phenomenon "soft budget constraints" for the former centrally planned economies of central and eastern Europe. Unemployment was regarded as politically undesirable; thus, state-owned enterprises were subsidized with costless credit by state-controlled banks. The banks were kept alive with the help of the printing press of the central bank.

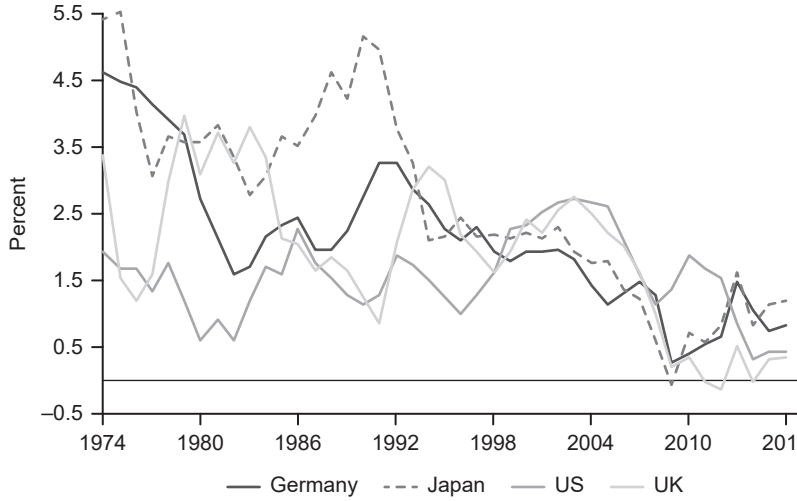
With resources remaining bound in low-return investment projects, a restraint has been put on efficiency-increasing innovation. In the neoclassical growth model, given a declining marginal efficiency of investment, output converges toward a steady state (Solow 1956, Swan 1956). Beyond that point, growth is only possible, if innovation takes place (Solow 1957). If, however, financial

[5]See Hayek (1968) on competition as a discovery procedure.

[6]The overinvestment theories by Mises (1912) and Hayek (1931) assume that central bank interest rates above the natural interest during the downturn trigger a dismantling of investment projects with low returns. Schumpeter (1934) dubbed this process cleansing effect: resources bound in investment projects with low or negative returns are freed and can be shifted into projects with higher returns. See also White (2015).

[7]Hayek (1976) would characterize this process as a gradual shift from a spontaneous to a planned order.

FIGURE 3
Labor Productivity Growth in G4 Countries



Source: OECD.

repression undermines the innovation process by binding resources in inefficient investment projects and reducing the incentive for household savings,[8] then investments, productivity gains, and growth will slow. This is shown in Figures 3 and 4 for the United States, United Kingdom, Japan, and Germany.

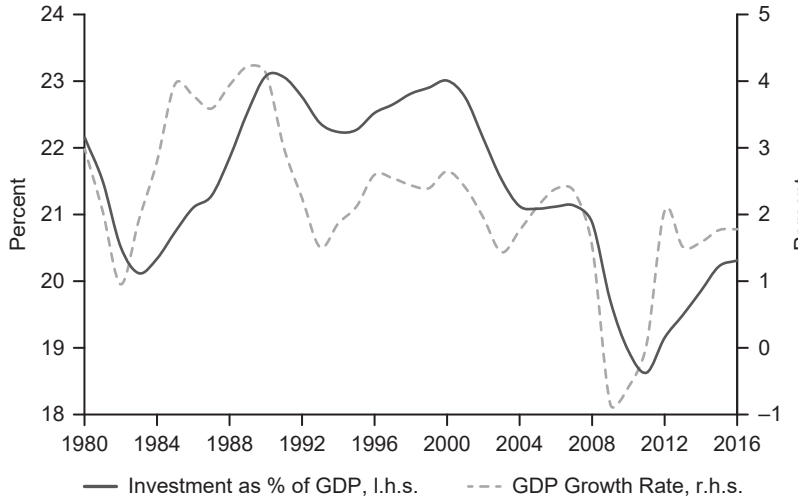
Distribution Effects and Political Instability

The negative growth effects have been paired with far-reaching redistribution effects of the very expansionary monetary policies.[9] First, if central banks depress government bond yields, the public sector gains at the cost of the private sector, which holds these assets. Second, the financial sector gains relative to the rest of the economy because currency units newly issued by the central bank are transferred first to the financial institutions, which can spend

[8]Since the mid-1980s household savings rates have trended downward in all major industrialized countries, which puts into question the savings glut hypothesis (Summers 2014).

[9]For details see Hoffmann and Schnabl (2016) and Duarte and Schnabl (2017).

FIGURE 4
Investment as Percent of GDP and Real Growth in G4 Countries



Note: Each line is the arithmetic average of the values for United States, Japan, Germany, and United Kingdom.
Source: IMF.

the newly issued currency units first. Each previously created currency unit held by other economic agents can purchase a smaller portion of goods, services, or assets (such as stocks and real estate) (Cantillon 1931).

Third, the higher income class (which owns the largest share of stocks and real estate) gains relative to the middle class (which tends to save in low-risk asset classes) because the excessive money creation inflates asset prices (see Figure 3), while it depresses returns on bank deposits and government bonds.

Fourth, young people lose relative to older people because productivity gains converging toward zero put a restriction on real wage increases. This burden is overproportionally shifted to newcomers in the labor markets, because older contracts allow for a stronger wage negotiation power. Given productivity gains close to zero, the wage level (and the social security benefits) of the younger generation declines compared to former generations. The real wage level of the younger generation declines even more when deflated by real estate

prices. The acquisition of real estate has become increasingly difficult for young people in the economic centers.

Fifth, as financing conditions for bank-based lending deteriorate while financing conditions on capital markets improve, large banks and enterprises (which have direct access to capital markets) gain relative to small and medium banks and enterprises. A concentration process in both the financial and enterprise sector evolves.[10] Sixth, if large enterprises and financial institutions are clustered in specific regions, regional economic disparity grows. Young people are forced to move from the peripheries to the centers to find employment.

All in all, the redistribution effects of ultra-loose monetary policies and financial repression lead to growing wealth and income inequality. According to Hayek (1976) people regard the granting of privileges to specific groups—such as investment bankers, managers of large enterprises, and real estate owners—as unjust. Even if in the short-term it is rational to ignore the impact of monetary policies for increasing inequality,[11] in the longer term more and more people will call for change.

People who want to stress the need for more redistribution will tend to vote for very left parties or candidates. Others will move to the extreme right, as they see the solution to the problem in more economic (and thereby political) nationalism. The rise of nationalism is particularly favored when growing inequality is attributed in the public to globalization (see, e.g., Rodrik 2017). Figure 5 shows for the EU28 the average share of votes for the established parties in the EU, which has been declining together with "shadow" interest rates in the eurozone.[12]

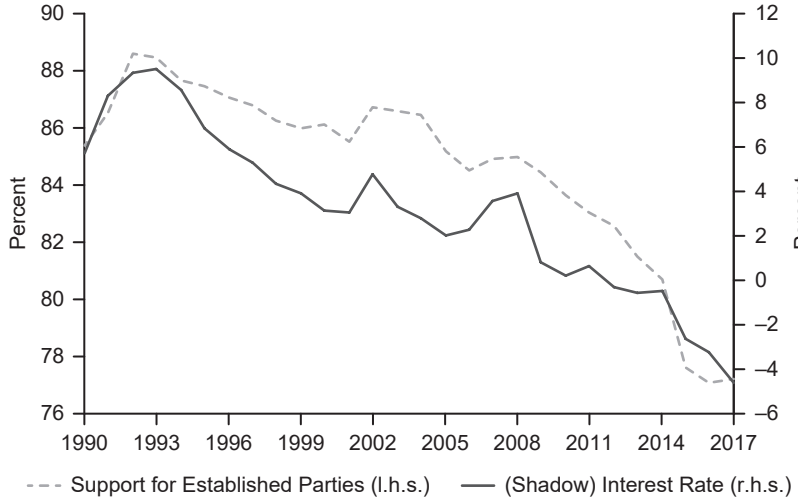
The causality between increasingly loose monetary conditions and political destabilization goes in both directions. First, the preceding monetary expansion increases inequality and therefore the likelihood of political dissatisfaction. Second, the resulting loss of votes for the established parties triggers additional redistribution efforts by the

[10]For details on the concentration process in the financial sector of Japan, see Gerstenberger and Schnabl (2017).

[11]On the rational ignorance, see Caplan (2001).

[12]The support for established parties is defined as one minus the share of votes for extreme left and extreme right parties in parliamentary elections. For detailed information on the data see Schnabl and Müller (2017).

FIGURE 5
Shadow Interest Rate and Political Polarization in the EU28



Source: Krippner (see footnote 1) and Institute for Economic Policy.

governments, which aim to restore political stability (e.g., by increasing retirement benefits and providing more financial support for young families and periphery regions). To finance the additional government expenditure, additional government bond purchases (quantitative easing) of central banks become necessary, which initiates a new round of adverse redistribution effects of monetary expansion.[13]

Because growing political instability constitutes a severe threat for welfare and peace, a timely exit including an exit strategy from ultra-loose monetary policies is necessary.

Exit Strategies

Debt reduction via financial repression as proposed by Reinhart and Sbrancia (2015) is not a solution. The United States and United Kingdom could reduce their post–World War II debt burden of

[13]If the decline of welfare for specific groups is publicly attributed to market forces and globalization, financial market regulation and barriers to international factors flows are encouraged, which puts an additional drag on growth.

more than 100 and 250 percent of the nominal GDP because the postwar reconstruction provided an exogenous source of growth.[14] In sharp contrast, today—by keeping interest rates artificially low—growth and therefore inflationary pressure are undermined by the very factor that has caused high government debt—that is, the extreme monetary expansion.[15]

As Friedman (1967) has noted, in the long run central banks are unable to influence real variables, such as the rate of unemployment, because expectations adjust to any monetary shock. Therefore, as in the emerging markets and the central and eastern European countries since the 1980s, in the industrialized countries a fundamental reconstitution of market principles is necessary to reanimate growth.

McKinnon (1993) shows that many emerging market economies that liberalized their financial markets and economic systems prior to the 1990s were able to achieve impressive economic growth. The most prominent growth miracle since the 1990s has been in China, although the liberalization process has been interrupted by the low interest rate policies of the industrialized countries.[16] Meanwhile, in the most industrialized countries, new unsustainable exuberance

[14]According to Reinhart and Sbrancia (2015), debts of 3 to 4 percent of GDP were liquidated annually by the interest rate and inflation effect of financial repression. Rogoff (2017) proposes to abolish cash to make financial repression as a tool to reduce public debt more effective. This would, however, further restrain economic freedom and growth.

[15]The transmission of the monetary expansion to financial markets has been mainly via declining interest rates, which caused—depending on the regulation and the mood of financial markets—inflationary pressure in changing segments of the international financial markets. In the case of the Federal Reserve, increasing deposits of commercial banks since 2008, which were remunerated at a moderate interest rate on required reserve balances and excess balances, cannot be seen as a sterilization tool because the monetary transmission worked via historically low interest rates. In Japan and the euro area, excess balances of commercial banks at the central banks emerged even without being remunerated or even being charged with negative interest rates. From this point of view, the growing balances of commercial banks at the central banks in many industrialized countries are more the consequence of subdued credit growth following the global financial crises rather than an indicator for sterilization.

[16]McKinnon and Schnabl (2014) show how the return of financial repression in China has been imposed from outside by the very low interest rate levels in the industrialized countries. This externally imposed financial repression has undermined the Chinese growth miracle by the build-up of tremendous overcapacities in the enterprise and real estate sectors.

in financial markets is contained by tighter financial supervision and comprehensive macroprudential measures, which have become, however, a main impediment for the efficient allocation of resources.[17]

McKinnon (1993) stressed that fiscal and monetary consolidation has to precede the liberalization of financial markets, otherwise the low-cost liquidity provision of central banks would trigger destabilizing turmoil in financial markets.[18] The focus of fiscal consolidation in industrialized countries would be on curtailing expenditure, as the share of government expenditure as percent of GDP is high in most countries.

The fiscal consolidation process could be facilitated by a debt relief. For instance, postwar Germany and Japan achieved the reduction of public debt by outright default. In Germany in the course of a currency reform, government bonds, cash, and sight deposits were simply devalued. The resulting burdens were partially redistributed by taxing real assets, in particular real estate.[19] As such a redistribution process is vulnerable to the influence of special interest groups, it is likely to further enhance political discontent. Therefore, a market-oriented debt reduction process based on gradual interest rate increases is the superior solution.

To achieve an exit without tears, which avoids major meltdowns in the financial sector and the bankruptcy of highly indebted states, the process has to be simultaneously *credible, slow, transparent, sequenced along the yield curve, and internationally coordinated*. As nominal interest rates at zero and real interest rates below zero can—from a Hayek-Mises perspective—be assumed to be far below the natural interest rate, a sustainable exit strategy would restore the

[17]With the financial sector being more tightly controlled, the risks are currently building up in the enterprise sector, represented by sharply increasing volumes of (debt-financed) mergers and acquisitions as well as stock prices.

[18]Before liberalizing financial markets the monetary and fiscal system had to be converted from a passive mode that had simply accommodated the planned government expenditure into a constraint on the ability of enterprises, households and local governments to bid for scarce resources (McKinnon 1993: 3).

[19]The "Law on the Redistribution of Burdens" (Lastenausgleichsgesetz) of 1952 taxed real estate at a rate of up to 50 percent. As the resulting liability could be spread over a period of up to 30 years, the yearly burden could be financed out of the returns of the taxed assets. The real burden was further eased by moderate inflation.

long-term average in the postwar nominal short-term interest rate of about 6 percent.[20] This long-term average before the start of the asymmetric interest rate path can be seen as a rough proxy of Hayek's natural interest rate.

First, as monetary policies have become increasingly expansionary for more than three decades—as represented by the convergence of short-term and long-term interest rates toward zero and the gradual inflation of central bank balance sheets—expectations have become strongly tilted toward the persistence of the ultra-low interest rates. To shift the expectations toward an exit from ultra-low loose policies, a *credible* reversal is necessary. As inflation targeting regimes have contributed to the detrimental persistence of the ultra-loose monetary policies,[21] the credible announcement of a fundamental change in the monetary policy strategy is a prerequisite for a shift in expectations.

For this purpose, consumer price index–based inflation-targeting regimes should be publicly dismissed, as they are mainly serving the perpetuation of government financing by central banks. The new monetary regime should be based on targeting the monetary base in the tradition of the quantity theory of money with base money growth being oriented to output growth.[22] This strategy would minimize the destabilizing effects of monetary policies in financial markets.

Second, the exit from the ultra-low interest rate policies has to be *slow* because the structural distortions, which have been caused by the increasingly expansionary monetary policies, can be assumed to be immense. To avoid major economic disruptions including surging unemployment, the production factors have to be reallocated steadily. A gradual increase of interest rates would force governments to reduce debt by gradually cutting expenditure and streamlining social security systems. This would shift resources from the public sector back to the private sector.

[20]This value is based on the assumption that the long-term average in the inflation is 2 percent and therefore the long-term average in the real interest rates would be 4 percent. In the view of Hayek (1931) and Mises (1949), the real interest rate has to be positive because it represents a positive time preference rate.

[21]Since the mid-1980s, monetary expansion has increasingly become visible on asset rather than goods markets.

[22]Also, nominal GDP targeting may be an alternative (see Meade 1978 and Schumer 2012).

Reducing the liquidity provision to the financial sector would deflate the balance sheets of financial institutions, thereby shifting resources from the financial sector to the enterprise sector. In particular, the financial sectors in the United States and United Kingdom would be consolidated, stimulating industrial production. As speculation would be reduced, investment banking would shrink more than traditional banking (which would be reanimated).

The commercial banks would have to restructure their balance sheets by removing bad loans. By doing so they would have to exert pressure on their debtors in the enterprise sector to increase efficiency. The enterprises would be forced to push forward innovation and efficiency gains in the production process. This would necessitate additional investment in fixed and/or human capital. As the consolidation process in the government, financial, and enterprise sectors would take time, the increase in short-term interest rates should not be more than, say, 0.5 or 0.25 percentage points per year.

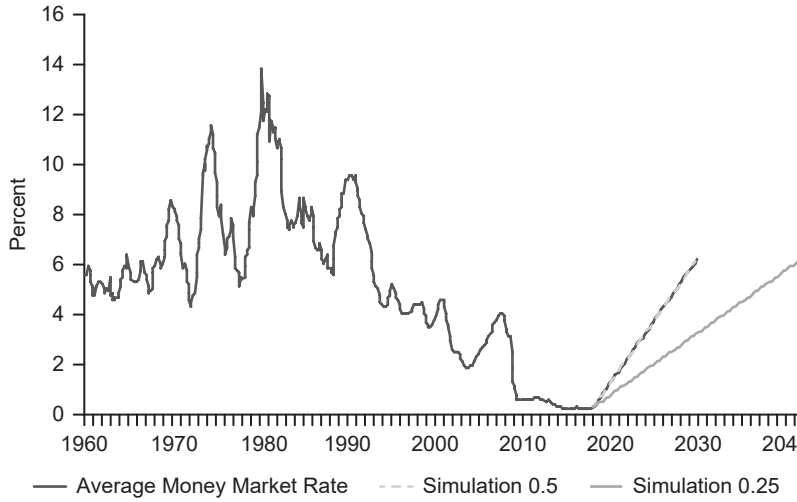
Third, to stabilize expectations, the exit process has to be *transparent* by following an exit rule that aims to reconstitute the natural interest rate level.[23] For example, the central bank could be restrained to hold increases in the policy rate to 0.5 or 0.25 percentage points per year for a predefined time period, without any possibility of suspending that rule. The slow, but rule-based interest rate increases would contain financial turbulence as the first move is small and further steps are slow and predictable. The slow speed of interest rate increases would give all involved institutions sufficient time to adjust, so that panic is misplaced. At the earliest, after a period of 12 (0.5) or 24 (0.25) years, the rule should be allowed to be reassessed and to be transformed into a revised monetary policy rule.[24] The respective exit paths are shown in Figure 6.

Fourth, a forward-looking exit strategy should consider the fact that interest rates have become manipulated by central banks both at the short and the long end of the yield curve. Therefore, the exit process has to be *sequenced along the yield curve*. The exit from conventional monetary expansion (targeting the short-term interest rate)

[23]This exit rule is not equivalent to a general monetary policy rule, which would be applied once a successful exit has occurred.

[24]With the purchasing power of people being strengthened, inflation would moderately pick up, rendering real interest rate increases smaller than nominal interest rate increases.

FIGURE 6
Simulation of Exit Paths



Source: IMF.

should precede the exit from unconventional monetary expansion (targeting the long-term interest rate).

Lifting the short-term interest rate first would stabilize the financial sector. Up to the present, zero- or close-to-zero interest rate policies have paralyzed the money market thereby restricting the lending of banks with liquidity shortages (but good lending opportunities). The conventional and unconventional monetary policies have depressed lending–deposit spreads as the traditional source of commercial banks' income. This has particularly destabilized small and medium banks and their lending activity to small and medium enterprises.

If short-term interest rates increase, potential lenders on the money market would start lending again to banks with liquidity shortages. Both banks with liquidity overhangs and banks with liquidity shortages could generate additional profits. Banks with liquidity overhangs would gain from money market lending. Banks with liquidity shortages would gain, as additional business would be generated and lending-deposit spreads would increase. With growing profits of small and medium banks, lending to small and medium enterprises could grow, thereby supporting small and

medium enterprises. The strengthening of the banking sector would contain concerns that banks have to be recapitalized by the governments. This would contribute to the stabilization of the public sectors.

As long-term interest rates would be kept under control via unconventional monetary policies in the first phase of the exit, this would help to stabilize financial institutions and insurance companies, which hold large amounts of government bonds. Sharp fluctuations of long-term interest rates in response to the announcement of the exit would be contained. Governments would gain some time to reduce expenditure and debt levels.

After a year, the restrictions on long-term interest rates should be gradually removed by reducing the stocks of government bond holdings of central banks. The reduction should follow an exit rule as well, specifying a specific amount per month. The rule could mirror inversely the build-up of government bond holdings, with respect to both timing and scale. The target point of the unwinding of government bond holdings should be fixed at the share of GDP as it prevailed before the start of the unconventional monetary policy measures.

Then, long-term interest rates also would be increasingly determined by market forces. Without unconventional purchases of government bonds by the central banks, long-term yields would be set again at the average of expected future short-term rates plus a liquidity premium. The gradual reduction of public debt would help to contain large shifts in risk premiums.

Fifth, the exit from low interest rates has to be *coordinated* among the four largest central banks—Federal Reserve, Bank of Japan, European Central Bank, and Bank of England—to avoid major disruptions in the foreign exchange markets. The recent history of tapering and the exit from low interest rates in the United States has shown that an isolated exit of only one major central bank from the ultra-low interest rate environment causes an appreciation of the domestic currency.

Discontent among export-oriented (i.e., large and politically influential) enterprises and the deflationary pressure of appreciation constitute a restraint on any unilateral exit strategy. A coordinated exit of all major central banks is a way to escape from the current prisoner's dilemma in the international monetary system, which would avoid exchange rate disruptions. The coordination process

would also enhance the credibility of the exit in every singly participating country.

Outlook

Many former developing countries and socialist planning economies have shown that the exit from low interest rate policies and financial repression is worthwhile because it nudges companies, banks, and citizens back into a market-oriented, spontaneous order. This boosts productivity gains and growth. Thus, today in the industrialized countries also, the exit from the asymmetric monetary policies would be equivalent to a reanimation of growth, as the hidden nationalization process in the financial and enterprise sector would be reversed.

In the industrialized countries, banks and enterprises still operate based on market principles (although the public sector fundamentally distorts price signals). International trade and capital flows remain widely liberalized, and robust legal frameworks prevail. Therefore, the adjustment to the new environment will be much easier compared to the transformation processes in the formerly financially repressed emerging market economies.

Most financial institutions, enterprises, and governments will be able to adjust. If some banks and enterprises fail, new ones will emerge. Most states would be able to adjust, as huge and inefficient budgets provide ample room for consolidation. Large assets owned by the public sector such as real estate and infrastructure would provide room for debt-equity-swaps. Insolvent states will be forced to restructure.

There are concerns that the exit from low interest rate policies would lead into a global crisis initiated by a meltdown in the financial sector. Yet the opposite is likely to be the case. The gradual decline of interest rates since the mid-1980s has not boosted but has paralyzed growth. It has increased volatility on financial markets, with the resulting uncertainty further depressing investment as a main determinant of growth. Therefore, inverting the process would imply in the medium term accelerating growth supported by growing financial stability.

To achieve an exit without tears, the exit process has to be credible, slow, transparent, sequenced over the yield curve, and internationally coordinated. Neglecting one of these principles would

destabilize the exit path. The G7 would provide an appropriate platform for international coordination.

With incentives being restored, resources would be reshuffled from speculative investment toward investment in fixed and human capital. Economic activity would be reshuffled from the public to the private sector and from the financial sector to the enterprise sector. Both are likely to generate substantial productivity gains, which would be the basis for real wage increases. The reduction of financial market speculation would help to reduce wealth and income inequality. This would strengthen private consumption and encourage investment by enterprises, thereby creating better-paid jobs.

As speculation is discouraged, the richer part of the population would contribute more than other parts of the population to the adjustment process via a declining market value of their assets and lower payment for the highly ranked management. The access of low- and middle-income groups to assets such as stocks and real estate would be facilitated. Both factors would be regarded as just among major parts of the population and therefore help to restore political stability. This adjustment would help to promote free markets and free trade, which are the basis of long-run economic growth and welfare in the industrialized countries.

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The Curse of the War on Cash

Lawrence H. White

The "war on cash" refers to a set of policies, in the United States and around the world, deploying the power of government agencies to suppress the use of paper currency. The principal aim is to shift transactions to credit card and bank account media that leave an electronic data trail for law enforcement and tax authorities. A secondary aim is to raise the cost of cash storage so as to allow the central bank to push nominal interest rates further below zero.

The phrase "war on cash" is of course intended to be dramatic. Harvard economist Kenneth Rogoff (2017) has objected to it as "a polemical exaggeration" in his response to a critical essay review (Hummel 2017) of his recent book on the topic. What he considers an exaggeration is not the term "war," mind you, but the unqualified term "cash," given that he himself advocates only "a war on big bills" and not a fully "cashless society." Point granted. But this complaint about overly dramatic phrasing is a bit ironic coming from the author of a book entitled *The Curse of Cash*, not *The Disadvantages of High-Denomination Bills* (Rogoff 2016a).

Some other writers and officials wage war not only on big bills but also on all cash transactions and on other private payment methods like bitcoin. They do seek a cashless society. They want to drive *all* transactions into forms that leave an audit trail for the law

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enforcement and tax authorities. In this respect the phrase "war on cash" is too narrow rather than too broad. It is really a "war on financial privacy." They would welcome us to a financial panopticon.

The phrase "war on cash" suggests a parallel to the "war on drugs" and aptly so. In both wars, traditional civil liberties are shunted aside in the criminalization, surveillance, and prosecution of victimless private activities.

The main indictments of large-denomination currency notes by anti-cash warriors are built on guilt by association: criminals use large notes, so anyone who uses them might be a criminal. It is of course true that the notes are used by tax evaders, money launderers, terrorists, human traffickers, drug dealers, and any other horrible type of criminals you might like to name.

But large notes are also used by noncriminals. While it is no doubt true that banning high-denomination notes would "make life harder" for criminal enterprises (Sands 2016), it would also, as I have previously written (White 2016), "make life harder for everyone else." The rest of us also find high-denomination notes convenient now and again for completely legal and noncontroversial purposes, like buying automobiles and carrying vacation cash compactly. A serious survey of eurozone currency use finds that "in Italy, Spain and Austria . . . almost one-third of the interviewees always or often use cash for purchases between €200 and €1,000" (ECB 2011). A Deutsche Bundesbank webpage (2016) has noted that, in the eurozone, "Cash in circulation has more than quadrupled since euro currency was introduced; it now stands at more than €1 trillion." Is this because crime has quadrupled? No. More likely, it is because cash is a convenient payment method, and cash has become less costly to hold with the euro bringing lower inflation to the formerly high-inflation member countries.

Coercive efforts to suppress cash deprive honest people of the ability to use their preferred method of payment. The demonetization fiasco in India, discussed below, is a dramatic illustration of the resulting harms.

Current Tactics in the War

The main policy tactics in the war on cash are currently four:

1. Abolish high-denomination banknotes.
2. Place a maximum legal value on cash payments.

3. Require declarations from any party carrying a cash amount above a specified value across the national border.
4. Require banks to report to authorities any cash deposits or withdrawals in amounts above (or suspiciously near) a specified value.

I will comment on the status of each of the four in turn, for the benefit of the reader who is not aware how far the war on cash has already proceeded. I note here without further discussion that there is talk in some developed countries of deploying additional weapons, including a tax on cash withdrawals above a threshold amount such as already practiced in Nigeria. I note also that since 2016 Greece has required citizens to declare to the tax authorities any personal cash holdings of €15,000 or more.

Abolish High-Denomination Banknotes

Central banks long ago (the 1930s in the United States) monopolized the issue of currency notes, banning private note issue by commercial banks in all but a few places (Scotland, Northern Ireland, Hong Kong). This may be regarded as an early government victory in the war on cash.[1] As a result governments can now restrict the sizes of currency notes in circulation merely as an administrative matter. A few central banks in recent years have withdrawn their popular high-denomination banknotes. Most prominently the European Central Bank, citing concern about the criminal use of currency, recently stopped producing its €500 notes and will stop distributing them in 2018. The largest U.S. dollar currency note has remained the $100 bill since the $500 bill was eliminated in 1969, but the $100 bill today buys less than the $20 bill did in 1969. It is because of the war on cash that the United States has not reintroduced a $500 bill to keep up with inflation. Rogoff (2016a), Summers (2016), and Sands (2016) advocate removing the $100 bill as soon as possible. Rogoff would also remove the $50 and $20 bills in due time.

As further discussed below, in November 2016 the Indian government suddenly withdrew its two largest and most popular currency notes, the Rs. 500 and Rs. 1,000, together constituting 86 percent of

[1]The earliest laws on banknotes in the United Kingdom and the United States were actually bans on *small* notes, placing *lower* limits on the denominations that banks were allowed to issue.

the currency stock. But the "demonetization" was temporary: the government soon began replacing the old notes with a redesigned Rs. 500 note and a new Rs. 2,000 note. By mid-October 2017 the stock of currency in circulation had returned to 90 percent of its level before the note ban (Livemint 2017), and it remains on an upward trend. Contrary to the hopes of some that the shock policy would jump-start the replacement of cash by electronic payments, no sizable effect is evident.

The Swiss National Bank is the most important central bank still bucking the trend. It has said that it has no plans to withdraw its 1,000 Swiss Franc note (*Guardian* 2016b), worth US$1,010 at the exchange rate of October 25, 2017.

Place a Legal Ceiling on Cash Payments

Ceilings on the allowed size of cash payments to businesses are common in Europe. A Deutsche Bundesbank (2016) webpage reports, "Restrictions on cash payments are currently in place in 12 of the 28 EU member states." In Italy the maximum allowable consumer-to-business or business-to-business cash payment by residents is currently €2,999.99; in France and Spain the limit is €1,000; in Greece it is a mere €500. The German finance ministry in early 2016 proposed a national limit of €5,000 but met with strong political resistance from defenders of financial privacy (*Guardian* 2016a). Person-to-person cash payments appear not to be capped, which indicates that the target of the restrictions is tax evasion rather than terrorism or crime.

While such a cash payment ceiling has not yet been introduced in the United States, any business that receives $10,000 in cash from a single customer must report it to the tax authorities within 15 days on IRS/FinCEN Form 8300. The Internal Revenue Service (IRS) shares the information with the Treasury's Financial Crimes Enforcement Network (IRS 2017). Businesses that must often file Form 8300 include sellers of big-ticket items like automobiles, boats, aircraft, jewelry, and furniture, and providers of big-ticket services like law firms, real estate brokers, insurance agencies, and travel agencies.

Require Individuals to Declare Cash above a Legal Minimum Upon Entering the United States

Under the Currency and Foreign Transaction Reporting Act (CFTRA), the United States' government requires any party (individual or group traveling together) bringing $10,000 or more of cash

(or travelers' checks or other negotiable instruments) into the country to declare the sum at the border. Failure to declare makes the currency contraband subject to seizure. For entrants to the eurozone the threshold is €10,000. The European Commission has proposed expanding the scope of requirement to include gold and other precious commodities. For mainland China, the threshold is US$5,000. Switzerland and Hong Kong, by contrast, have no cash declaration requirements.

Require New Reports on Cross-Border Currency Transactions for Financial Institutions

Under the same CFTRA, also known as the "Bank Secrecy Act," a U.S. financial institution must file a "Currency Transaction Report" (CTR) with FinCEN for any deposit, withdrawal, currency swap, or transfer involving $10,000 or more in currency, whether or not the institution employees handling it consider the transaction suspicious. They are required to file a "Suspicious Activity Report" for any activity they do consider suspicious if it involves $3,000 or more in cash.

Subdividing deposits or withdrawals in order to avoid triggering a CTR is itself a crime, called "structuring." Innocent family businesses have been charged with structuring, and had tens of thousands of dollars seized by the federal government, merely for making repeated deposits or withdrawals below the $10,000 threshold. In the notorious case of dairy farmers Randy and Karen Sowers, who frequently deposited cash income from sales at farmers' markets, Treasury officials seized $29,500 in February 2012, charging the couple with structuring, without suspecting them of any other crime. After an Institute of Justice petition and congressional hearings into the case, the federal government finally returned the seized money in June 2016.

Under public pressure, the IRS and Justice Department amended their policies in 2014 to forgo seizures for structuring where no other crime (such as tax evasion or money laundering) is suspected. During the period before that change, however, the Institute for Justice has estimated that the IRS took $43 million from 618 people in cases similar to the Sowers' where mere structuring was the only charge (Rawlinson 2016).

Collateral Damage

The war on cash might be more accurately labelled the "war on people who use cash." What are suppressed by the above-listed

tactics are not inanimate objects but people. Cash itself experiences no harms. People do. Coercive anti-cash policies abridge the freedom and reduce the welfare of peaceful individuals who prefer to use cash.

More specifically, policies that limit cash use or otherwise compel people instead to pay through banks or credit card companies have the following effects:

- They compromise financial privacy and enable the prosecution of victimless crimes wherever banks are required to "know their customers" and to provide transaction records to government officials.
- They impose an unlegislated tax on money-holders, and leave them no means of escape into untaxed media of exchange, whenever the central bank decides to pursue a negative interest rate policy.
- They harm the livelihood of small businesspeople who rely on cash sales, particularly those serving the unbanked or operating in outdoor markets, and reduce the welfare of their (mostly poor) customers by raising transaction costs.[2]

The sudden anti-cash offensive of the Indian government at the end of 2016 dramatically illustrates the third set of harms. To summarize the story,[3] on November 8 Prime Minister Narendra Modi suddenly announced that the two highest denomination rupee notes (the Rs. 500 and Rs. 1,000, worth about US$7.50 and $15) would become invalid at midnight. Indian citizens had 50 days to deposit the invalidated notes into banks for deposit credit, or swap them for new valid notes of Rs. 500 and Rs. 2,000. But initially the swaps could be made only in small amounts (Rs. 2,000, or about $30, per person per day) because too few new notes had been printed, forcing hundreds of millions to waste literally billions of hours standing in queues. The two invalidated notes together made up 86 percent of the currency circulation by value, and currency made up 62 percent of the money stock (currency plus checking deposits). More than half of the nation's money stock (86 percent of 62 percent) was thus temporarily immobilized. In the critical words of Norbert Häring (2017), "Narendra Modi performed the great and brutal experiment of starving the whole of India of cash for months."

[2]See Desjardins (2017) for an infographic presentation of these and other points.
[3]Here I draw on White and Rajagopalan (2016) and White (2017b).

The currency shortage caused enormous hardship for the cash-dependent unbanked half of the Indian populace. For want of a circulating medium, wage laborers normally paid in cash went unpaid, and farmers were unable to sell their produce. By some counts there were more than one hundred deaths of people waiting in exchange queues, or unable to get medical treatment or medicine because of lost cash income. A policy ostensibly intended to inflict losses on tax evaders and criminals imposed severe collateral damage on honest users of currency.

The shock move was intended to impose a one-time wealth loss on tax evaders, bribe-takers, and other imagined holders of large "black money" currency hoards. Such people were expected to eat losses rather than risk the official scrutiny that would accompany an attempt to deposit or convert their hoards of old notes. As it turned out (Kaul 2017), 99 percent of the invalidated notes were returned. People with black wealth were either not holding much in the form of currency or successfully hired surrogates to swap or deposit their currency.

Commenting on the Indian experiment in its midst (November 2016), Rogoff (2016b) wrote: "Is India following the playbook in *The Curse of Cash*? On motivation, yes, absolutely. . . . On implementation, however, India's approach is radically different." Unlike Modi's program, Rogoff's plan calls for a gradual phase-out of big bills, has no reintroduction of them, and "is not aimed at developing countries, where the share of people without effective access to banking is just too large." It is true that a preannounced phase-out of large-denomination currency notes need not create a temporary currency shortage. But even in rich countries it will raise the cost of transacting for law-abiding people who use large notes, and thus reduce their real income, just as in India if not so dramatically.

Large-note abolitionist Peter Sands (2016) supposes that "lower denomination notes offer an only slightly more inconvenient solution for ordinary people, given the sums involved," while "only the very wealthy would be truly inconvenienced." This kind of casual assessment does not show that the benefits exceed the costs of inconvenience for withdrawing the US $100 bill, much less for also withdrawing the $50 and $20 bills. Note that the $100 bill is popular around the world as a savings and transaction vehicle, such that its withdrawal would inconvenience a great many who are not very wealthy. And, when the governments of low-income countries

impose coercive policies to shove ordinary people out of cash and into other payment methods, it is the poor who are harmed.

Am I attacking a straw man here? Who actually advocates a war on cash in low-income countries? The important Better Than Cash Alliance (BTCA) does.[4] Operating under the aegis of the United Nations, the BTCA advances the implausible idea that removing cash from the payment options of the world's poor will benefit the poor as part of a program of promoting "financial inclusion." Some of the funding partners of the BTCA, nonprofit organizations like the Bill and Melinda Gates Foundation and Omidyar Network, may sincerely have the interests of the poor at heart.[5] Other funding partners may have other agendas, namely the giant payment processors Visa, MasterCard, and Citi, which can expect to gain transaction fees. Members of the BTCA include international agencies and governments that can expect to gain tax revenue by driving transactions out of cash.

The BTCA says that its goal is to promote "the transition from cash to digital payments *in a way that improves lives*." But standard economic reasoning tells us that improving lives means adding attractive options, not removing what people currently consider their most advantageous options. Taking away people's best options (including payment options) is seldom a way to make them wealthier or better off as they see it. The BTCA studiously overlooks this obvious consideration. Its literature treats transition to digital payments as welfare-improving no matter the costs or compulsion involved. A BTCA report on "Accelerators to an Inclusive Digital Payments Ecosystem" (BTCA 2016) recommends "measures to encourage *or require* government entities, *private businesses, and individuals* to shift away from cash, sometimes in the form of policies that disincentivize cash usage" (emphasis added). It endorses Nigerian government policy measures that include a tax on cash withdrawals above a daily limit, a ban on unlicensed cash courier services, and a prohibition against banks cashing large third-party checks. Although they fly the banner of financial inclusion, as Häring (2017) observes, by advocating coercive policies, the BTCA and like-minded agencies actually "support financial exclusion of poor people by preventing them from using their preferred and often only means of payment."

[4]For more on the BTCA, see White (2017a).

[5]Note, however, that Pierre Omidiyar's fortune came from cofounding the payment processor PayPal. For a skeptical view of Bill Gates' interests, see Häring (2017).

Is there a collective-action rationale (perhaps a network-externality problem) for compelling or subsidizing people to give up cash? Not that I have seen anyone spell out. There is no such problem evident in the process of attracting payers to use the banking system rather than cash. In every country where banks offer checking accounts, noncash payments have already established a foothold, and the infrastructure already exists for clearing and settling deposit transfers. At the margin of transactions between unbanked and banked individuals, people can be persuaded to move their payments from cash to digital transfer. They will be persuaded once digital payments become more beneficial or less costly to them than at present. Using compulsion is an admission that the benefits to the payers don't yet exceed the costs.

Attracting cash users to digital payments, in a way that improves their lives from their own perspective, is thus an entrepreneurial challenge, not a collective action problem. The BTCA's case for forcing people to stop using cash in *their own interest* is an empty box. To genuinely promote the well-being of the poor and everyone else, the BTCA should explicitly reject policies that restrict the choices of cash users.

Conclusion

Well-meaning supporters of the "war on cash" should ask themselves whether the war is really in the public's interest rather only in than the private interest of tax authorities and incumbent payment service providers. They should consider how it looks from the point of view of skeptics like Don Quijones (2016):

> The war on cash is being waged for the exclusive benefit of those who already wield an inordinate amount of power and control over the economy and the people that are struggling in it. And they want more. By slowly, quietly killing cash, they seek to seize the last remaining thing that offers people a small semblance of privacy, anonymity, and personal freedom in their increasingly controlled and surveyed lives. And the way things are going, they'll get it.

The concerns of the opponent of rule by experts cannot be readily dismissed as unwarranted so long as the tactics used in the war really do threaten autonomy and financial privacy. "First, do no harm" should be the watchword for the doctors of political economy.

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Special Interest Politics Could Save Cash or Kill It

Norbert J. Michel

There has been a steady shift from paper-based payments to electronic means of payment in the United States during the last 30 years (Federal Reserve 2016). Many consumers and businesses have relied more on credit and debit cards, as well as electronic transfers, instead of on checks and cash. Of these electronic methods, credit and debit card transactions account for much of the growth. The percentage of U.S. consumer expenditures with debit and credit cards (combined) was only 3 percent in 1986 but rose to 25 percent by 2000 (Lyon 2006). In 1995, debit and credit cards (combined) accounted for less than 20 percent of all noncash payment transactions but increased to more than 40 percent of this volume by 2003 (Lyon 2006). As of 2015, cards accounted for more than 65 percent of all noncash transactions (Federal Reserve 2016). More recently, smartphone-based payment services have rapidly gained importance as a noncash form of payment, "increasing from 0.3 billion payments in 2012 to 1.3 billion in 2015, or 71.9 percent per year" (Federal Reserve 2016).

Globally, mobile phone–based financial services are having a major impact in the developing world. Since 2007, more than 250 such services have reached more than 300 million customers in 89 countries, with more than half the services deployed in Sub-Saharan Africa (Burns 2015). This shift also coincides with the rise

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of bitcoin and similar blockchain-based digital currencies, the underlying technology of which serves as a digital payments system. The first bitcoin was created in 2009, and there are approximately 16.5 million bitcoins as of November 2017, as computed at the website bitcoincharts.com. Though it is difficult to tell precisely how many people transact with bitcoins or similar digital currencies, Coinbase recently estimated that more than 10 million people worldwide hold a material amount of Bitcoin (Torpey 2017). To date, overseas remittances remain one of the most prominent uses for such digital currencies. In 2016, remittances totaled more than $429 billion, with some of the largest markets in China and the Philippines (Young 2017).

Even though bitcoins—or some offshoot—may become a generally accepted medium of exchange in the future, these digital currencies do not yet rival established national currencies such as the U.S. dollar. Nonetheless, there is no doubt that bitcoin proved thousands of economists wrong: private markets can, in fact, successfully issue digital currency that is not backed by any government or any physical commodity. Most economists, polled prior to bitcoin, would likely have predicted that no such digital currency would ever take hold because people would not accept it. But the privately produced cryptocurrency bitcoin is clearly an example of a market innovation that allows people to choose their own mediums of exchange, and it happens to be a digital means of payment rather than a paper-based method. Although the success of bitcoin, smartphone-based payment applications, credit and debit cards, and other electronic forms of payment have led many to predict the demise of cash (Wolman 2012, Norris 2016), it is striking how many people still use cash.

Federal Reserve data shows that "consumers choose to use cash more frequently than any other payment instrument, including debit or credit cards," and that cash still plays "a dominant role for small-value transactions" (Bennett et al. 2014). Furthermore, cash is still frequently used for relatively large transactions, particularly by lower-income consumers, and is the leading payment instrument for several expenditure categories, such as (1) person-to-person gift transfers, (2) food and personal care supplies, and (3) entertainment and transportation expenditures (ibid.). As of 2012, cash accounted for roughly 40 percent of U.S. consumer transactions by volume, and approximately 14 percent by value (ibid.). Anyone predisposed

to the benefits of private competition would recognize these trends for nothing more than what they are: people revealing their preferred ways of making payments as technologies change. Not surprisingly, many people see these trends as an opportunity to impose their will on others.

Overview of War on Cash

Several prominent academics and policymakers throughout the world have been actively seeking to either phase out or (at least partially) ban the use of paper currency.[1] Three commonly cited reasons to support a ban on cash are (1) paper currency requires an inefficient use of resources; (2) paper currency facilitates tax evasion and criminal activity; and, (3) paper currency makes monetary policy more ineffective when interest rates are at the zero-lower bound. One study estimates that cash cost U.S. consumers $200 billion per year, including expenses associated with collecting, sorting, and transporting cash, as well as ATM fees (Chakravorti and Mazzotta 2013). Banning cash, or certain denominations of paper currency, to stamp out tax evasion and criminal activity is perhaps the most often cited justification, with one author calling on policymakers to "consider the broad spectrum of socio-economic gains—things like reduced criminal activity of nearly every stripe and the promotion of financial inclusion" (Wolman 2012).

Perhaps the most recent rationale for banning cash deals with monetary policy and the somewhat obscure topic of negative interest rates. Negative interest rates on deposits are effectively a penalty for holding cash in a bank account, so any bank customer faced with such a penalty is likely to remove his money from the bank and keep his cash at home. Of course, if enough people keep their cash under mattresses, total spending in the economy will fall. The anti-cash crowd's solution is to ban cash so that people have no choice but to use electronic means of payment. Thus, government officials would always be able to assess a penalty on people when they believe aggregate spending is too low, thus providing a bulletproof mechanism to incentivize people to spend money rather than save it (Rogoff 2014, 2016; Michel 2016).

[1]In several cases, policymakers are seeking to ban both cash and coin in favor of digital alternatives.

Aside from the merits of these arguments, many of the G20 countries have undertaken some type of effort to ban, or at least curb the use of, cash. For instance Australia recently moved to a cashless welfare system to more tightly control which items benefit recipients could purchase (ABC News 2015). The Canadian government disallowed the payment of taxes in cash (at service counters) in 2007 (CBC News 2007), stopped accepting cash as a payment for passports in 2010 (*Toronto Star* 2011), and eliminated the penny in 2013 (Smith 2013). In 2016, the European Central Bank stopped production of its €500 banknote (ECB 2016). In 2014, the Bank of Indonesia launched a campaign urging businesses and consumers to switch to alternative forms of (noncash) payment (Bank of Indonesia 2014). The Italian prime minister made cash payments of more than €1,000 illegal in 2011 (Migliaccio and Sirletti 2011), and in 2015 the Bank of England's chief economist publicly made the case for abolishing cash (Spence 2015).[2] In perhaps the most extreme example, India banned its 500 and 1,000 rupee notes (worth $7.50 and $15, respectively), which constituted more than 85 percent of circulating currency in 2016, primarily in the name of cracking down on corruption and tax evasion (Iyengar 2017, Chakravorti 2017).[3]

In the United States, the effort has been far less dramatic, and there is currently no serious (federal) legislative effort to ban cash. However, several prominent academics, such as Harvard's Larry Summers, Peter Sands, and Kenneth Rogoff, have all publicly supported government policies that curb the use of cash. Summers, a former U.S. Treasury secretary, and Sands, a senior fellow at Harvard, have called for banning $100 bills "based on a judgment that any losses in commercial convenience are dwarfed by the gains in combatting criminal activity" (Sands and Summers 2016).

[2]Citizens in other countries, such as Argentina, shun official paper currency because they do not trust the government (Saks-McLeod 2014).

[3]Interestingly, one of the most vocal proponents of banning cash, Harvard's Kenneth Rogoff, casts doubt on the effectiveness of mitigating certain crimes in this manner. For instance, Rogoff states that "Obviously there are better ways of reducing drug-related crime" and "Eliminating cash would hardly eliminate drug cartels." (Rogoff 2016: 69). Similarly, Citigroup's Willem Buiter, who has argued for eliminating high-denomination paper currency, states that "even though hard evidence is hard to come by, it is very likely that the underground economy and the criminal community are among the heaviest users of currency" (Keohane 2015).

Rogoff, a professor of public policy and economics at Harvard, has written several papers on the subject as well as a book titled *The Curse of Cash*. Rogoff would like to phase out cash over a 15-year period to stem criminal activity and improve monetary policy effectiveness. He also notes the following:

> Third, it is essential that poor and unbanked individuals have access to free basic debit accounts (or the future equivalent), and possibly also basic smartphones, as several countries have already done or are contemplating. The cost is ideally borne directly by the government, though it can also be imposed on banks that will eventually pass the costs on to paying customers. Under the current system, financial exclusion imposes high costs on the poor (e.g., high fees for cashing checks or wiring money), and a strong case can be made for providing better access to financial services even under the current system [Rogoff 2016: 93].

Regardless of the merits of such arguments, it is easy to see how politicians could use these themes—particularly reducing criminal activity and promoting access to banking for the poor—to attract voters.

For the most part, the anti-crime theme has dominated the other reasons for banning and curbing the use of cash. One recent example at the state level is Louisiana HB 195, passed in July 2011. This law, which went into effect in August 2011, banned the use of cash in any secondhand market transaction in the state of Louisiana. The bill was cosponsored by state Rep. Rick Hardy (D), who argued that the legislation would help create "a mechanism to be used so the police department has something to go on and have a lead" (Steigerwald 2011). Secondhand dealers who failed to comply with the bill three times or more could have been fined up to $10,000 and face up to five years in prison. The crucial section of the bill was as follows:

> A second-hand dealer shall not enter into any cash transactions in payment for the purchase of junk or used or second-hand property. Payment shall be made in the form of check, electronic transfers, or money order issued to the seller of the junk or used or second-hand property and made payable to the name and address of the seller. All payments made by

> check, electronic transfers, or money order shall be reported separately in the daily reports required by R.S. 37:1866 [LA HB 195: 30].

The bill, passed mainly in response to a spike in copper thefts, created a public outcry and was quickly amended to apply *only* to businesses that purchase secondhand copper. Louisiana was not alone—it was actually among a handful of states (and cities) to ban junkyards from purchasing scrap metal during an increase in copper and metal thefts (Wiggin 2011). Unsurprisingly, the effort was particularly controversial with scrap dealers. For example, an attorney for the Institute of Scrap Recycling Industries noted: "If you wish to be paid in cash, you're a criminal. We have a problem with that" (Wiggin 2011). Though it may seem odd that state and local governments could restrict payment in Federal Reserve notes (legal tender), federal courts have actually upheld statutes similar to Louisiana's in New York, Mississippi, and Tennessee (Wiggin 2011). To be sure, the legislation in Louisiana did not appear to be driven by partisan politics—of the original sponsors, nine were Republicans and seven were Democrats.

At the federal level, very few members of Congress have introduced legislation aimed directly at curbing the use of cash.[4] One recent bill is the Currency Optimization, Innovation, and National Savings Act of 2017 (COINS Act), introduced by Senator John McCain (R-AZ). The COINS Act would (among other things) suspend the production of the penny for 10 years and require the Government Accountability Office to study the effect of this temporary suspension. The COINS Act would also replace $1 paper notes with $1 coins. The COINS Act was introduced in a previous Congress (in 2011) by Rep. David Schweikert (R-AZ)—neither bill (nor their counterparts in the Senate and House) made it through committee. Incidentally, another bill introduced in 2011—the Currency Efficiency Act, sponsored by Senator Scott Brown (R-MA)

[4]The 1970 Bank Secrecy Act, and its concomitant know-your-customer rules, certainly makes it more difficult to use cash. The bill is rightly viewed as a major turning point in the war on cash in the United States. However, the bill did not ban the use of any particular denomination of U.S. currency, and it was originally aimed at deterring *foreign banks* from laundering criminal proceeds and helping people evade federal income taxes (Burton and Michel 2016).

and cosponsored by Senator John Kerry (D-MA)—would have *suspended* the production of $1 coins "during any period for which the [Treasury] secretary determines that the surplus supply of $1 coins exceeds the reasonable circulation needs for one year" (Currency Efficiency Act of 2011, S. 1624).

Special Interests in the War on Cash

Unless one believes in pure coincidence, the near simultaneous introduction of the COINS Act and the Currency Efficiency Act in 2011 provide a gloomy lesson in the politics of Washington, D.C. The COINS Act was sponsored by a representative from Arizona, a state with a notable mining constituency. Copper ore mines are indigenous to Arizona and nearly 70 percent of the U.S. copper supply is mined in the state (Thorburn 2017). Meanwhile, the Currency Efficiency Act was sponsored by two senators—one Republican and one Democrat—from the state of Massachusetts. It turns out that Massachusetts is the home state of Crane & Co., a paper manufacturing company that has supplied its currency paper to the U.S. Treasury since 1879. Although it has been difficult to find any public statements from either the senators or Crane & Co. that directly bolster this connection, the Dollar Coin Alliance has been happy to connect the dots (Kasperowicz 2011). This group (with members such as the Arizona Mining Association, Copper and Brass Fabricators Council, Copper Development Association, American Amusement Machine Association, National Mining Association, and the Snack Food Association) has openly lobbied for the COINS Act. Because so few bills of this nature have been introduced in Congress, the remainder of the special interest story is less centered on members of Congress and specific legislation.

Visa and Mastercard, the dominant card network companies, have an obvious vested interest in moving more people away from making cash transactions. In 2017, Visa launched the "The Visa Cashless Challenge," whereby it offered small business food service owners direct financial incentives to stop accepting cash payments. It is not yet clear whether the effort was successful, but Visa offered 50 eligible businesses up to $10,000 each in exchange for going cashless (Wattles 2017). Mastercard has been similarly aggressive, but in its own way. For instance, Mastercard launched a campaign called the "Cashless Journey" to "track progress towards cashless economies"

(Thomas 2014). Mastercard markets increasing electronic payments as a solution to an efficiency problem, noting that cash usage costs national economies up to 1.5 percent of GDP (ibid.).

Separately, Mastercard CEO Ajay Banga has been "one of the most ardent supporters of ditching paper currency in the U.S." (Surane 2017). Banga unabashedly states that he views "cash as the real competitor for the company" (ibid.). In 2014, Mastercard also became the first payment company to officially lobby on behalf of bitcoin (Hattem 2014). The bitcoin company Xapo has developed a bitcoin debit card that works on Mastercard and Visa networks, but Mastercard is not affiliated with the company. Regardless, records show that Mastercard paid the lobbying firm Peck Madigan Jones to concentrate on "bitcoin and mobile payments" issues (Hattem 2014). While there are several payment network–related trade associations in Washington, D.C., these groups have been more passive with regard to taking a stand against cash. For example, the Merchants Payment Coalition focuses mainly on reforming card interchange fees and has no official position on banning cash. Similarly, the Electronic Payments Coalition—a coalition including trade associations, credit unions, community banks, and payment networks—has no official position on efforts to ban cash.

Naturally, there are several companies on the opposite side of this issue, and they are lobbying against those that want to ban cash. Perhaps the most vocal is the ATM Industry Association (ATMIA), a trade group that has more than 10,000 members from over 650 companies, including different-sized financial institutions, as well as independent ATM deployers, manufacturers, and processors. In a direct response to Visa's Cashless Challenge, Mike Lee, the CEO of the ATMIA, issued a press release blasting Visa. Lee stated:

> By paying these food service owners $10,000 to reduce their customers' payment choices, Visa Inc. has elevated its commercial interests above the public interest in America. Currency is going to become more important in the cyber era as a bulwark against identity theft, card fraud, skimming, customer data compromises and the kind of global hacking which can render systems in the public and private sectors inoperable. You can't hack cash in the hand. Nor can cash be used as a basis for identity theft. And it never leads to mass data compromises. Nobody needs a war on cash. All we're asking for is freedom of choice for all [Orem 2017].

Loomis International and The Brinks Company are two of the most widely recognized companies on the same side as the ATMIA. In 2014, both companies (along with others) sponsored a report titled "The Case for Cash," aimed at dispelling myths surrounding the anti-cash movement (Currency Research 2014).[5] Though perhaps lesser known to the general public, both Cardtronics (the world's largest ATM operator) and Payment Alliance International (a leading provider of payment-processing solutions) have publicly promoted the benefits of cash.

One of the more powerful trade groups that *could* end up influencing the outcome of this debate is the National Federation of Independent Business (NFIB). The NFIB represents more than 300,000 small businesses and certainly influences legislative outcomes. The NFIB has not, however, taken an official position on whether cash should be banned. On the basis of conversations with NFIB representatives, it appears likely that the NFIB will only weigh in on the debate if its members push it to do so. A similar approach is being taken by the Retail Industry Leaders Association (RILA) and several state and local retail trade associations contacted for this article—all are unlikely to take sides in the debate until their members push them.[6]

As anyone who observed the legislative battles over the Durbin Amendment—the price control that Dodd-Frank instituted on debit card swipe fees—can attest, retail trade associations can undoubtedly sway members of Congress on important financial legislation votes. The National Retail Federation (NRF), for instance, played a pivotal role in convincing Republican members to strip a repeal of the price control from the Financial CHOICE Act, a bill that ultimately passed the House of Representatives. The NRF, and other groups, were successful even though they were pitted against many bank trade groups (Kharif 2016).

[5]The report was published by Currency Research, an "international organization," that represents many financial institutions and other organizations within the "currency and cash handling industries." See http://currencyresearch.com/about.

[6]A partial list of associations, with no official position on the cash debate, contacted for this article includes the following: Colorado Restaurant Association, Maine Restaurant Association, National Restaurant Association, Restaurant Association of Metropolitan Washington, National Association of Convenience Stores, the American Beverage Association, and the National Pawnbrokers Association.

In the debate over banning cash, the NRF has not yet taken an official position, but a recent article indicates that the NRF is unlikely to support anything like a full ban on cash anytime soon. NRF Senior Vice President Mallory Duncan argued that many retailers prefer cash transactions because cash still provides 100 cents on the dollar versus the 97 to 98 cents on the dollar they receive from card network transactions. Duncan noted that these swipe fees far outweigh the cost of handling cash, and stated, "From a cost standpoint for most retailers of any size, cash is still king" (Greene 2016). If any member of Congress makes a serious effort to ban cash in the near future, the NRF seems likely to mount an opposition campaign.

Last but not least, it is unclear what role the banking industry will ultimately play in this debate. It is true that Chase, the nation's largest bank, recently stopped allowing customers to use cash to make payments on credit cards, mortgages, equity lines, and auto loans, and also prohibited the storage of cash in safe deposit boxes (Murray 2015). Though it would be easy to argue that "the banking industry" is beholden to federal regulators, and is simply carrying out more controls on cash at regulators behest (Burton and Michel 2014), the industry is actually quite fragmented. For instance, the CEO of Iowa's Northwest Financial Corp, Jeff Plagge, argues that the cashless society may be "overhyped," and that he sees "a less-cash society rather than a cash-free society" (Epstein 2017). In general, community banks take a very different view of regulation than the largest banks—even when it comes to the cash-unfriendly know-your customer rules. It is unlikely, for instance, that JP Morgan Chase's CEO would make a statement similar to Plagge's.

There is, of course, no doubt that all banks would be at the mercy of their federal regulators should the federal government decide to crack down on cash even further, but the largest banks stand to gain the most by policies such as negative interest rates because they hold such a large percentage of customers' deposits.[7] The true wildcard in this debate, though, is the Federal Reserve.

[7]It is tempting to think that the largest banks have the most leverage with government regulators, but community bank trade groups, such as the Independent Community Bankers of America, hold enormous sway on Capitol Hill. And, many members view large banks negatively. Exactly how this dynamic influences the debate on banning cash will depend on how (and when) events unfold.

Should the Fed decide that implementing monetary policy requires a move to a digital-only world without paper currency, it will become very difficult to stop the ban—especially if current trends continue and people continue to rely less on cash. Nonetheless, powerful special interest groups regularly affect the outcome of policy battles, and there is no reason to think that the assault on cash will play out any differently. Still, if the use of cash continues to diminish, then the interest groups that currently oppose banning cash will hold less sway. If history is any guide, groups that want to preserve consumer choice in forms of payment should waste no time redirecting federal efforts toward solving real economic problems and directly stemming criminal activity. Otherwise, the long-term trend of central banks taking over monetary functions from private markets will surely continue.

Conclusion

Throughout the world, there has been a steady shift away from paper-based payments during the last few decades. This change has occurred as technology changed, thus making it easier to facilitate consumer exchanges electronically. If the federal government would simply allow those changes to take place, there would be no particularly unique problem—the trends toward a less-cash society would likely continue. Criminals may find it more expedient to transfer money anonymously via the Internet, but they have surely found it easier to commit crimes with the advent of better automobiles, computers, and communication devices.

There is certainly a strong public interest in preventing terrorist attacks and prosecuting fraudulent behavior, but there is an equally strong public interest in protecting law-abiding citizens' personal and financial privacy. And there is simply no reason that these factors cannot be properly balanced without banning cash and forcing all citizens to use only one form of money. Virtually no U.S. banker would object to, for example, providing legitimate criminal suspects' transaction records to the proper authorities. There is no need to criminalize cash itself to prosecute someone engaged in criminal activity, or to ignore law-abiding citizens' right to personal and financial privacy.

Even some of the staunchest supporters of banning (or limiting) the use of cash acknowledge that doing so will not eliminate crime. Furthermore, at least one prominent supporter of banning cash

acknowledges that "the biggest threat to the value of the currency is often the government itself" (Rogoff 2016: 19). It seems risky, at best, to give the government so much control over the form of payment citizens choose, but that is exactly what many policymakers are hoping to do. At the federal level, there is no doubt that special interest lobbying will influence whether the government successfully bans cash. As citizens continue to rely more on digital payments and less on cash, it will become more difficult for trade associations to resist the federal push to ban cash. If history is any guide—central banks have taken over nearly all of the monetary functions that private markets used to handle—it is critical that policymakers soon redirect their efforts at the source of real economic problems and criminal activity.

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The Costs and Benefits of Eliminating Currency

William D. Lastrapes

Government-issued paper currency is under fire. Proposals to eliminate it—or at least to demonetize and no longer issue large denomination notes—are prevalent (Rogoff 1998, 2016; Sands 2016). Proponents point out that paper notes—circulating bearer-bonds that pay a zero (nominal) return—promote underground and illicit economic activity because of their anonymity, and preclude "negative interest rate" monetary policy during financial crises and severe downturns. Taking currency out of peoples' hands will increase the costs of bad behavior, and free up the Fed.[1]

Clearly, doing away with paper currency entails important trade-offs that must be considered by policymakers. Whereas currency might reduce the costs of tax evasion, corruption, and drug trafficking, and cause discomfort to central bankers, it has a long history as a beneficial and popular means of legitimate payment. Whether we should support proposals to eliminate large-denomination banknotes or circulating currency altogether depends on whether, overall, the benefits of doing so exceed the costs. Does ditching currency improve social welfare?

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[1]Current proposals have been around for a while: Recommendation 24 of the Financial Action Task Force on Money Laundering of the OECD (1998) moves to combat money laundering by "encourag[ing] the replacement of cash transfers" through better money management. More recently, India has demonetized (i.e., removed legal tender status of) its 500 and 1,000 denomination rupee notes, ostensibly to curb corruption, to mixed reviews (White 2017).

I argue that there are two essential dimensions to any approach that seeks an answer to this question. First, the framework for analysis must be one of general equilibrium—all channels through which such a major policy change affects economic incentives and behavior, both direct and indirect, must be considered. Second, the analysis must be quantitative. Pointing out the potential responses to the policy change can give us an understanding of the qualitative nature of the effects of demonetization, but only gets us so far. Understanding their overall effect on human well-being requires assessing the *magnitudes* of the tradeoffs, how big the costs and benefits are. Formal models of the overall economy are needed to achieve this understanding.

The aim of this article is to make an initial pass at measuring the welfare effects of currency elimination in the United States using the tools of macroeconomic theory. I rely on a standard dynamic general equilibrium model extended to allow households to avoid taxes by not reporting income, where holding and using money helps toward that end. Money in the model also serves to reduce the costs of legal transactions in consumer goods. Thus, the model, in a stylized but general way, captures the demand for holding money both for legitimate purposes and to facilitate tax evasion. For tractability, my model does not distinguish currency from other forms of transactions media; the model's analog to currency demonetization is the analytical assumption that government monetary authorities can control how productive money is as a tax evasion device. In the model, reducing the productivity of money for tax evasion is tantamount to lowering the share of paper money in the nation's overall money supply. I use this framework to illustrate the basic macroeconomic tradeoffs that eliminating currency would involve, and to quantitatively predict the overall effects on welfare.[2]

With only mild apologies, I set up the model to focus on tax evasion as the sole means by which paper currency can be abused, and ignore the many other illicit uses of cash, such as drug trafficking, prostitution, money laundering, and corruption. For many of these activities it would be straightforward to generalize the model to

[2]My model extends the work of Rogoff (1998: Appendix A) to a general equilibrium setting. Rogoff (1998: Appendix B) develops a more realistic model with two currency denominations, but I have used the simpler model here.

account for their role, but for my purposes doing so would excessively complicate things. Perhaps more importantly, though, tax evasion in the United States is, according to Rogoff (1998: 59), "truly massive" and is an important, if not the most important, underground use of cash in the United States. Thus, the costs and benefits of policies to diminish tax evasion—like currency demonetization— are relevant and worth studying. At the same time, while tax evasion introduces its own distortions and inequities, unreported income can also be an efficient response to tax distortions and can create incentives for work and production, which affects the cost-benefit calculus. It is also not clear how to appropriately incorporate some illicit activities, like the drug trade and prostitution, into the analysis when simply legalizing these activities would probably be a first-best solution. Finally, the model in this article has nothing to say regarding the negative-interest-rate argument for eliminating cash; I simply note that there are many ways to pay negative interest rates on cash, as described by Kimball (2017) for example, so that the potential benefit of currency elimination has less importance for monetary policy than its supporters might suggest.[3]

Here is a rough sketch of the relevant interactions in the model. Holding currency, by encouraging tax evasion through unreported income, reduces the effective income tax rate of the average household. Thus, cash holdings increase after-tax returns to labor and capital, which in turn increase the supply of inputs to firms, increase output, and increase the tax base. Whether tax revenues rise with money and tax evasion depends on the relative strength of the opposing movements in the effective tax rate and the tax base. Government spends resources on public goods, which directly improves welfare and which also increases factor productivity (think of infrastructure expenditures, like roads). Government policy that reduces the effectiveness of money as a tool for tax evasion—like eliminating large-denomination notes—can therefore have complicated effects on welfare by affecting work (and leisure), production, consumption, tax revenues, and government spending. The model accounts for all of

[3]One more reason for my limited focus on tax evasion is that Rogoff (1998: 2) claims that "the effect of curtailing paper currency on tax evasion alone would likely cover the lost profits from printing paper currency, even if tax evasion fell by 10–15 percent." My approach is one way to directly assess claims like this.

these effects and feedback loops. The model also accounts for the likelihood that policies to eliminate cash or large-denomination notes also unavoidably negatively affect the ability of money to reduce transactions costs for legitimate purposes.

There is a large literature on tax evasion; for surveys see Slemrod (2007) and Alm (2012). Balafoutas et al. (2015) is a recent attempt to measure the costs of tax evasion, while Mazhar and Mon (2017) empirically consider the impact of the underground economy and tax evasion for developing and developed economies. Gordon (1990) is an early theoretical effort to examine the role of currency for tax evasion but is not a general equilibrium analysis. Camera (2001) moves in the right direction with a search-theoretic, general equilibrium framework that specifically models interactions between illegal activities and alternative media of exchange. Yet his model is complex and there is no quantitative welfare analysis. Much work in this area uses currency demand to estimate the size of the underground economy, as in Cebula and Feige (2012). This work is useful, but none of these papers or those cited in the surveys provide direct estimates of welfare effects of currency demonetization, which motivates my paper.

Without question this model is too stylized and restrictive to provide confident policy advice. For example, not only do I ignore other factors besides tax evasion where the use of currency can impose costs to society, but I also do not account for other exchange media that can aid tax evasion. Yet the model remains a reasonable way to examine the questions at hand if we simply assume that alternative media reduce the capability of the government to restrict cash's productivity for tax evasion. The main strength of the model is that the general equilibrium effects are coherent and can be quantified. To obtain magnitudes, I calibrate the model's parameters to plausible values and compute the implications for the steady-state values of consumption, employment, output, and welfare. Ignoring short-run dynamics is another important shortcoming of the article that needs to be dealt with in future work.

As will be seen below, for the benchmark parameterization, as well as for some alternatives, social welfare goes down when money's tax-evasion productivity falls owing to government action on the order of magnitude of what a large-note demonetization in the United States might entail. The loss in welfare from the resulting increased tax burden and reduction in output and consumption is not offset by the gains from an increase in public goods and infrastructure spending.

Nonetheless, this finding is sensitive to the calibration and the model specification, so I make no claims here on the optimal policy stance. The modest goal of this paper is to describe a feasible approach for assessing the potential welfare gains to society of eliminating currency.

The Model

I imagine an economy consisting of many identical households, many identical profit-maximizing firms, and a government sector. Households earn income by supplying labor and physical capital to firms in competitive factor markets; firms in turn use these inputs to produce a consumer good based on a common production technology. The produced good is sold by firms to households and the government sector in competitive markets as well. All actors in this economy take prices—wages, interest rates, and the overall price level—as given when making allocation decisions. These prices adjust to ensure that input and output markets clear, households maximize their utility, firms maximize their value, and the government taxes and buys its share of output, all obeying the economy's overall resource constraint.

Households are forward-looking and infinitely lived, and have perfect foresight about the future.[4] They maximize lifetime utility, derived from current and future consumption of the produced good and from leisure, subject to a resource constraint. This constraint depends on households' lifetime flow of income generated by supplying labor and capital to firms, for which they earn wages and profits net of income taxes paid to the government sector, and the ability to accumulate new capital in financial markets. Households hold and accumulate real (fiat) money balances because cash reduces transactions costs incurred when consumer goods are purchased and serves as an input into a "tax evasion" technology (more on this below). Money is also subject to storage costs, which are increasing in the quantity of money. Households' utility maximization ultimately determines the demand for consumption, the supply of labor (which

[4]Since my analysis focuses on the economy's "steady state," which rules out, by assumption, the possibility of unpredictable shocks, perfect foresight is an innocuous assumption here.

is the households' only alternative use of time besides leisure), the demand for money, and the accumulation of capital through saving, all as they evolve over time.

Firms produce output according to a constant-returns-to-scale production technology. Because firms hire labor and rent capital from households, maximizing the value of the firm (discounted lifetime profits) is tantamount to maximizing profits each period. This objective generates firms' demand for labor and capital and determines the supply of consumer goods. The model's equilibrium is the predicted outcome of household and firm interaction in competitive markets, as prices ensure that supply and demand are equal in all markets. This outcome determines quantities for household consumption, employment, capital accumulation and total output of the produced good (GDP).

The government sector purchases a share of produced goods, financed by collecting lump sum and flat rate income taxes, and by issuing new nominal money balances, which provides seigniorage.[5] To simplify, I assume that the government sets the nominal money supply to grow at a constant rate, and ignore countercyclical monetary policy that is not needed in a full-employment steady state. The government, without cost, converts its purchases of produced goods to public goods that provide utility directly to households and increase the productivity of labor and capital. Equilibrium in the model also requires that the real supply of money provided by the government equal the demand for money arising from households' optimal decisions, and that the government always satisfy its budget constraint.[6]

To better understand the model and to quantify its predictions, it is necessary to formalize it. Exposition of the model's formal structure is aided by ignoring prices and treating the competitive economy as being directed by a fictitious central planner who chooses optimal consumption, employment, capital accumulation, money holdings,

[5]Debt and lump sum taxes are equivalent by the assumptions of Ricardian Equivalence; therefore, I do not model nonmonetary debt explicitly

[6]The economy's price level will adjust to ensure that real money supply equals real money demand, even if the nominal money stock is exogenously determined by a central bank. Rogoff (1998: 298–99) provides weak conditions for price level determinancy in this model.

and output given full information about preferences and technology.[7] The formal model is given by the following equations:

$$\max V = \sum_{t=0}^{\infty} \frac{u(c_t,\ n_t,\ g_t)}{(1+\rho)^t} \tag{1}$$

$$i_t + \frac{\theta m_{t-1}}{1+\pi_t} + c_t = y_t - [T_t + \tau(m_t)y_t] - v(m_t)c_t - bm_t^2 \tag{2}$$

$$y_t = Ag_t^a k_t^\alpha n_t^{1-\alpha} \tag{3}$$

$$g_t = T_t + \tau(m_t)y_t + \frac{\theta m_{t-1}}{1+\pi_t} \tag{4}$$

Equation (1) is the representative household's lifetime utility function, which depends on consumption (c), leisure ($1 - n$, where n is labor supply given a unit time endowment), and the provision of public goods by the government (g_t). Future utility is discounted to the present at the rate of time preference, ρ. The household chooses time paths for c_t, n_t, k_{t+1} (physical capital) and real money balances ($m_t = M_t/P_t$, where M is the nominal stock of money, P_t is the price level, and $\pi_t = (P_t - P_{t-1})/P_{t-1}$ is the inflation rate) to maximize (1) with respect to the sequence of constraints in equation (2), presumed to hold for each period in the planning horizon. In equation (2), i_t is gross investment in physical capital, θ is the constant rate of price level inflation set by the government, y_t is total output of the produced good (GDP), T_t are lump sum taxes, $\tau(m_t)$ is the effective income tax rate where money can be used to shield taxable income, $v(m_t)$ is the proportion of consumption expenditures used up in transactions, and the last term is a quadratic storage cost function for currency. Equation (3) is the production function that I incorporate directly into the household's constraint owing to the central planner assumption: α is the elasticity of output with respect to the capital stock, and a is the elasticity of output with respect to government

[7]The central planner in this model is only an expositional device that has no policy implications. Under the conditions of the model the fictitious planner's allocation will precisely mimic that of a multiagent, competitive market economy in which prices coordinate choice.

spending.[8] The final equation is the government's budget constraint, which shows that government spending is financed by income taxes and money growth. All lowercase variables, except labor, are real (as opposed to unit of account) values and measured in terms of the consumer good. Labor is simply the number of hours worked.

The important innovation in the model, due to Rogoff (1998) and essential for the aim of this article, is the effective tax rate function, $\tau(m_t)$. I restrict the function so that as m increases the effective tax rate falls, although it is assumed to fall at a declining rate. The function accounts for the potential value of cash as an anonymous transaction medium that enables households to underreport income to the government, which reduces their effective tax rate. I parameterize the function to be $\tau(m_t) = \bar{\tau}e^{-\varphi_\tau m_t}$, where $\varphi_\tau > 0$ and $\bar{\tau}$ is the constant statutory income tax rate. φ_τ is the semielasticity of the household's effective income tax rate with respect to its holding of real money balances, and can be thought of as the marginal value of money for tax evasion.

The key parameter of the analysis is φ_τ. I assume that the government sector has some control over its value. A policy that reduces φ_τ will make money less valuable as a means for avoiding taxes, and will also lower money's value in reducing legitimate transactions costs. I implement the latter assumption by making $v(m_t)$ depend negatively on φ_τ . Reducing φ_τ is the model's analog to proposals to eliminate currency or large-denomination banknotes, and is the policy change I examine in this article.

What does the model predict will happen, economy wide, under such a policy? A decrease in φ_τ increases the effective tax rate for a given level of cash holdings and thus increases tax revenues for a given tax base. All else the same, government spending rises with the increase in tax revenues, which will increase household welfare through additional public goods and output through enhanced factor productivity. At the same time, however, there is downward pressure on output because, since the return to labor and capital falls with the increase in effective tax rates, labor and capital inputs fall. More resources are also wasted through higher transactions costs for consumption. As employment falls and leisure rises, welfare increases.

[8]Note the public good nature of government spending—the same quantity can directly add to household utility and improve input productivity.

But as output falls, so do consumption and welfare. Also, the equilibrium response of tax revenues, and therefore government spending, is ambiguous because of the offsetting movements of tax rates and the income tax base. The ultimate effects on output, consumption, and welfare are complex and subtle, and depend on the magnitudes of the model's parameters. The value of a numerical simulation, performed in the next section, is to quantitatively evaluate these general equilibrium effects on the basis of plausible calibrations of the model.

Clearly, the model is highly stylized and misses important channels through which altering the composition of the money supply, by eliminating currency, will affect economic activity and welfare. However, the mechanisms built into this model are general enough to shed light on the channels of influence. For example, in the model I have considered only one type of money—currency—and have assumed away bank deposits and the importance of the composition of the money supply. However, interpreting money in the model as M1 (currency and checkable deposits) would simply scale down the value of φ_τ, and eliminating currency altogether could still be interpreted as a reduction (perhaps of smaller magnitude) in money's tax evasion elasticity. Similarly, the existence of alternative tax evasion media, like gold or bitcoin, could be accommodated by suitable scaling of φ_τ. In the end, richer models than the one used here are needed to confidently understand the costs and benefits of currency elimination in the United States. However, the simple model of this paper is a reasonable start.

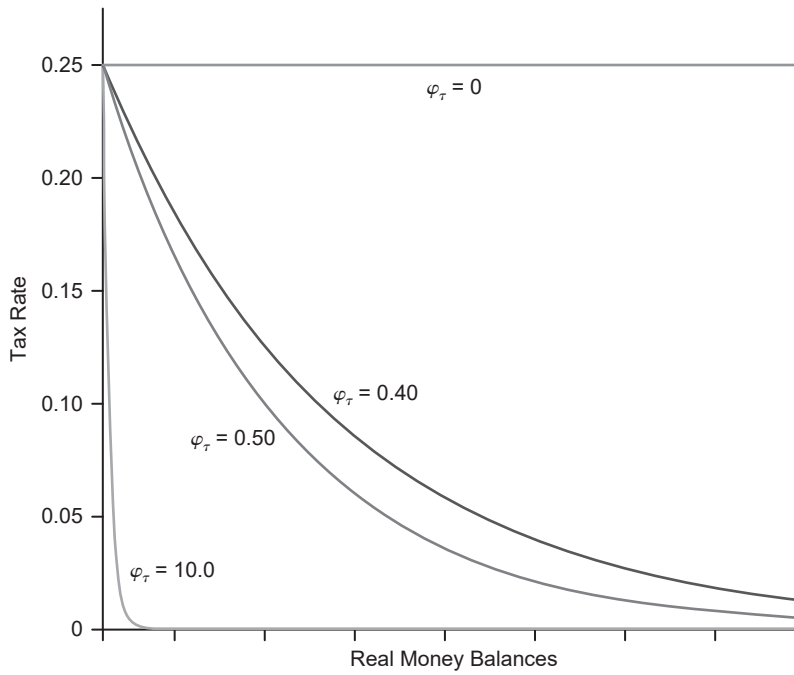
Simulation

Given specific functional forms, the model above can be solved for the variables of interest in a straightforward manner using standard techniques. I ignore transitional dynamics and focus on the model's steady state—the time-invariant equilibrium quantities of household consumption, employment, capital stock, money holdings, and government expenditures and their implications for household welfare, to which the system converges over time. These values are functions of the model's parameters, which I calibrate to force the steady state to roughly match U.S. experience. I then compare initial steady-state magnitudes to the new steady state for a policy-induced change in parameters. In particular, I consider the effects on steady-state

quantities and welfare of a reduction in the value of money for tax evasion, which I take to proxy for currency or large-note elimination. The appendix provides technical details about the model, its solution, and its steady state. The appendix also reports the calibrated parameter values used to simulate the model.

Figure 1 illustrates the form of the model's effective tax rate function, $\tau\ (m_t)$, which helps explain the nature of the policy experiment. Each curve in the graph shows, for a given value of φ_τ (the semi-elasticity of the effective tax rate with respect to money), the effect on the household's tax rate of varying its real money balances. If $\varphi_\tau = 0$, households' effective tax rate is a constant 25 percent, the value of $\bar{\tau}$ used in the simulation, regardless of the quantity of real balances held. As φ_τ rises, say to 40 percent (as in the figure), the tax rate falls for any given level of money holding, as indicated by a shift down in the curve, and continues to fall (though at a diminishing rate) as real money balances rise. The downward slope of the curve

FIGURE 1
Tax Evasion Function



thus represents the ability of holding and using cash to reduce effective income tax rates by hiding income from the tax authorities. A value for φ_τ as large as 10 means that even small increases in m cause substantial declines in effective rates for small money holdings. The "productivity" of cash as a tax evasion device thus rises and falls with φ_τ.

My aim is to consider the welfare effects of eliminating currency, which I represent here as government action to reduce φ_τ. In particular, I simulate the steady-state solution of the model assuming $\varphi_\tau = 0.5$, then resimulate in the face of an exogenous reduction in this parameter to 0.4. I take this to be the model's analog to a policy of eliminating large-denomination notes. I consider a baseline parameterization in which government spending has no effect on productivity and so set $a = 0$; in a second model I let $a = 0.05$, which assumes government spending capital goods is 15 percent of the productivity of private capital. I also consider sensitivity to changes in the direct utility contribution of government spending through public goods.

Table 1 shows the simulation results for the two model parameterizations, the baseline case in the first panel and the case where government spending is productive in the second. The first column

TABLE 1
Simulation Results

	$a = 0$			$a = 0.05$		
	$\varphi_\tau = 0.5$	$\varphi_\tau = 0.4$	Δ	$\varphi_\tau = 0.5$	$\varphi_\tau = 0.4$	Δ
Y	27.044	25.657	−5.13%	28.619	28.230	−1.36%
C	16.313	15.348	−5.91%	17.674	17.111	−3.18%
N	0.328	0.323	−1.53%	0.324	0.321	−0.70%
M	1.040	0.915	−12.02%	1.080	0.982	−9.12%
G	4.030	4.458	10.61%	4.179	4.775	14.26%
K	196.161	172.555	−12.03%	193.072	184.177	−4.61%
C/Y	0.603	0.598	−0.50pp	0.618	0.606	−1.14pp
G/Y	0.149	0.174	2.47pp	0.146	0.169	2.31pp
M/Y	0.038	0.036	−0.28pp	0.038	0.035	−0.30pp
$V(\varphi_g = 0)$	0.722	0.705	−2.20%	0.754	0.745	−1.20%
$V(\varphi_g = 0.035)$	0.770	0.757	−1.68%	0.804	0.800	−0.57%

in each panel reports steady-state values for the six endogenous variables, the implied ratios of consumption, government spending and money balances to overall income, and the level of household welfare, all when $\varphi_\tau = 0.5$. The second column contains the same information for a reduction in φ_τ to 0.4. As shown in the first panel for the baseline case, the calibrated parameters imply reasonable steady-state values for the income ratios: consumption is just above 60 percent of GDP, and government spending is just below 15 percent. The ratio of money to income is 3.8 percent, which puts it in the neighborhood of the average U.S. currency–to–GDP ratio (Judson 2012: Figure 3), and very close to the ratio of large denomination notes to GDP. Because the scale of the variables in the model is arbitrary, equilibrium levels of output and consumption cannot directly be matched to the data, but the implied ratios provide support for the calibrated parameters. Likewise, the fraction of time spent working—33 percent in the baseline model—is also reasonable and consistent with U.S. experience.

Some back-of-the-envelope calculations can help to interpret the quantitative nature of the paper's policy experiment. Judson (2012: 25–26) estimates that, as of 2011, $340 billion in $100 and $50 bills were held domestically in the United States, or 40 percent of the $780 billion total in circulation. If large bills have a velocity for unreported cash transactions of 3, and the average (marginal) tax rate is 25 percent, then completely eliminating large notes would add $255.5 billion to U.S. tax coffers, or roughly 1.4 percent of GDP. In my model, reducing φ_τ from 0.5 to 0.4 increases households' effective tax rate from around 14.5 percent to 16 percent (evaluated at the initial steady-state value of m), a 1.5 percentage point increase. Thus, reducing the semielasticity of money by the amount in this experiment is similar in magnitude to eliminating large bills in the United States.[9]

Consider first the baseline model of panel 1, in which $a = 0$. Eliminating large-denomination notes (according to the model's analog) causes households' effective tax rate to rise from 14.9 percent

[9]Rogoff (1998: 60), citing work by Slemrod (2007), notes that the "net tax gap" of uncollected taxes relative to expected taxes was 2.7 percent of U.S. GDP in 2006. The experiment considered here reduces this gap by more than half, which is feasible and plausible. The tax gap estimates in Cebula and Feige (2012) for 2009 in the United States are a bit larger than Slemrod's.

to 17.3 percent (which is essentially the government's share of output) and output to decline by over 5 percent. This decline comes about because employment falls by 1.5 percent and capital falls by over 12 percent, owing to the lower incentives to supply inputs in the face of higher marginal tax rates. Not surprisingly, the demand for real money declines, in this case by 12 percent, since cash has less value on the margin after the elimination of large notes. Tax revenues rise, leading to a reallocation of output from the household to the government sector—consumption falls by almost 6 percent and government spending rises by almost 11 percent, with the output share of the former falling slightly.

Given these equilibrium adjustments in response to the policy change, the overall effect on household welfare is negative. As shown by the last rows of the table, steady-state utility falls by 2.2 percent because of the large decline in consumption, while the implied increase in leisure, as labor supply falls, does not offset the consumption effect. If we allow government spending on public goods to directly affect utility with weight of $\varphi_g = 0.035$ (10 percent of the weight given to private consumption), the general equilibrium costs of the policy still outweigh the benefits, with welfare declining by 1.7 percent.

Does infrastructure spending by the government improve the case for large-note elimination in the model? The second panel simulates the steady state assuming the parameter a is 5 percent, instead of 0. As might be expected, equilibrium output is higher than the baseline case regardless of the tax evasion parameter, and its decline is also dampened with the policy move, falling by only 1.4 percent. Yet, while the decline in consumption is also weaker than the baseline case, so is the fall in labor supply and the net effect on household welfare remains negative. Even when government spending directly adds to utility, welfare falls with the note-elimination policy by 0.6 percent, noticeably smaller but welfare-reducing nonetheless. The threshold for φ_g in the second parameterization that just makes households indifferent to the policy is a value of 0.2.

Conclusion

This article takes a first step to providing quantitative estimates of the welfare effects of proposals to eliminate currency or large-denomination currency notes in the United States. Importantly, the

model is one of general equilibrium, so costs and benefits are clearly specified, coherent, and complete (within the context of the model). My findings indicate that a currency ban might negatively affect overall welfare, which is consistent with the conjectured cautions of Camera (2001: 405).

I have been upfront regarding the many limitations of this study. Models that more precisely distinguish among currencies of different denominations, that incorporate other illicit uses of cash besides tax evasion and allow for alternative transactions media like bitcoin, that more carefully calibrate the model to developed and developing countries, and that pay attention to short-run transitional dynamics are needed before sensible assessments of policy proposals can be made. I leave these important extensions to future work.

Appendix

The complete model, including the household problem and the government budget constraint, and where all functional forms are specified, is given by

$$\max V = \sum_{t=0}^{\infty} \beta^t \left[\frac{[c_t^{\gamma}(1-n_t)^{1-\gamma}]^{1-\sigma} - 1}{1-\sigma} + \varphi_g \ln(g_t) \right]$$

$$\text{subject to } k_{t+1} - (1-\delta)k_t + m_t + (1 + \bar{v}e^{-\varphi_v m_t})c_t + T_t$$
$$= (1 - \bar{\tau}e^{-\varphi_\tau m_t})y_t - bm_t^2 + \frac{m_{t+1}}{1+\pi_t}$$

$$y_t = \bar{A}g_t^a k_t^{\alpha} n_t^{1-\alpha}$$

$$g_t = \bar{\tau}e^{-\varphi_\tau m_t} + T_t + \frac{M_t - M_{t-1}}{P_t}$$

$$M_t = (1+\theta)M_{t-1}$$

where all variables are as defined in the text. Note that the competitive market model is written in terms of a fictitious central planner where prices are implicit. The functional forms are common.

Using standard techniques for optimization yields the following dynamic equilibrium conditions:

$$\left(\frac{1-\gamma}{\gamma}\right)\frac{c_t}{1-n_t}=\frac{1-\bar{\tau}e^{-\varphi_\tau m_t}}{1+\bar{\upsilon}e^{-\varphi_\upsilon m_t}}(1-\alpha)\frac{y_t}{n_t}$$

$$\beta\left[\frac{c_{t+1}^{\gamma}(1-n_{t+1})^{1-\gamma}}{c_t^{\gamma}(1-n_t)^{1-\gamma}}\right]^{1-\sigma}\frac{c_t}{c_{t+1}}\frac{(1+\bar{\upsilon}e^{-\varphi_\upsilon m_t})}{(1+\bar{\upsilon}e^{-\varphi_\upsilon m_{t+1}})}$$

$$=(1-\bar{\upsilon}e^{-\varphi_\upsilon m_t}\varphi_\upsilon c_t-\bar{\tau}e^{-\varphi_\tau m_t}\varphi_\tau y_t+2bm_t)(1+\pi_{t+1})$$

$$\beta\left[\frac{c_{t+1}^{\gamma}(1-n_{t+1})^{1-\gamma}}{c_t^{\gamma}(1-n_t)^{1-\gamma}}\right]^{1-\sigma}\frac{c_t}{c_{t+1}}\frac{(1+\bar{\upsilon}e^{-\varphi_\upsilon m_t})}{(1+\bar{\upsilon}e^{-\varphi_\upsilon m_{t+1}})}$$

$$=\left[(1-\delta)+(1-\tau e^{-\varphi_\tau m_{t+1}})\alpha\frac{y_{t+1}}{k_{t+1}}\right]^{-1}$$

$$y_t=k_{t+1}-(1-\delta)k_t+(1+\bar{\upsilon}e^{-\varphi_\upsilon m_t})c_t+g_t+bm_t^2$$

$$g_t=\bar{\tau}e^{-\varphi_\tau m_t}y_t+\frac{\theta m_{t-1}}{1+\pi_t}$$

Together with the production function, these equations determine optimal paths for c, n, m, k', g and y, taking initial values for k and m as given and lump sum taxes, T as exogenous. The model admits a steady state in which the endogenous variables are constant and the rate of inflation $\pi_t = \theta$. Because T is exogenous, changes in income taxes and seigniorage, which are endogenous, necessarily determine government spending. The model's steady state is:

$$\frac{1-\gamma}{\gamma}\frac{\bar{c}}{1-\bar{n}}=\frac{1-\bar{\tau}e^{-\varphi_\tau\bar{m}}}{1+\bar{\upsilon}e^{-\varphi_\upsilon\bar{m}}}(1-\alpha)\frac{\bar{y}}{\bar{n}}$$

$$\beta=(1-\bar{\upsilon}e^{-\varphi_\upsilon\bar{m}}\varphi_\upsilon\bar{c}-\bar{\tau}e^{-\varphi_\tau\bar{m}}\varphi_\tau\bar{y}+2b\bar{m})(1+\theta)$$

$$\beta\left[(1-\delta)+(1-\bar{\tau}e^{-\varphi_\tau\bar{m}})\alpha\frac{\bar{y}}{\bar{k}}\right]=1$$

APPENDIX TABLE 1
Model Parameters and Values

Parameter	Description	Value
σ	coefficient of relative risk aversion	1.0
γ	utility share of consumption	0.35
φ_g	utility share of government spending	$0/0.2\gamma$
α	elasticity of output with respect to capital	0.33
δ	capital depreciation rate	0.025
β	intertemporal discount factor	0.99
b	money storage cost factor	1.0
$\overline{T}$	lump sum component of taxes	0.0
θ	steady-state inflation	0.01
$\overline{A}$	steady-state total factor productivity	10.0
a	elasticity of output with respect to government spending	$0/0.15a$
$\bar{v}$	proportional transactions costs	0.05
φ_v	semielasticity of $v(m)$ with respect to real money	$0.25\varphi_\tau$
$\bar{\tau}$	statutory income tax rate	0.25
φ_τ	tax rate semielasticity of money	0.4/0.5

Note: See DeJong and Dave (2007) for justification of the model's standard parameters.

$$\bar{y} = \bar{k} + (1 + \bar{v}e^{-\varphi_v \bar{m}})\bar{c} + \bar{g} + b\bar{m}^2$$

$$\bar{g} = \bar{\tau}e^{-\varphi_\tau \bar{m}}\bar{y} + \left[\overline{T} + \left(\frac{\theta}{1+\theta}\right)\bar{m}\right]$$

Appendix Table 1 lists the parameters, their description, and the values used in the calibration. As is typical, I assume time is measured quarterly.

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The Slow, Uneven Rise of the Renminbi

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The Chinese renminbi (RMB) has come a long way in a short period. It was only in the early 2000s that the Chinese government began the process of gradually opening up the country's capital account, allowing financial capital to flow more freely across its borders. This process was very gradual at first and picked up pace only a decade later. Over the last few years, the RMB's progress as an international currency has been remarkable in some aspects. However, the currency's seemingly inexorable progress stalled in 2014. Starting in mid-2014, the Chinese economy seemed to be losing steam, domestic and foreign investors became less confident about the stability of its financial markets, and, to compound these problems, China's central bank made some missteps as it attempted to make the currency's value more market determined.

Nevertheless, in October 2016, the RMB achieved a major milestone in its ascendance as an international currency. That month, the International Monetary Fund (IMF) officially anointed the RMB as an elite global reserve currency. The RMB joined the select basket of currencies (previously comprising the dollar, the euro, the Japanese yen, and the British pound sterling) that

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constitute the IMF's artificial currency unit, the special drawing right (SDR). However, this does not by itself mean that the RMB is already in a position to significantly reshape global finance, and it still has a long way to go before it can play a major role in international finance.

This article considers three related but distinct aspects of the role of the RMB in the global monetary system and describes the Chinese government's actions in each of these areas. First, I discuss changes in the openness of China's capital account and the degree of progress toward capital account convertibility. Second, I consider the currency's internationalization, which involves its use in denominating and settling cross-border trades and financial transactions—that is, its use as an international medium of exchange. Third, I trace the RMB's evolution as a reserve currency.

The RMB is likely to become a significant player in international financial markets even if its rise to prominence levels off, yet its full potential may remain unrealized unless the Chinese government undertakes a broad range of economic and financial system reforms. In the long run, what the RMB's ascendance means for the global financial system depends, to a large extent, on how China's economy itself changes in the process of elevating its currency.

Capital Account Opening

In recent years, the Chinese government has taken a number of steps to elevate the RMB into this group of elite currencies by increasing its international use. However, the RMB's adoption in global markets has been limited by the Chinese government's unwillingness to free up its exchange rate and fully open the capital account.[1]

The government has removed restrictions on capital inflows and outflows, but in a controlled and gradual manner. For instance, the government has set up a number of schemes to allow foreign

[1]The literature examining specific aspects of China's exchange rate management and capital account liberalization, along with the RMB's rising role in international finance, includes Frankel (2005, 2011); Lardy and Douglass (2011); Yam (2011); Prasad and Ye (2012); Ito and Chinn (2014); Huang, Wang, and Fan (2014); Eichengreen (2015); Eichengreen and Kawai (2015); Yu (2015); and Subacchi (2016).

investors to invest in China's stock and bond markets. These include the Qualified Foreign Institutional Investor Scheme and the Renminbi Qualified Foreign Institutional Investor Scheme.

At the same time, there are now many channels available for Chinese households, corporations, and institutional investors that wish to invest some portion of their investments in foreign markets. This includes the Qualified Domestic Institutional Investor and Qualified Domestic Individual Investor Schemes.

A few channels for two-way flows, such as the Stock Connect and Bond Connect programs, have also been opened up. But the government continues to maintain a tight grip over each of these channels.

China continues to manage its nominal exchange rate, although it has in principle allowed market forces to play an increasing role in determining the external value of the RMB. In principle, the currency is now managed against a trade-weighted basket of other major currencies, although market participants still see China's central bank as playing a major role in influencing the level of the exchange rate in a manner that does not always hew to such a rule.

International Use of the RMB

China has promoted the availability of RMB outside its borders, including sanctioning 16 offshore trading centers where transactions between RMB and other currencies can be conducted. The government has also set up a payment system, the Cross-Border International Payment System, to facilitate commercial transactions between domestic and foreign companies using RMB rather than more widely used currencies such as the dollar and the euro.

These measures have led to the rising internationalization of the RMB. This term signifies its greater use in denominating and settling cross-border trade and financial transactions—that is, its use as an international medium of exchange. By the latter half of 2014, about one-third of China's international trade was being denominated and settled in RMB. Furthermore, according to data from SWIFT, by 2015 the RMB accounted for over 2 percent of cross-border payments around the world, a low share but one that already ranked the RMB as among the top five payment currencies in the world.

But then the currency's progress stalled, as China grappled with a growth slowdown, a sharp boom and bust cycle in the stock market, and concerns about rising debt levels and financial instability.

Since then, the RMB's progress as an international medium of exchange has gone into reverse. The quantitative indicators of its use in international finance all point to signs of a sharp retreat.

Still, it is important to keep both the upswings and downswings in proper perspective. Despite the constraints on capital flowing in and out of China, the RMB has begun playing a larger, although still modest, role in international finance over a relatively short period. The SWIFT data reveal the rising prominence of the RMB as an international payments currency, although it is still a long way from being a major payments currency that can rival the U.S. dollar. This will be aided by a payments system that China has set up for intermediating transactions. In October 2015, China launched a new cross-border RMB payments system—the China International Payment System (CIPS)—that is organized more in line with internationally accepted standards. This will help facilitate settlement and clearing of cross-border RMB transactions, including trade and investment flows, and bolster the international role of the RMB.

Reserve Currency

A different aspect of a currency's role in international finance is its status as a reserve currency, one that is held by foreign central banks as protection against balance of payments crises. This topic might seem premature given that China has neither a flexible exchange rate nor an open capital account—two features once considered absolute prerequisites for a reserve currency. Even though the IMF has officially anointed the RMB as a reserve currency, financial market participants' views are more important in determining a currency's status.

The RMB's prospects as a reserve currency will ultimately be influenced by progress on these criteria: (1) capital account openness, (2) exchange rate flexibility, (3) economic size, (4) macroeconomic policies, and (5) financial market development.

This section discusses the relative importance of each of these criteria for reserve currency status and summarizes how China measures up against each of these.

Reserves must be acceptable as payments to a country's trade and financial partners, which requires that the currency be easily tradable in global financial markets. China is gradually and selectively easing restrictions on both inflows and outflows. The capital account has

become increasingly open in de facto terms, but extensive capital controls remain in place.

Reserve currencies are typically traded freely and their external value is market-determined, although this does not preclude occasional bouts of intervention by the country's central bank in foreign exchange markets. China has in principle increased the flexibility of the exchange rate, but it still remains tightly managed.

China's economy is now the second largest in the world (based on market exchange rates). In 2017, its annual GDP was $12 trillion, accounting for 15 percent of world GDP, placing it second only to the United States, which has an annual GDP of $19 trillion. China is also an important player in international trade, accounting for 13 percent of global trade in goods. China's impact on the world economy is even greater when measured along other dimensions. The country holds about 30 percent of global foreign exchange reserves and has accounted for one-third of global GDP growth since the financial crisis.

Investors in a country's sovereign assets must have faith in its commitment to low inflation and sustainable levels of public debt, so the value of the currency is not in danger of being eroded. China has a lower ratio of explicit public debt to GDP than most major reserve currency economies and has maintained moderate inflation in recent years.

A country must have broad, deep, and liquid financial markets so that international investors can access a wide array of financial assets denominated in its currency. China's financial markets remain limited and underdeveloped, with a number of constraints such as a rigid interest rate structure. The recent growth and opening-up of China's debt markets suggest that the pace of the country's financial market development is consistent with its intention to gradually increase acceptance of its currency as an international currency. Moreover, to satisfy their demand for relatively safe RMB-denominated assets, foreign investors—both official and private—will eventually need to be given greater access to China's debt markets if the RMB is to become a significant reserve currency.

Remarkably, the RMB has already become a de facto reserve currency even though China does not meet some of the traditional prerequisites. China's sheer economic size and the strength of its trade and financial linkages with economies around the world seem to have overridden the other limitations.

Many central banks around the world are gradually acquiring at least a modest amount of RMB assets for their foreign exchange reserve portfolios. The list comprises a geographically and economically diverse group of countries, including Australia, Austria, Chile, Nigeria, South Africa, Korea, Malaysia, and Japan. According to IMF estimates, about 2 percent of global foreign exchange reserves are now held in RMB-denominated financial assets. About 35 central banks around the world have signed bilateral local currency swap arrangements with China's central bank. These arrangements give them access to RMB liquidity that they can draw upon to defend their currencies or maintain stable imports even if foreign capital inflows into their economies were to dry up.

Although the RMB has managed to attain the status of a reserve currency, its progress is likely to be limited by its lack of well-developed financial markets. Foreign official investors, such as central banks and sovereign wealth funds, typically seek to invest in highly liquid and relatively safe fixed-income debt securities, even if such securities have a relatively low rate of return. China's government and corporate debt securities markets are quite large but still seen as having limited trading volume and weak regulatory frameworks.

Thus, strengthening its financial markets is important both for China's own economic development and for promoting the international role of its currency.

Safe Haven Status Out of Reach

Since the global financial crisis, a new concept has gained traction in international finance: that of a "safe haven" currency.[2] Such a currency is one that investors turn to for safety during times of global turmoil, rather than for diversifying their stores of assets denominated in foreign currencies or seeking higher yields on their investments.

China might have rising economic clout, but there is an open question whether it will ever gain the trust of foreign investors. Such trust is crucial for a currency to be seen as a safe haven. A country seeking this status for its currency must have a sound institutional framework—including an independent judiciary, an open and democratic government, and robust public institutions (especially a

[2]See Prasad (2014) for more on the criteria for safe haven currencies.

credible central bank). These elements have traditionally been seen as vital for earning the trust of foreign investors, both private as well as official, including central banks and sovereign wealth funds.

Foreign investors typically want to know that they will be treated fairly according to well-established legal procedures, rather than being subject to the whims of the government. They also tend to value independence of institutions such as the central bank from government interference, as this is important for maintaining the credibility and value of the currency.

While the Chinese leadership is pursuing financial liberalization and limited market-oriented economic reforms, it has unequivocally repudiated political, legal, and institutional reforms. China's government has, if anything, rolled back freedom of expression, the rule of law, and the independence of key institutions from government interference. In short, while the RMB has the potential to become a significant reserve currency, it will not attain "safe haven" status in the absence of far-reaching reforms to China's institutional and political structure. Such reforms are apparently not in the cards.

Conclusion

Despite China's economic might, the international stature of its currency, the RMB, does not yet quite match that of its economy. Among the currencies of the world's six largest economies, the RMB is only now beginning to emerge as a factor in the global economy. The others—the U.S. dollar, the euro (which covers two of the six largest economies—Germany and France), the Japanese yen, and the British pound sterling—all have well-established roles in global finance.

Still, notwithstanding some fits and starts in the process, the RMB is on its way to becoming a significant international currency, although this will take many years. If China plays its cards right, with suitable financial sector and other market-oriented reforms, the RMB has the potential to one day become an important reserve currency.

For the RMB to become a safe haven currency, however, China will have to undertake even more far-reaching reforms of its institutional framework that would ultimately alter its political, legal, and public institutions. As President Xi Jinping enters his second term with an even stronger lock on power, such changes seem unlikely.

Still, the RMB's rise to international prominence will change international finance, and even China itself, in many ways. Over the next few years, the RMB's rising importance in international finance could well serve as a catalyst for domestic reforms and also help in improving the stability of the international financial system.

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Bluster Notwithstanding, China's Bargaining Position Will Weaken

Charles W. Calomiris

The Trump administration began the year by pivoting in its stated approaches to trade with China and Mexico, backing off from threats to overhaul NAFTA, and "redefining" Chinese currency manipulation to focus on trade distortions. In an interview published in the *Wall Street Journal* several months ago (Baker, Lee, and Bender 2017), the president went further, saying that he might give up on his trade liberalization goals with China if the Chinese "solve the problem in North Korea." Although a NAFTA overhaul has reemerged as a stated goal of the administration in recents months, President Trump's recent trip to China, and his many conciliatory statements about President Xi Jinping, give further grounds for believing that geopolitical goals may trump economic ones in the current negotiations with China. That would be a mistake. China's unfair practices in trade, intellectual property, and other areas need addressing, and the time has never been better. The president should not cede too much ground to achieve geopolitical goals. His bargaining power with China may be stronger than he thinks.

Currency Manipulation: Rhetoric versus Reality

At the same time, the movement away from rhetoric about currency manipulation is a positive change. Accusations of currency

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manipulation by Chuck Schumer, Donald Trump, and others that were made regularly for the past two decades never made much sense as explanations for Chinese growth or for the persistent U.S. trade deficit with China. First, it's impossible for monetary policy (including exchange rate policy) to produce long-run growth or trade consequences. Indeed, the principle of long-run "monetary neutrality" is one of few tenets in economics believed by virtually every trained economist. If a nominal exchange rate were set at an undervalued level, eventually differences in domestic and foreign inflation would make it correctly valued. This is the conclusion of every model used by economists of the "real exchange rate" (the ratio of the exchange rate between two currencies divided by the relative price level ratios in the respective countries).

Second, the facts of Chinese exchange rates show that the Chinese government has not been trying to keep its currency weak. Indeed, the opposite is the case. The renminbi (RMB), also known as the yuan, appreciated 26 percent on a trade-weighted basis from 1995 to 2014. And China's real exchange rate (which captures the relative competitiveness of the prices of goods sold by China and its competitors) appreciated even more: 53 percent from 1995 to 2014.

An appreciating real exchange rate trend is understood by economists as reflecting high productivity growth (the Harrod-Balassa-Samuelson effect). Circa 1978, when China's opening to global markets began, China's total factor productivity stood at roughly 8 percent of the U.S. level. Starting from that very low efficiency level, China was able to grow quickly for more than three decades by removing some of the limits that communism had placed on its markets.

These same forces have propelled China's growing share of world exports and foreign direct investment in recent decades, but it is also true that China kept its tariffs relatively high and uses government policies to favor its own producers and limit the ability of foreigners to compete, which also boost its trade surplus.

Since 2015 China's currency has taken a new weakening direction, although recently the government has propped it up to counter market perceptions of a weakening trend. This is part of a long-term pattern. In the past, the government also has intervened to limit the depreciation of its currency, partly with an eye to the political backlash in the United States of a rapidly

falling currency value. For example, on April 13, government intervention raised the RMB 1 percent against the dollar. Such interventions belie the view that China wishes to pursue a weakening currency strategy.

Despite such interventions, it will be hard for the government to resist RMB depreciation, which will be propelled by two powerful and related phenomena: (1) a long-term growth slowdown in China, and (2) China's new financial fragility. That fragility reflects a combination of diminishing returns from investment (an inevitable slowdown after three decades of catching up) and China's autocratic structure, which will make it very hard to sustain high growth during the new phase of economic development, where the efficiency of the allocation of investment will be more important than it has been in the past for promoting growth.

As Minxin Pei predicted in his 2006 book, *China's Trapped Transition*, the Chinese Communist Party preserves its survival through the perpetuation of inefficient state-owned enterprises (SOEs), which fund its operations. Other political uses of the financial system include support of government-supported investments such as the infrastructure and construction boom the government orchestrated after 2007 to insulate the economy from the effects of the global slowdown. The financial system cannot truly liberalize because it must be an instrument for channeling credit subsidies to SOEs, and for meeting other government goals that necessarily conflict with efficient resource allocation.

Furthermore, the Chinese government has permitted the recent spending on buildings and infrastructure to be mainly funded with debt of various kinds, which is explicitly or implicitly guaranteed by the state. Household, government, and nonfinancial corporate debt now stands at roughly two and a half times GDP. In 1999, China paid off its banks' bad debts, but since then a combination of slow growth and booming debt now imply a bailout bill of about $3 trillion (some observers claim it is much higher), which is ten times the cost of the 1999 bailout. The likely path of least resistance would be for China to raise inflation as part of the means to address nonperforming debts (enabling them to be repaid with cheaper currency).

However China's economic problems are addressed, a combination of slower growth, debt write downs, and inflation will continue to weaken the RMB and reduce capital inflows. Foreign reserves, which grew for decades, have declined since 2014. The Chinese elite

is cognizant of these problems, hence their increasingly desperate attempts to smuggle their own wealth out of China in recent years.

Capital Controls

If China's core problems are so likely to produce long-term currency depreciation, why haven't market speculators already piled on to force the hand of the government? The answer is simple: China's capital controls prevent large-scale speculation against its currency. The small offshore market in the RMB is regularly manipulated by the Chinese government, by varying the supply of currency that is sent to that market, in order to cause losses whenever short positions become too embarrassing. Hence, there is no point in shorting the RMB in the offshore market.

Note the consequent inconsistency between China's current propping up its currency—to instill confidence in its economy—and its desire to make the RMB a global reserve currency. Capital controls like those maintained by China make reserve currency status impossible under the current regime. And once the inevitable inflationary surge and depreciation occur, reserve currency status will be even less likely in the future.

Slowing Growth and President Xi's Rising Power

The declining economic prospects of China also provide much of the explanation for recent political changes that have consolidated President Xi's power. If they happen, falling growth, debt defaults, and rising inflation will make the Chinese regime increasingly unpopular domestically, and that is a scary prospect for Beijing, which is already facing other major challenges, such as an aging population, a lack of pension funding to support the elderly, and life-threatening levels of pollution. Protests of government policy shortcomings have been common, and it is wrong to see the government as immune to public pressures.

It is best to see President Xi's recent purges, threats to party subordinates, and consolidation of power at the 19th Party Congress in this light. Autocracies that crack down on parts of their crony elite usually do so as the economic rents from political power that are available for sharing get scarcer. Crackdowns are a sign of weakness, not strength. It is strange to see so many journalists, business leaders, politicians, and academics viewing the

recent crackdown as a preamble to a new phase of strong Chinese growth and expanding geopolitical power. If we have learned one thing from the history of autocracies, it is that they cannot sustain efficient growth or the projection of political power, and the more they rely on one-man rule the more fragile and temporary they will be. The vision of a newly invigorated and centralized CCP rule that will solve the daunting growth and indebtedness problems that plague China today is a chimera. Belief in that vision by so many business and political leaders outside China shows how little leaders of the West understand the basis for Western Civilization's remarkable historical success.

It is true that China's autocratic system can mobilize resources to pursue an end that its leaders identify as a priority, whether that be artificial intelligence, quantum computing, or the development of a cutting edge payment system. But that is not what produces sustainable economic development. As Charles Lindblom (1977) noted, government policy can be a useful force for thumb-like pushing, but without the dexterity of the market's fingers, the thumb is of little use to create sustainable development.

One consequence of all this is that continuing negotiations between China and the United States may actually produce something interesting, if President Trump's team does not buy in to President Xi's propaganda. Xi would like to convince everyone that he can personally produce economic development without creating the strong institutions and incentives that every other successful economy has depended upon in the past.

Conclusion

It is not clear when the long-term problems China is facing will manifest themselves in a visible slowdown and inflation. But one thing is clear: because of China's vulnerability, Chinese leaders cannot afford a significant drop in exports, which implies weakening Chinese bargaining power and an opportunity for the United States to gain ground in its dealings with China. If the Trump administration plays its cards wisely and deliberately, it should be able to succeed better than its predecessors with respect to trade policy, and other geopolitical issues, such as securing China's help to limit North Korea's belligerence, and limiting China's attempts to expand its control of international waters.

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Long-Term and Short-Term Impediments to the RMB's Rise as a Reserve Currency

David Dollar

The internationalization of China's currency, the Renminbi (RMB) or yuan, has accelerated since the global financial crisis. On the one hand, the rate at which China is overtaking the United States as the largest economy in the world sped up because of the lingering effects of the crisis on U.S. growth and the fact that China weathered the crisis very well. On the other hand, global and Chinese confidence in the dollar and U.S. financial institutions was seriously undermined by the crisis. China's central bank governor, Zhou Xiaochuan, wrote an article in 2009 criticizing the dependence of the world on the dollar and launching a period in which China actively promoted the internationalization of its currency (Zhou 2009).

Initially there was steady and rapid increase in measures of internationalization, such as the RMB's share in global payments (Figure 1). However, the growth came to an end in the middle of 2015, and since then China's share has declined modestly. There was also an expectation that China's growing role as a source of development finance would enhance the importance of the RMB. China in the period 2012–14 lent about $40 billion per year to developing countries for infrastructure projects, including along the Belt and

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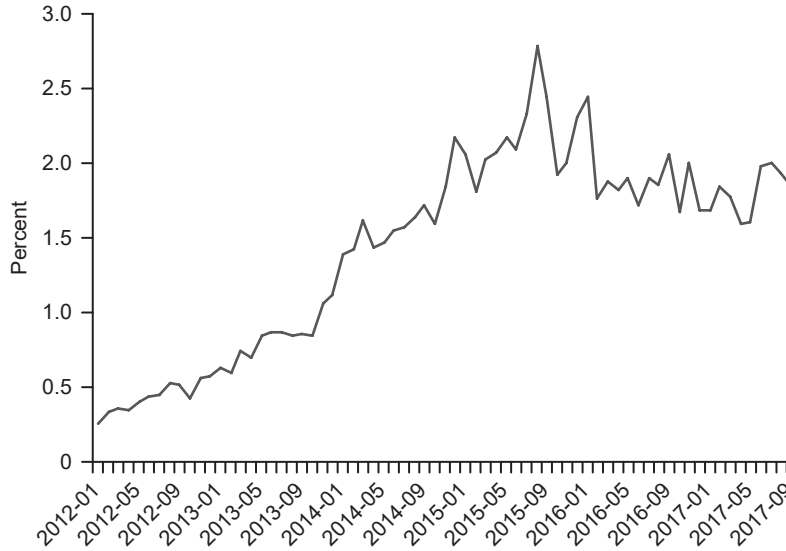
FIGURE 1
RMB's Share as a World Payments Currency



Source: SWIFT.

Road, according to updated AidData (Dreher et al. 2017). Curiously, most of this lending is in dollars and only 2.6 percent was denominated in RMB.

How do we understand the stalled progress in the emergence of the yuan as a major currency? China's prospects to be the largest economy in the world in about 10 years have not changed. But other factors that are relevant for reserve currency status are coming increasingly into play. Prasad (2015) identifies several factors that are relevant to reserve currency status, in addition to market size: open capital account, flexible exchange rate, macroeconomic policies, and financial market development.

In addition, there is a significant literature relating financial market development and macroeconomic policies to underlying institutions such as property rights and rule of law and open political institutions. At the moment, China has institutional weaknesses that hamper its emergence as a major reserve currency country. It also has limitations on capital account openness and exchange rate flexibility that are more in the nature of short-term impediments.

The next two sections focus on (1) the institutional weaknesses that are long-term impediments and (2) the current situation with macroeconomic policies, the capital account, and the exchange rate. It is not surprising that the initial enthusiasm over RMB internationalization has waned to some extent: China is a long way from meeting the conditions to be a major reserve currency country.

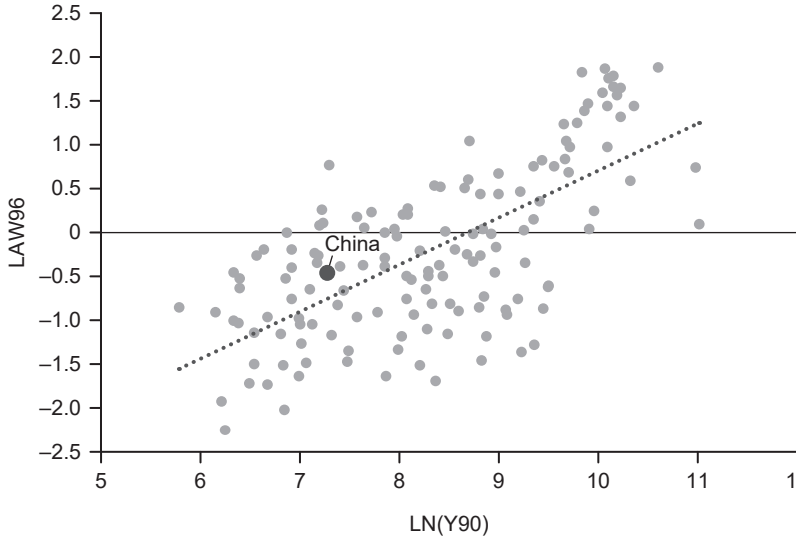
Evolution of Institutional Quality in China

The issue of institutional quality in China presents something of a puzzle. In general, we think that economic institutions such as property rights and the rule of law are fundamental to long-run growth (Acemoglu, Johnson, and James 2001). However, China appears to have rather poor institutions, and yet has grown at about 10 percent per year for four decades. One resolution of this paradox is to think of institutions *relative to development level.* China emerged from the Mao era and the Cultural Revolution as one of the poorest countries in the world, poorer than Sub-Saharan Africa. It began its economic reform under Deng Xiaoping with a series of institutional reforms that dramatically increased incentives to invest and produce: the household responsibility system that restored family farming, opening of a growing number of cities to foreign investment and trade, and legalization of private firms (Eckaus 1997). Unfortunately, there are no consistent measures of institutional quality from this early era, but the basic picture emerges from an examination of data from the mid-1990s.

Empirically, there are a number of options for measuring economic institutions. I prefer the Rule of Law Index from the World Governance Database, which "captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence." The index, which has a mean of zero and standard deviation of 1.0, is available for a large number of countries.

In general, measures such as the Rule of Law Index rise with per capita GDP, though in fact the fit is not that tight and there is a lot of dispersion (Figure 2). Most developing countries have below-average institutional quality, but, as noted, there is large dispersion. Figure 2 illustrates Rule of Law 1996 (first year available) and log per capita GDP in 1990.

FIGURE 2
Rule of Law and Per Capita GDP in the 1990s



Source: World Bank, Worldwide Governance Indicators.

China was measured to be about half a standard deviation below the mean on the index: it did not have especially good economic institutions. However, it was above the regression line, indicating that it had good institutions for its level of development. Another way to express this is that China's Rule of Law Index in 1996 was at the 45th percentile among countries. Its per capita GDP in 1990 was at the 23rd percentile among countries.

Think of China competing with other low-income countries in the early 1990s to attract foreign direct investment (FDI), generate exports, and begin the growth process. It was a very low-wage economy. Among the countries with which it was competing, China proved to be an attractive production location and subsequently grew well. A poor country that can manage to put reasonably good institutions in place has all of the convergence advantages: it can attract FDI, borrow technology from abroad, and start the catch-up process.

Thinking about institutions relative to level of development naturally leads to some questions: Are institutions keeping up? Is there regular institutional improvement as the economy develops? For China, the answer is basically, "no." China's per capita GDP has

grown enormously: by 2016 it was at the 58th percentile of countries for per capita GDP in purchasing power parity (PPP) terms. Its rule of law ranking, on the other hand, has barely changed over time and in 2016 was at the 46th percentile. Over 20 years there has been no measurable improvement. China's reform program has stalled (Naughton 2014), and now it has poor economic institutions for its level of development.

What about the relationship between political institutions and economic institutions? Acemoglu and Robinson (2012), in their book *Why Nations Fail,* emphasize the link from political institutions to economic institutions to outcomes. In their model, countries with democratic political institutions tend to develop inclusive economic institutions, which, in turn, lead to innovation and productivity growth, and, hence, sustained improvements in living standards.

An alternative view these days is the "Beijing consensus" model: democratic countries seem incapable of making the difficult decisions and investments needed to sustain prosperity, whereas an authoritarian "developmental" state is capable of operating more efficiently.[1] Huntington (1968) offers something of an intermediate argument—namely, that premature increases in political participation, including early elections, could destabilize fragile political systems. His argument laid the groundwork for a development strategy that came to be called the "authoritarian transition," whereby a modernizing dictatorship provides political order, rule of law, and the conditions for successful economic and social development. Once these building blocks were in place, other aspects of modernity like democracy and civic participation could be added. What does the evidence from the past 20 years suggest about this debate?

To measure political institutions, I use Freedom House's Civil Liberties Index.[2] Freedom House also has a Political Rights Index that focuses on democratic political institutions. I prefer the Civil Liberties Index that measures aspects such as freedom of speech, the media, assembly, and association. In practice the two series are

[1]Ramo (2004) argues that China has created a superior development model with an authoritarian system and state capitalism. Williamson (2012) and Zhao (2010) acknowledge that the model has produced rapid growth for China up to a point, but argue that the model is unsustainable.

[2]See Freedom House's annual *Freedom in the World* reports (https://freedomhouse.org).

highly correlated and will not produce different empirical results. I prefer the Civil Liberties measure because I think of it as more closely connected to the environment for innovation and competition—that is, the economic institutions.

The Civil Liberties Index is available for a large group of countries starting in 1994. It ranges from 1 (completely free) to 7 (completely unfree). Among the poorer half of countries in the world, there is little correlation between economic institutions and political institutions (correlation coefficient equals −0.33). I have already highlighted that authoritarian countries such as China had relatively good economic institutions among poor countries in the 1990s. Vietnam would be another example, as would South Korea and Taiwan in an earlier era. The latter two are the best examples of economies that made the transition to political openness in middle income. Among the richer half of countries, on the other hand, there is fairly high correlation (−0.67) between political freedom and rule of law. There are few historical cases of achieving truly strong property rights and rule of law without political openness.

China so far is not following the path of political liberalization as it transits through middle income. The civil liberties measure for China has remained at 6 for a long time. Xi Jinping has made it clear that he wants to pursue economic reform without political reform.[3] Not only has there not been political reform, but also most observers feel that there has been recent backsliding in terms of freedom of ideas and debate.

Challenges of Capital Account and Financial Liberalization

In addition to the long-run challenge of improving property rights and rule of law, China also faces short-term challenges of financial stability. Its capital account is largely closed, and it would be risky to open in the current macroeconomic environment. Credit has been growing very rapidly in China, and such excessively fast growth of credit is a good predictor of financial crises. The Bank for International

[3]The resolutions that came out of the important Third Plenum meeting in the fall of 2013 make clear that political reform is not on the agenda. See "Decision of the CCCPC on Some Major Issues Concerning Comprehensively Deepening the Reform" (www.china.org.cn/chinese/2014-01/17/content_31226494_3.htm).

Settlements (BIS) calculates the "credit gap" as the difference between actual credit growth and trend. Drehmann and Tsatsaronis (2014) find that "historically, for a large cross section of countries and crisis episodes, the credit-to-GDP gap is a robust single indicator of the build-up of financial vulnerabilities." Martinez (2016) similarly argues that domestic credit to the private sector as a percent of GDP is the most common significant indicator in forecasting banking crises. In earlier crises in Japan, Thailand, and Spain, growth of credit ran well ahead of trend for a few years. There was an investment boom that was somewhat different in each case, but with a similar end result: that a lot of poor investments were financed. Eventually these investments failed to provide sufficient return to service the loans, bad loans became manifest both in banking and in bond defaults, and a financial crisis ensued. One of the key features of these crises is that, as bad loans start to build up, banks are unsure about which clients will fail and tend to restrict lending even to potentially good clients. That drying up of credit is a key reason why the real impact of these crises is so severe. In each of the previous cases the crisis was followed by a period of deleveraging in which the stock of credit relative to GDP fell sharply.

In China's case the BIS calculates a credit gap of about 30 percentage points of GDP—that is, the actual build-up of the stock of credit outstanding is about 30 percentage points of GDP higher than would have been predicted by trend. This is alarming, and Chinese officials have spoken of the need to reduce leverage—most recently in Governor Zhou's warning of a "Minksy moment" for China (see Reuters 2017). Yet the growth of credit continues at a rate well in excess of the growth of nominal GDP.

While many outside analysts worry about a financial crisis in China, there are reasons to think that it will not take the predictable form. There are some special features of the Chinese financial system. First, this credit growth is domestically financed. China has a very high savings rate, around 50 percent of GDP, and does not rely on external financing in any meaningful way. In contrast, earlier credit booms in Thailand and Spain were to a large extent funded by external capital. Consequently, as their boom–bust crises unfolded, capital outflows accelerated domestic credit contraction. Japan's case was more similar to contemporary China in that the country's credit and investment boom was self-financed. A second, related feature of China is that the main backing for credit expansion is household deposits in banks. These tend to be very stable. This is

somewhat less true in the past year as financing from nonbank institutions (shadow banking) has played a big role in credit expansion. The formal banking system primarily consists of state-owned banks lending to SOEs, including local government investment vehicles. It is hard to see a traditional banking crisis in this sector. Already many SOEs are in distress and cannot service their loans. But banks continue to lend to them and others, and it is hard to see households losing confidence in the system and pulling their deposits out. What is less clear is how the shadow banking system will operate in an incipient crisis. As some of the wealth management products backing shadow lending start to fail, it is possible households will withdraw significant amounts from these products and nonbank lending will contract. But given the state's role in the financial sector, it seems unlikely that overall financing would contract as in a traditional financial crisis.

A second risk that is building up concerns China's exchange rate and capital account. Until recently China had "twin surpluses" on the current and capital accounts. Large-scale reserve accumulation was required to prevent rapid appreciation of the Chinese currency. China had pegged its currency to the dollar at a rate of 8.3:1 in 1994, not an unreasonable choice for a developing economy. But by the mid-2000s productivity growth in China had resulted in the currency being increasingly undervalued. China moved off the peg in 2005, and gradually allowed some appreciation vis-à-vis the dollar. Over the past decade China's effective exchange rate has appreciated more than any other major currency, rising by about 40 percent. The fact that the U.S. dollar had little trend between 2006 and 2013 means the RMB was rising against the dollar during that period.

China's balance of payments situation began to change around 2014. First, the dollar began rising quite sharply against other currencies; effective appreciation was about 20 percent over a year. Initially, China followed the dollar up but began to worry that the appreciation was too much, especially if the Fed was going to normalize interest rates. Second, the capital account shifted from a surplus to a deficit. With diminishing returns to capital in China and ongoing restrictions on inward investment in many sectors, China's capital account began to be dominated by state enterprises going out for investment and private Chinese capital moving some assets abroad. For a short period in 2014 the net capital outflows roughly matched the continuing current account surplus: China's exchange rate was

stable without any significant central bank intervention. But as 2015 began, the net capital outflows accelerated and China started selling reserves in order to prevent the currency from depreciating.

In August 2015 China carried out a "mini-devaluation" that was poorly executed and communicated. This was mostly a technical adjustment in the daily fixing system carried out under IMF advice. But it was coupled with a small, discrete devaluation that spooked global markets. It was taken as a sign that China's economy was much weaker than previously thought and as a herald of a new exchange rate policy. Capital outflows accelerated. In a little more than a year, China's reserve holdings went from $4 trillion to $3 trillion.

China's officials have said publicly and privately that they have no intention to devalue the currency to spur exports and that they see no foundation for sustained depreciation of the currency. In terms of fundamentals, they are right that there is no foundation for depreciation. China has a large current account surplus, and its share of global exports hit a new historical high in 2015. Clearly, there is no competitiveness problem. Given China's large trade surplus, any significant depreciation now would be disruptive to the world economy and could well spark trade protection from China's partners. The problem that the country faces is that it is still fighting large capital outflows. The national savings rate has come down only a small amount from the 50 percent of GDP level, and it is likely that saving behavior will change only slowly. With diminishing investment opportunities within the country, it makes sense that significant amounts of capital are trying to leave. The reserve loss and the outflow pressure also create a reasonable fear that, whatever authorities say, they may not be able to prevent a large depreciation. That just encourages capital to try to leave sooner.

In 2016 the balance of payments stabilized to some extent. Pressures on capital outflows were eased by the clear communication from the authorities that devaluation is not the policy, the somewhat better data from the real economy, and ongoing credit stimulus of investment. Also, the government tightened up on its capital controls to make moving money more difficult.

The issue of capital controls is of crucial importance. Kaminsky, Lizondo, and Reinhart (1998) find that the ratio of broad money to international reserves is a good leading indicator of currency crises. The IMF (2015) argues that a ratio of broad money to reserves of 5:1 is a warning level for a country with bank-dominated finance, limited

exchange rate flexibility, and an open capital account. Since 2010, however, there has been an alarming rise in the ratio from below 4:1 to nearly 8:1. China would be at risk of a currency crisis if it had an open capital account. Hence, it is rational that China has tightened up its capital controls over the past year. China will need to carry out significant deleveraging and financial reform before it can safely open its capital account.

Conclusion

China faces both short-run and long-run challenges to achieving the status of a major reserve currency country. In the short run, it needs to open its capital account, but it makes sense to approach this cautiously as a large overhang of debt creates a risk of financial crisis. China needs to strengthen financial institutions first through greater interest rate flexibility and a more effective resolution regime, including exit of zombie firms. It needs to introduce more exchange rate flexibility though this is hard to do when there are risks of large capital outflow and downward pressure on the currency. It is easier to introduce flexibility in the good times when market pressures will push the currency up.

In the longer run there are issues about confidence in property rights in China. Will global investors have enough confidence in China's institutions to place large amounts of wealth there? That is the fundamental question. After an initial set of property rights reforms at the beginning of China's reform and opening, there has been relatively little progress on that front. China now has poor economic institutions for its income level. It is a unique case of an economy that likely will be the largest in the world while still having serious institutional weaknesses. Its size alone will give the RMB a certain global status, but it is not likely to emerge as a major currency until its institutional and policy weaknesses are addressed.

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Progress and Promise for Monetary Policy Reforms

Andy Barr

Today we are turning the corner on monetary policy. We will soon have a new Federal Reserve Board chairman and could, in an important sense, have an entirely new Board of Governors before too long. We are excited about what this prospective change in personnel can bring in terms of more reliable policy for American economic opportunities. But we are not waiting for personnel changes in the Eccles Building to further our own monetary policy changes from the Hill.

Effective personnel are important. But even the best Fed governors cannot do right by our economy without political-legal institutions that reliably support competitive trade wherever it might lie. Recently we took an important step to improve the rules of the game for both our monetary policymakers and Congress. We marked up three bills that will (1) reduce growth-killing uncertainty that continues to undercut the efficacy of our monetary policies; (2) sweep out the Fed's growth-killing balance sheet distortions; and (3) stop relying on the Fed to spend money that we do not have, and start holding Congress accountable for America's credit policy.

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As the legislative process moves forward, we are motivated by the simple truth that, if monetary policy does not work, then our economy cannot work. We know that some forms of monetary policy are clearly better than others. Throughout history, a number of commodities have served as money. Even stone wheels at the bottom of the Pacific Ocean have been respected as a legitimate exchange medium.

And imagine the exchange medium that people might have used not too long ago where we sit today. Certain types of tobacco leaves could have served as money, and we would have spent more time and effort examining whether a particular leaf would reliably store value than we would enjoying that value. The high cost of transacting itself would have slowed or altogether stopped markets from helping goods and services (which include labor) find their most promising opportunities.

Monetary policy can appear complicated, but unless we appreciate its foundational role in producing and delivering the economic opportunities that can and should be readily available across our country, we will continue to fall short of our true potential. Our work on the Committee is dedicated to making sure that does not happen.

Two years ago, my colleague on the House Financial Services Committee, Representative Bill Huizenga of Michigan, spoke at this conference on the eve of our Fed Oversight Reform and Modernization Act or FORM Act. Shortly thereafter, my colleagues and I passed that legislation through the full House of Representatives. This time, we have a chance to move our legislation even further. Our goal now is not only to move a solid set of monetary policy reforms out of the House, but also to place it on President Trump's desk for signature.

Motivation for and Details of Markup Bills

We marked up three reforms that are strong on policy and capable of attracting both deep and broad support. We started by introducing a simple but important strategy to improve how the Fed communicates monetary policies.

Monetary Policy Strategy

Better communication may sound boring. But it is key to reducing growth-killing policy uncertainty that, according to recent Fed

research, creates a significant drag on our economy.[1] Our legislation brings greater transparency to how monetary policy reacts to economic changes so that households and businesses have the information they need to make productive decisions.

The Federal Open Market Committee (FOMC) characterizes its conduct of monetary policy as "data dependent." In doing so, however, it leaves households and businesses uncertain about *what data matter* and *how they matter*. By providing for the annual adoption of a monetary policy strategy of the Fed's own choosing, as well as a small set of reference policy rules, our legislation will reduce that uncertainty and provide more reliable and stronger support for a dynamic economy.

During our Committee's last Humphrey–Hawkins hearing,[2] Federal Reserve Board Chair Yellen expressed interest in working with our Committee to codify a simple and effective framework for a more transparent and accountable monetary policy. By adopting the best of proposals from both sides of the aisle, this framework promises to reliably support a stronger economy that works for everyone. Testifying before our monetary policy subcommittee, economist Joseph Gagnon from the Peterson Institute shared the following observation: "The best strategy is for the Fed to use various rules in assessing the stance of policy. Whenever it deviates noticeably from popular rules, the Fed should explain clearly why it is doing so."[3] Our Monetary Policy Transparency and Accountability Act provides for exactly the type of framework that Gagnon and other highly regarded witnesses from both sides of the aisle have advocated during our extensive hearings.

Moving this legislation into law is essential to minimize growth-killing uncertainty and reliably support the kind of economic

[1]A recent study by Federal Reserve Board economists finds that "positive shocks to uncertainty about monetary policy robustly raise credit spreads and reduce output" (Husted, Rogers, and Sun 2017).

[2]Full-Committee hearing entitled "Monetary Policy and the State of the Economy" (July 12, 2017). Available at https://financialservices.house.gov/calendar/eventsingle.aspx?EventID=402098.

[3]Monetary Policy and Trade Subcommittee hearing entitled "The Fed Turns 100: Lessons Learned over a Century of Central Banking" (September 11, 2013). Quoted from page 11 of the printed hearing, available at https://financialservices.house.gov/calendar/eventsingle.aspx?EventID=347585.

dynamism that each of our diverse constituencies needs to engage the opportunities they deserve.

A Monetary Policy Balance Sheet

In addition to reducing policy uncertainty, we also address the Fed's distortionary balance sheet. We do so by establishing a Fed-Treasury asset swap—one that will transfer unconventional assets to the Treasury in exchange for an equally valued set of Treasury securities. Almost half of today's Federal Reserve balance sheet continues to reflect the Fed's emergency expedition into favoring some asset prices at the expense of others.[4] In addition to creating asset price distortions, continuing this expedition increases threats to monetary policy independence. Our asset swap facility sets the ship straight, leaving the Fed with the assets it needs to conduct monetary policy and requiring our government's fiscal principals to manage credit-related assets.

As I mentioned earlier, an efficient monetary policy helps goods and services readily find their most promising opportunities. To be sure, realizing this ideal is hard, even under favorable conditions. It becomes harder still when central banks step beyond their monetary policy role and into the political realm of favoring some credit prices over others (as the Fed has done, for example, by purchasing almost $2 trillion of mortgage backed securities during and after the financial crisis).[5]

Economists of different stripes shared considerable concerns with our Committee about this unfortunate development. Testifying as a minority witness before our monetary policy subcommittee, MIT economist Simon Johnson observed that "we're all agreeing . . . that fiscal policy infrastructure is the responsibility of the fiscal authority, which is that Congress in the United States . . . it is not the responsibility, and should not become the responsibility of the Federal Reserve."[6]

[4]Federal Reserve Statistical Release (H.4.1), "Factors Affecting Reserve Balances" (October 26, 2017). Available at www.federalreserve.gov/releases/h41/current/h41.htm.

[5]As of October 26, 2017, the Federal Reserve Banks own almost $1.8 trillion of federal agency debt securities and mortgage backed securities. See www.federalreserve.gov/releases/h41/current/h41.htm.

[6]See the Monetary Policy and Trade Subcommittee hearing entitled "Unconventional Monetary Policy" (December 7, 2016). Available at https://financialservices.house.gov/calendar/eventsingle.aspx?EventID=401201.

Our Independence from Credit Policy Act promotes a more resilient financial system *and* more productive allocation of credit. It provides for an orderly return of the Fed's balance sheet to, as Chair Yellen has described, "a primarily treasury-only portfolio."[7]

Congressional Accountability for Emergency Credit Facilities

Finally, our Committee voted out a framework for congressional approval of emergency lending. Time and again, Americans have watched their Federal Reserve stretch its mandates beyond the breaking point, with the predictable result of increased financial fragility and decreased economic opportunity.

Politicians and advocacy groups from both sides of the aisle agree that doing better requires a brighter line between conventional monetary policy and emergency credit policy. Following the introduction of Warren-Vitter, the president and CEO of Better Markets, Dennis Kelleher, warned:

> While the much smaller $700 billion TARP program received widespread scrutiny, the Fed's trillions in bailouts did not. In fact, the public and even its elected officials in Congress were mostly kept in the dark about these bailouts. That was wrong. The Dodd-Frank Wall Street Reform and Consumer Protection Act made some modest changes to limit the Fed's ability to bailout Wall Street in the future, but more needs to be done if taxpayers are to be protected, bailouts are to be limited, too big to fail is to be ended and market discipline is to apply to Wall Street like the rest of America's banks and businesses [Kelleher 2015].

By drawing a bright line of accountability between monetary and credit policy, our Committee's Congressional Accountability for Emergency Lending Act provides for both a more productive monetary policy and a less distortionary credit policy. Moreover, it does so in a manner that Americans for Financial Reform characterized as aligning "not only with the intent of the Dodd-Frank Act, but with traditional principles of central bank lending that go back centuries."[8]

[7]Full-Committee hearing entitled "Monetary Policy and the State of the Economy" (July 12, 2017). Available at https://financialservices.house.gov/calendar/eventsingle.aspx?EventID=402098.

[8]Quoted from Warren (2015).

Moving Forward

Ambitious for sure, our work from this week has a few more miles to travel. We hope you will join us for the ride. Our detractors persist with the mantra that, except for the Fed's great monetary distortion, our economy would have fallen into another Great Depression. According to them, we should be thanking the Fed, not reforming it.

It is true that our economy is performing better than many. But "better than many" is the wrong metric for America and Americans. The right metric is whether we are performing as strongly as we can. The fact that our recovery has been considerably weaker than previous post-war recoveries tells us that we are not living up to our potential (Federal Reserve Bank of Minneapolis 2017).

Macroeconomic Orthodoxy vs. Sound Monetary Policy

As we dig out of this hole—and the past two quarters of 3 percent growth are a promising start—our efforts will be more effective by understanding how we got here. We got here, unfortunately, by asking more from our monetary policy than it can possibly deliver.

Some of you remember the Rock & Roll Hall of Fame band, Jefferson Starship. One of their hit songs includes the line "if only you believe in miracles . . . we'd get by." A catchy tune, for sure, but monetary policies should not rely on believing in miracles. Year after year, the oracles of macro and money told us that the promises of unconventional policies are coming soon. Almost a decade out of the financial crisis, we are done waiting!

The legislation we are moving through Congress builds on a foundation of local knowledge and individual incentives—fundamentals that have disappeared from too many of our policy discussions. The oracles of macro and money instead apologize that our best days are behind us. They tell us that their seat-of-the-pants response to the Great Recession has nothing to do with an economy that only recently started showing signs of life—over eight years post-recession.

Today we enjoy the most remarkable technologies that human kind has known. But the oracles continue to tell us our best ideas are behind us. They say that today's breakthroughs represent only marginal advances on historically seminal innovations. They tell us we should not expect to see seminal innovations repeated.

With his book on *The Rise and Fall of American Growth*, Northwestern University economist Robert Gordon gained

prominence for this neo-Malthusian outlook.[9] According to Gordon, America's remarkable economic boom from the 1870s to the 1940s was a one-off event (Krugman 2016). The professor is not alone in peddling such a dismal outlook. Spinning such yarns has become a thriving business for popular economists. Consider Lawrence Summers' reincarnation of "secular stagnation" theory. According to the former Harvard president and Treasury secretary, we "suffer from an imbalance resulting from an increasing propensity to save and a decreasing propensity to invest" (Summers 2016). As a consequence, the so-called natural rate of interest has fallen so low that conventional monetary policy has little if any room to work its Keynesian magic.

Viewed through this lens, today's economic lethargy appears normal. According to the oracles, we should sing halleluiah for unconventional monetary policy and fiscal deficits as far as the eye can see. Except for these measures, they tell us, the new normal would be even worse. But this emperor has no clothes. Today's oracles look to highly aggregated data for policy information, despite those data having little if anything to do with economic fundamentals. Boilerplate policy responses to economic anemia have thus become repeated exercises in goosing consumption, investment, or government spending.

By ignoring that macro performance depends on micro decisions, models like those referenced by the oracles presume a supernatural capacity to optimally control the most complex of systems—our economy. But just as businesses cannot continually hide mismanagement behind financial engineering, governments cannot create true prosperity by opportunistically diverting scarce resources into politically favored national income accounts.

Setting the Ship Straight

My colleagues and I in the House have a better way. Consider what you would have lived through during what Professor Gordon characterizes as our golden age. You would have endured Reconstruction following the Civil War, lynchings, economic

[9]The prominent *Wall Street Journal* columnist, Greg Ip, is also promoting this hypothesis (Ip 2016).

depressions, and world wars—and major banking crises at a rate of more than once-per-decade.[10] If people living under those conditions produced a remarkable economic expansion, then we can surely find a better way today.

Instead of throwing up our hands in response to Professor Gordon's treatise, we should get to the bottom of why we are not fulfilling our potential. The answer lies with missing policies for economic opportunity—those that build on clearly defined property rights and institutions for competitive markets. The contrast between this framework for efficiency and those that motivate the above-described orthodoxy could not be greater.

Today's oracles of money and macro depend more on imagination than sound economic principles. They tell us that, were it not for unsustainable deficits and unconventional monetary policies, our economy would be falling even further from its potential. Given that neither logic nor evidence stands on their side, perhaps they should embrace a strategy along the lines of Seinfeld's George Costanza—"do the opposite" of what tried and untrue Keynesian instincts dictate.[11]

A better way builds from *why* we find ourselves in this unacceptable environment. The natural rate of interest, which enjoys frequent reference without reliable understanding, simply refers to the price of credit that emerges from competition between borrowers and savers. But when distortionary monetary and economic policies sow pessimism instead of promise, people curb investment and consumption to save more, and thus drive the natural rate toward zero.

Loosely grounded policies that promised economic liftoff left us grounded in an economic fog. Notice that these policies are effectively based on contradictory premises—that is, clear price signals give households and businesses the information they need to make productive economic decisions in normal time; but, in times of

[10]Americans saw major banking crises in 1873, 1884, 1890, 1893, 1896, 1907, the 1920s, and 1930–33 (see Calomiris and Haber (2014: 5).

[11]During the fifth season of the sitcom Seinfeld, the hapless character George Costanza has a revelation. Recognizing that every decision he ever made was wrong, George commits to doing the opposite of what his demonstrably failed instincts would have dictated.

turbulence, we should stop believing in physics and start believing in animal spirits. In other words, we are supposed to believe that monetary distortions are a reliable antidote to economic distortions.

Even more worrisome, others think we can fool all of the people all of the time. These economists founded the "QE [quantitative easing] forever caucus," and repent for our sins by pointing to an outsized balance sheet that lets the Fed make outsized Treasury remittances. Remarkably, the Fed continues to embrace this story, ignoring the risks inherent in such a carry trade. If public companies played this game of non-disclosure, they would be getting regular calls from the SEC or worse. Pretend money will never cure our fiscal problems, and it cannot support the kind of economic dynamism that American households and businesses are fully capable of producing.

Almost a decade out from the Great Recession, returning to a more reliable monetary policy is long overdue. Monetary policy distortions helped us get into the recession. More of the same will not bring a stronger recovery.

Remember what Milton Friedman said in his 1967 presidential address to the American Economic Association:

> We are in danger of assigning to monetary policy a larger role than it can perform, in danger of asking it to accomplish tasks that it cannot achieve, and as a result, in danger of preventing it from making the contribution that it is capable of making [Friedman 1968: 5].

Conclusion

I agree with Milton Friedman: monetary policy needs to return to doing what it can and only what it can—that is, consistently producing an efficient exchange medium so that real goods and services (which include labor) can freely engage their most promising opportunities. The legislation we passed out of Committee does just that, by reducing policy uncertainty, facilitating an orderly exit from distortionary Fed credit policies, and holding Congress to account for risking taxpayers' money through emergency loans. I look forward to advancing these bills through Congress and introducing complementary legislation in the not too distant future.

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Book Reviews

Clashing Over Commerce: A History of U.S. Trade Policy
Douglas A. Irwin
Chicago: University of Chicago Press, 2017, 832 pp.

During the first 16 months of Donald Trump's tumultuous presidency, the subjects of trade, tariffs, and America's role in the global economy have featured prominently in the public square. Although it may not have been as obvious before 2017, the conduct and consequences of U.S. trade policy—and, perhaps more so, the misconceptions surrounding it—have long stirred the people's passions.

That's not news to Dartmouth economics professor Douglas A. Irwin, whose latest treatise on the history of U.S. trade policy documents in exquisite detail how "The Tariff" has sparked bitter political, economic, and constitutional debate and has been a persistent source of sectoral conflict from the founding of the republic to the present.

Clashing over Commerce: A History of U.S. Trade Policy was written, according to Irwin, to fill a glaring void. The last major history of U.S. trade policy to be published was the 8th edition of *A Tariff History of the United States* in 1931, by Frank Taussig, the famous Harvard trade economist who became the first chairman of the U.S. Tariff Commission (predecessor of the U.S. International Trade Commission) when it was created in 1916. As Irwin aptly demonstrates in *Clashing*, much trade policy history has transpired since 1931.

But Irwin doesn't begin where Taussig left off. He starts in colonial times to make certain his readers understand not only that U.S.

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trade policy played a major role in shaping the course of U.S. history, but that the mercantilist trade policies of the British Empire—such as the Navigation Acts, which precluded direct trade between the American colonies and other countries and required all goods be channeled through England—contributed to the growing anti-Crown fervor that eventually erupted into revolution and the birth of a nation.

In the introduction, Irwin references *Federalist 10*, in which James Madison notes that in every society there exist competing economic interests with contrasting views about what government policy ought to be. Alluding to what we would call the process of trade policy formulation today, Madison observed:

> Shall domestic manufactures be encouraged, and in what degree, by restrictions on foreign manufactures? are questions which would be differently decided by the landed and the manufacturing classes, and probably by neither with a sole regard to justice and the public good. . . . It is in vain to say that enlightened statesmen will be able to adjust these clashing interests, and render them all subservient to the public good.

Irwin's broad thesis, however, is that despite these bitter debates and the frictions and conflicts generated by this clashing of self-interests, U.S. trade policy has shown remarkable stability throughout the nation's history. Irwin attributes that stability to a geographic continuity of economic interests (such as steel production in Pennsylvania, tobacco farming in Kentucky, textile manufacturing in South Carolina) and the separation of powers (Madison's handiwork), which makes wrenching policy changes less likely. "Producer interests, labor unions, advocacy groups, public intellectuals, and even presidents can demand, protest, denounce, and complain all they want," Irwin writes, "but to change existing policy requires a majority in Congress and the approval of the executive. If the votes are not lined up, the existing policy will not change."

In fact, Irwin argues that U.S. trade policy substantively changed course *only twice* in our history, both times in response to exogenous shocks which led to political realignments—the Civil War and the Great Depression. Within each of the three periods delineated by these two shocks, policy continuity largely prevailed. But the shocks themselves heralded wholesale changes in the objectives of

U.S. trade policy. In Irwin's shorthand, the objectives of the three periods, chronologically, were "revenue, restriction, and reciprocity."

From the Founding in 1787 until the Civil War, the main purpose of the tariff was to raise revenues for the operations of a modest federal government that had few other means of funding. Much of the early debate in this era was over the question of how high a tariff "for revenue only" should be. Some worried that too high a tariff would squeeze foreigners' incomes, reducing the market for U.S. commodity exports. Others were wary that too much funding of the federal government would encourage its growth and encroachment into the jurisdiction of the states. Indeed, those concerns were very much at the heart of the conflicts over the 1828 Tariff of Abominations and the South Carolina Nullification Crisis in 1832. On the latter subject, Irwin notes—with a hint of pride—that trade policy was important enough to be the catalyst for America's first significant constitutional crisis.

Although the tariff was used to protect domestic industry on occasion during this era, it wasn't until after the Civil War that bald protectionism became the tariff's primary motive. With the end of the Civil War came the ascent of the Republican Party, which represented northern industrial interests that for decades had been clamoring for protection over the objections of southern agrarian interests. For most of the period between 1865 and 1932, Republicans controlled Congress and the White House, and restriction of imported manufactures to protect America's growing industrial concerns became the tariff's main purpose. The lobbying industry as we know it today has its roots in this era.

Describing the legislative process surrounding the writing of the Mongrel Tariff of 1883, Irwin cites a reporter at the time who wrote:

> Lobbyists descended like a flock of buzzards upon Washington, crowding all the hotels that winter, pulling, tugging at the statesmen in the name of the all the diverse, conflicting interests that employed them, . . . as committeemen in both chambers wrestled with long schedules and with the unblushing and unending demands of lobbies for sugar, iron, wool, glass, marble, and a hundred other trades.

With a few small exceptions, pro-tariff Republicans held sway over trade policy until the early 1930s. As the disastrous effects of the Tariff Act of 1930 (the "Smoot-Hawley" or "Hawley-Smoot Tariff," as

Irwin calls it) were rippling across the globe, and the Democrats returned to power in Washington, the main function of the tariff became a nobler one: reciprocity. According to Irwin's thesis, from the 1934 Reciprocal Trade Agreements Act to the founding of the General Agreement on Tariffs and Trade in 1947, through the multiple GATT rounds culminating in the founding of the World Trade Organization in 1995, and through the Obama presidency, inducing foreign governments into reciprocal trade liberalization was the main purpose of the tariff.

Irwin is the author of five other books covering different aspects and themes of trade policy history, including *Against the Tide: An Intellectual History of Free Trade*, in which he masterfully assesses and dispenses with formidable challenges to Adam Smith's theories about the primacy of specialization and free trade. But *Clashing* is easily Irwin's most ambitious undertaking.

Covering 250 years of trade policy in 693 pages of text and 185 pages of notes and references, the book is not for the faint-hearted. But neither is it "narcolepsy engendering," as Irwin admits some historians consider lengthy tariff tomes to be. It is comprehensive in coverage, rich in detail, and presented as history ought to be, which is to say factually, objectively, and with an engaging narrative. And, frankly, those hungering for a more substantive discussion about trade policy will find the book a welcome refuge from the boisterous, often fact-starved exchanges witnessed nowadays on cable news and social media.

The book covers many subthemes, including the tensions and rationales behind Congress's delegation of some of its constitutional authority over trade policy to the executive branch. Irwin could not have known when he began writing the book how topical that subject would be in 2018—with President Trump seemingly testing the limits of that authority by invoking dusty statutes to levy tariffs. Persistent, historically relevant questions—such as whether the tariff helped or hindered U.S. development, whether tariff policy was a cause of the Civil War, and whether Smoot-Hawley caused the Great Depression—are all given thorough analysis in the book. Likewise, the book describes the views and motives of many figures from history who helped shape U.S. trade policy for better or worse: Franklin, Hamilton, Jefferson, Daniel Webster, Cordell Hull. Henry Clay, with his advocacy of "The American System" of protection, evokes the typical modern day economic nationalist. Robert Walker,

Treasury Secretary to James Polk, in his insistence that foreign trade barriers are no excuse for our own, evokes Frederic Bastiat and Milton Friedman.

If there is any major question that lingers after reading *Clashing*, it is whether Irwin is prepared to accommodate substantive revisions in subsequent editions. Although not a challenge to his broad thesis that U.S. trade policy has been guided by the three Rs (Revenue, Restriction, Reciprocity), it seems reasonable to posit that, under the direction of President Trump, the United States is departing the era of reciprocity and entering, perhaps, a new R: the era of Retribution.

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Statecraft and Liberal Reform in Advanced Democracies
Nils Karlson
Cham, Switzerland: Palgrave Macmillan, 2018, 189 pp.

The study of politics in the United States now follows two paths. One apes economics, seeking to climb the ladder of higher math to theories of rational choice and scientific prestige. The other path—called American Political Development (APD)—looks to history to explain the growth of the American state. The devotees of APD seek to understand rather than evaluate the emerging American state, but their stories sometimes appear to justify administrative expertise and other aspects of their subject. Until recently APD scholars paid little attention to the liberalizing reforms enacted in the United States and other developed nations after 1980. Nils Karlson offers an admirable effort to understand the politics and outcomes of those reforms.

Karlson is suited to the job. He served as founding president and CEO of the Ratio Institute in Stockholm, Sweden. He was trained as an economist and political scientist at George Mason University and Uppsala University, respectively. Readers will be pleased to learn Karlson is also a board member of the Mont Pelerin Society. His interdisciplinary background should be (but is not) a starting point for studying state and political development. Academics laud interdisciplinary research, but academic careers prosper through specialization. To the benefit of his work, Karlson has done more than talk the interdisciplinary talk. He has also been involved in the practical matter of the politics of policy reform. Karlson has heard what

Max Weber called the *Beruf der Politik* (the calling to politics/policy). Our author, in short, has an exemplary background for his task.

Karlson's subject is the modern welfare state, that combination of market regulation and monetary redistribution that came to mark all developed nations. In 1965 most saw the welfare state as a remarkable success, a friend to both efficiency and equality and a teacher of improved tastes among the governed (according to Lyndon Johnson's speech announcing the Great Society). By 1980, at the latest, the welfare state was troubled if not in crisis even in Sweden, the enduring model of market egalitarianism.

But reforms to the welfare state were hard. Karlson provides a lucid inventory of the barriers to reforming the welfare state, all of which will be familiar to public-choice economists. Public choice tends toward pessimism about reforms. Recall Mancur Olson's view that rent-seeking favors small groups over the larger public. How in Olson's world could diffuse benefits ever impose concentrated costs? Yet liberal reform did happen (and not just in Sweden and Australia, the two nations treated here). So perk up, liberals! Liberty may not be doomed after all.

Karlson is mainly interested in the "how and why of reform." He proposes a reform cycle beginning with a change in social and economic conditions whose failings foster a need for new ideas that may be articulated by policy entrepreneurs. In turn, they engage interests and politics bringing about changes in policies and institutions that affect social and economic conditions. Karlson puts policy ideas and policy entrepreneurs at the center of his reform cycle. Put another way, he describes a road to reform paved by philosophy and policies though laid down by political engagement.

Here we come across Karlson's first lesson for American liberals, a lesson learned long ago with the founding of the Cato Institute but perhaps now being lost by libertarians generally. Philosophy, especially anarchism, is not enough. The point indeed is not to interpret the world but to change it. And that requires policy entrepreneurs engaged in the dubious business of politics. Here again Max Weber could offer some guidance: Liberals need an ethic of responsibility (not an ethic of absolute ends) informed by Karlson's studies of successful reform cycles.

Karlson seeks a theory of "liberal statecraft" to guide reforms. Statecraft is the "art of governing a country well." *Liberal* statecraft would be the art of governing well by increasing liberty, in fact as

well as in theory. Karlson sets out three strategies of reform: the Popperian, the Kuhnian, and the Machiavellian. The Popperian is "fact-based and involves the use of research, rational argumentation, and pragmatism." The Kuhnian strategy is "idea-based and involves the use of paradigmatic shifts of perspectives, narratives, framing, new authorities, and agenda setting." The Machiavellian, named after the putative "teacher of evil," involves "shrewdness and . . . the use of obfuscating, blame avoidance, splitting, compensating, and scapegoating." Good governance in general—and liberal reform in particular—require all three.

Liberals in Sweden (including Karlson himself) and Australia embraced all three strategies. What about American liberals? Perhaps we can say Ronald Reagan did so if libertarianism was indeed the heart of his conservatism. Rand Paul might fit the bill too. Perhaps American liberals foster so few successful reformers because the task is so daunting. That's true, but not a wholly adequate explanation. Many American liberals hate politics precisely because of its Kuhnian and Machiavellian traits. They stay clear of its moral compromises, wishing instead to build a shining city on a hill that will eventually somehow inspire people to build a liberal world. But ideals, however important, are only part of the reform story, perhaps a small part. Politics, Kuhnian or Machiavellian, requires the practice and learning that arise from engagement rather than logic chopping. Karlson wanted to make something happen and he did. I wonder how many American liberals really do.

Karlson applies his theory to two nations who liberalized extensively in the last part of the 20th century: Sweden and Australia. Both case studies go into admirable and persuasive detail. Both cases hold surprises for readers. The success of liberalization in Sweden will be somewhat familiar; the transformation to private pension accounts has been discussed for some time in the United States. Yet the scope of the change was remarkable both in policy and institutions. The Sweden held up in my youth as a paragon for the American left of how to combine socialism and democracy jettisoned much of the former. Many will be surprised how collectivist the old Australia was and how quickly it changed. Karlson's reform story in both nations ends about the time of the global financial crisis of 2008 (in Australia) or shortly thereafter (in Sweden).

Sweden and Australia might seem poor comparisons to the United States. But Karlson's case studies need not be valid for all nations.

He is seeking in this book to initially test his theory with two examples examined in depth. Does the theory work well with U.S. history? The United States began liberal reforms following an extended crises prompted by the failure of Keynesian economics and managerialism. Policy entrepreneurs and politicians played important parts in that drama including Bill Clinton, a politician who might have been expected to oppose liberalization. U.S. political institutions probably limited the scope of overall change by diffusing power thereby making it harder to enact reforms. Parliamentary democracies like Sweden and Australia can act resolutely if voters want liberalization.

Karlson has written a fine book, one that needed to be written. He has traveled far toward understanding how liberal reforms happen and thus how they might happen again. I am happy to learn that policy ideas and think tanks matter a lot to liberal reform, but I take from his book a larger and more challenging lesson. Politics should matter a lot to liberals. Making the world a better place requires more than argumentative engagement and moral probity. Young liberals must become dissatisfied with righteous failure. They must hear their own calling to politics and policy which holds out the prospect of both moral achievements and moral dangers. They might after all lose their souls. But doing nothing may mean losing liberalism itself. Will liberals be up to that task?

John Samples
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The Cadaver King and the Country Dentist: A True Story of Injustice in the American South
Radley Balko and Tucker Carrington
New York: Public Affairs, 2018, 416 pp.

The stereotypical crime stories of the American Deep South often include openly racist government and corrupt law enforcement. The opposition to the Civil Rights Movement of the mid-20th century was led by figures like Bull Connor, George Wallace, as well as the less widely known Sheriff Willis McCall, men whose words and deeds have made them infamous in American history as caricatures of evil in public office. Men like those made it easy to identify racism, injustice, and the rigged systems they oversaw and protected.

More than half a century later, the machineries of injustice are less obvious to a majority of Americans. We have seen the eradication of *de jure* Jim Crow, the rise of the black middle class, and African Americans in numerous prominent positions in public life—not just in the historic roles in sports and entertainment, but literature, government, and business. The prisons that overflow with black and brown bodies are out of sight and thus very often out of mind. The aggressive policing that occurs in black ghettos throughout American cities, north and south—and the very existence of those black ghettos in the first place—are mostly just an accepted part of life. An occasional video may show an isolated instance of police abuse or a story will come out about an innocent man left to sit in jail for years without trial, but for the most part, these are blips in the daily lives of Americans who strongly support the police and express at least grudging support of the criminal justice system.

But when people dig a little deeper into any one the thousands of separate state, local, and county criminal justice systems, they may find dysfunctional apparatuses and ambitious people who, with no particular ill will or intent, railroad the innocent into long prison terms or even death sentences. Any given system's protections for the innocent often are undermined by shoddy police investigations, inept or overburdened defense council, and dubious "scientific" evidence that confirms the conclusions already reached by law enforcement and prosecutors. Such was the case for Kennedy Brewer and Levon Brooks, two innocent men who were trapped in a system that functioned—and often still functions—more like a conviction manufacturing machine than an instrument of public justice. While several of the men who made their livings in the Mississippi justice system described in *The Cadaver King and the Country Dentist* are seriously flawed, even detestable, the story told by journalist Radley Balko and attorney Tucker Carrington is missing that unquestionable villain that intentionally frames the innocent or acts out of hatred of his fellow man. To borrow the term coined by Hannah Arendt, to read this book about the Mississippi justice system in the 1990s is to encounter the banality of evil.

Bestselling author and Mississippi lawyer John Grisham wrote the forward to the book, in which he outlines the eight most common contributing factors at work in convictions of the innocent: bad police work, prosecutorial misconduct, false confessions, faulty eyewitness identification, jailhouse snitches, ineffective counsel, "sleeping"

judges, and junk science. The Brewer and Brooks cases each feature five or six of the eight, depending how one counts the series of misfortunes foisted upon these men. The system's supposed safeguards failed Brewer and Brooks at almost every level and, but for the advancement of DNA evidence, both men would almost certainly have died in prison.

The book's colorful title refers to Dr. Steven Hayne, a pathologist who became Mississippi prosecutors' number one man to confirm the state's assertions on the cause of death, and Dr. Michael West, a dentist who marketed himself, among other things, as a forensic bitemark expert. Although both men's degrees were legitimate—they were not complete frauds—Balko and Carrington argue that both took on responsibilities and supposed expertise that neither was humanly capable of performing (Hayne claimed to annually perform over 1,500 autopsies, many times the maximum amount recommended by certifying agencies), or qualified to claim (West once claimed expertise in interpreting grainy video). They each testified in countless criminal cases as experts, including those of Brewer and Brooks, and we're still unsure how many of their errors and fabrications put innocent men behind bars.

The story Balko and Carrington tell describes the men at the heart of the story, as well as the history of the offices that lacked the basic discipline and oversight required to approach the minimum standards of justice. Anyone the least bit familiar with the criminal procedure, even through highly fictionalized dramas on television, will find outrage after outrage that should never have been allowed in the investigation or let into the courtroom. Lawyers and others more familiar with how the system is supposed to work—and often doesn't—may be taken aback by the sheer number of egregious injustices recounted in the book.

Although Brewer and Brooks eventually were exonerated, the message of *The Cadaver King and the Country Dentist* is not and cannot be that "the truth will win out in the end." Avoidable tragedies robbed these men of decades of freedom and affected the lives of many more around them. These extraordinary cases have played out innumerable times in Mississippi, in part thanks to men like Drs. Hayne and West, but also in cities and towns across the country without the same unscrupulous opportunists. Herein lies the importance of the book: we have no idea how many innocent men and women sit in prison today. In a nation with roughly

two million people behind bars, a conservative estimate of the number of imprisoned innocent people is probably in the thousands, and perhaps in the tens of thousands. Our criminal systems must be improved to minimize the chances of wrongful convictions in the future. Balko and Carrington have produced a great—and infuriating—book about how this can happen. The state of justice in Mississippi may have been particularly bleak, but so many of the problems that happened there are not unique at all.

Jonathan Blanks
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The Case Against Education: Why the Education System Is a Waste of Time and Money

Bryan Caplan
Princeton, N.J.: Princeton University Press, 2018, 395 pp.

Bryan Caplan is a professor of economics at George Mason University who has spent over 40 years in school. "The system has been good to me," he confesses. "Very good. I have a dream job for life."

He's also a shameless traitor to his profession and guild, a critic of the system that's afforded him a life of leisure and affluence. That's a *good* thing. We need more honest critiques of the higher-education boondoggle from privileged insiders. As an economist, moreover, he argues from data and facts, not feelings or emotions. He'll undermine his own best interests if statistics lead him inexorably to positions at odds with his personal welfare.

The Case Against Education: Why the Education System Is a Waste of Time and Money hits bookshelves amid reductions in government spending on universities due to budget shortfalls in the aftermath of the Great Recession. The chorus of complaints runs something like this: "Legislators don't realize what goes on in the university; they don't understand what it takes to teach and research; they don't know what I do to earn my pay; they don't appreciate how important education is to our state; they can't competently assess my everyday work."

But Caplan understands these things, having spent his entire career as a student or a professor at major research institutions. The argument against educational excess is more credible coming from an academic, like him, who's complicit in its harms.

Caplan's chosen title (with subtitle) says it all: His target isn't the acquisition of knowledge (it's *good* for people to learn), but the wasteful, exorbitant *system* that in many cases impedes rather than facilitates the acquisition of knowledge. Five provocative words on the book's opening page—"there's way too much education"—are predicated on the proposition that learning and education are distinct, that garnering credentials does not correlate with increased erudition or competence.

It's no secret that the costs of higher education have been rising steadily for decades. Universities have long been reallocating resources away from basic classroom instruction and towards amenities, administrative payrolls, athletic programs, student services, and construction projects. The ready availability of federal student loan money has enabled colleges to hike tuition and fees, forcing students to shoulder heavy, often unmanageable debt burdens. As a result, the artificially inflated price of a college degree is greater than the actual costs associated with teaching and research.

Caplan believes enough is enough. "The heralded social dividends of education," he insists, "are largely illusory: rising education's main fruit is not broad-based prosperity, but credential inflation." He boldly submits that "the average *college student* shouldn't go to college."

Objections to these strong claims are predictable: don't college graduates earn more money than those without a college degree? The answer, of course, is yes. But that's not the full story.

Caplan explains that the primary value of a college degree is in its "signaling" power. That diploma on your wall doesn't tell employers how much you know or what skills you have attained. Rather, it signals to them your tenacious character and work ethic. Finishing college proves you have the wherewithal and discipline to claw your way to the top. The problem, of course, is that an abundance of earned bachelor's degrees diminishes their value while graduate degrees become the substitute marker of distinction. If you aren't learning practical skills as you chase multiple degrees, you and the institutions funding your education (likely the government) are just dumping money to jumpstart or advance your career, in which case all this spending seems, well, inefficient and unnecessary.

Courses in college aren't intrinsically valuable. You can spend months on YouTube watching recorded faculty instruction at Yale and Stanford, learning vast amounts of information, but no one will hire you for that effort. After all, you've gained no credential. On the other

hand, you could sit through college classes that don't interest you, excelling on exams but forgetting the tested material as soon as the class ends. You will be no wiser from this experience. Employers know that and don't care. They don't hire students for wisdom or knowledge. They hire students with a record of demonstrated success.

Caplan emphasizes the importance of "conformity" to the signaling model. Employers and teachers share a key preference: they generally favor cooperative and dutiful personalities over lazier and more disagreeable alternatives. The ability to fit in, to adapt to different social settings, tends to impress business leaders. College grades reveal temperaments, dispositions, traits, and priorities—they demonstrate whether a student conforms to expectations. Formal education isn't the only way to demonstrate conformity, but, in Caplan's words, it "signals a package of socially desirable strengths." He adds, "If you want the labor market to recognize your strengths, and most of the people who share your strengths hold a credential, you'd better earn one too."

Caplan sensibly advocates vocational training as an institutional corrective, but has little workable advice for people pursuing certain vocations. Someone who wants to be a teacher must earn the necessary credential; someone who wants to be a lawyer must attend law school. Whether these credentials are needed at all—that is, whether they are suitable prerequisites that adequately prepare students for the everyday practice of their desired vocation—is a significant question warranting extensive debate, but regrettably it falls outside the scope of Caplan's project. His substantial case against education might leave you wondering, at any rate, why he thinks universities can effectively provide vocational training at all. If they're so bad at what they do, why would they shine at this new task?

There's also a "presentist' element to Caplan's thesis. Universities weren't designed to prepare students for vocations outside of medicine, law, or the clergy. Until late in the 20th century, you didn't need college to compete on the job market. Universities have a complex and chaotic history that makes undue emphasis on workforce training seem shortsighted. The number of students attending college to advance innovative research or otherwise contribute academically to the sum of knowledge remains low. The central purpose of the university isn't served by the current form of higher education in which a premium is placed on employment outcomes. Caplan isn't trying to remake higher education or return it to its medieval roots, but by

inflaming passions at least he might redirect attention to the central mission of universities: to educate and spread knowledge.

As the holder of a Ph.D. in English, I commend the colorful chapter "Nourishing Mother" to the skeptically inclined humanities professor who stands ready to accuse Caplan of prizing social and economic returns over the immeasurable effects of literary, aesthetic, philosophical, historical, or theological inquiry. The scholar of arts, society, and culture may be surprised to find a useful ally in Caplan, although his discussions of "high culture" and "taste" may irritate English professors, who will quickly recognize how little Caplan understands their discipline.

It's obvious that higher education in its current manifestation is financially unsustainable. Something has to give. Skeptics should read *The Case Against Education* with an open mind and an eye toward the future. Caplan is heavy on issue-spotting but short on solutions, but he provokes difficult conversations that are long past due.

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