

Rules-Based International Monetary Reform

John B. Taylor, Richard Clarida, and George P. Shultz

PART 1

An International Monetary System Built on Policy Rules and Strategies

John B. Taylor

For nearly two decades in the 1980s and 1990s, economic performance and stability improved in major parts of the world as monetary policy tended to be more focused and rules based. During much of the past decade, monetary policy has deviated from a rules-based approach in much of the world, and economic performance and stability has deteriorated, remaining poor today. As Paul Volcker (2014) has put it, “the absence of an official, rules-based, cooperatively managed monetary system has not been a great success.”

In these remarks I discuss a new approach to international monetary policy. The proposed reform is based on years of experience and economic research which suggest that a rules-based reform in each country will deliver a rules-based international monetary system that “can better reconcile reasonably free and open markets

These remarks were presented at the conference on International Monetary Stability: Past, Present, and Future, Hoover Institution, Stanford University, and are based on Taylor 2016a. More details and related issues are discussed in Taylor 2016b and 2016c.

with independent national policies [and] stability,” the sensible goal called for by Volcker (2014).

I start with a review of the economic principles that indicate that such a rules-based policy will lead to good global economic performance. I then provide evidence—consistent with those principles—that shows that adhering to more rules-based policy has been associated with good performance while deviating from rules-based policy has been associated with poor economic performance. Building on this experience and the principles, I then describe the reform proposal and its implementation.

The international monetary system: A rules-space or strategy-space approach

Economic research going back to the 1980s showed that simple rules-based monetary policy would result in good global economic performance (Carlozzi and Taylor 1985; Taylor 1985). In this research, the monetary policy of each central bank was viewed as a rule or strategy for the instruments of policy, and questions of international coordination or cooperation were addressed in “rules-space” or “strategy-space” rather than in terms of the setting for the policy instruments. If each central bank adopted a rules-based monetary policy that was optimal for its own country’s price and output stability, it would contribute to global stability. Moreover, there would be little additional gain from the central banks also jointly optimizing their policy rules or strategies. In other words, the research showed that the Nash equilibrium—where each country chose its monetary strategy taking as given other countries’ strategies—is nearly optimal, or nearly an internationally cooperative equilibrium.

In the models used in this research, capital is mobile, which is largely appropriate for the modern global economy, and ri-

gibilities exist, including the fact that prices and wages are sticky. There are cross-country linkages: the price of foreign imports affects domestic prices, and the real exchange rate affects output. Shocks from abroad can hit anywhere. Monetary policymakers face a macroeconomic tradeoff between price stability and output stability, and they have the task of finding a policy strategy in which they adjust their monetary policy instrument to reach an optimal point on that tradeoff. The strategy must respond to shocks while not creating its own shocks either domestically or internationally.

The tradeoff is like a frontier. Monetary policy cannot take the economy to infeasible positions off the frontier. But suboptimal monetary policy—due to policy deviations, reacting to the wrong variables, and other factors—can take the economy to inferior points off the tradeoff. Along the frontier, lower price variability can only be achieved with greater output variability corresponding to different values of the reaction coefficients. The existence of such a tradeoff is quite general, and the modeling framework has been used in many different monetary policy studies going back to the 1970s and continuing today.

The important result for international policy is that such models imply that the central bank's choice of a policy *strategy* has little impact on output and price stability tradeoff in the other countries. The tradeoffs for other countries are virtually the same regardless of which optimal policy strategy is chosen by each country. This is the sense in which there is little to be gained by countries coordinating their choice of policy rules with other countries if all are following policy rules that are optimal domestically.

The converse situation where monetary policy in one or more countries does not follow an optimal rule is less clear-cut theoretically because it requires defining the nature of the deviation. Nevertheless, the tradeoff concept can be used to illustrate how such

deviations from an optimal policy rule can lead to a breakdown in the international system.

Suppose a country deviates from its policy rule and moves in the direction of an inefficient policy. There are two types of impacts on other countries. First, the tradeoff in other countries shifts in an unfavorable direction, perhaps due to more volatile capital flows, exchange rates, commodity prices, and export demand. Second, less efficient monetary policy in one country brings about a less efficient monetary policy in other countries. For example, if the policy change in one country brings about an excessively easy policy with very low interest rates, then the policymakers in other countries—concerned about exchange rate appreciation—may deviate from their policy rule by setting interest rates that are too low.

History has validated many of these theoretical predictions. As the United States and European central banks moved toward rules-based monetary policies, economic performance improved in the 1980s and 1990s, especially when compared with the instability of the 1970s. Evidence for this shift in policy was provided early on by Clarida, Gali, and Gertler (2000). When central banks in many emerging market countries started moving toward more rulelike policies with their inflation targeting approach, economic performance also improved, as shown by De Gregorio (2014).

During the past decade, however, policy has changed. I refer here to the departures from rules-based policy before and after the panic in the autumn of 2008, not to the lender of last resort actions taken by the Fed and other central banks during the panic. Empirical research by Ahrend (2010), Kahn (2010), and Taylor (2007) shows that a deviation from rules-based policy in the United States and other countries started more than a decade ago—well before the financial crisis. Hofmann and Bogdanova (2012) and Shin (2015) show that there has been a “Global Great Deviation,” which is continuing, as can be seen especially when

unconventional central bank interventions and large-scale balance sheet operations are included. Nikolsko-Rzhevskyy, Papell, and Prodan (2014) uncover these changes in policy using modern time-series techniques. Associated with the change has been deterioration in economic performance, including the Great Recession, the slow recovery, large negative international spillovers, and an increase in the volatility of capital flows and exchange rates. Policymakers in emerging market countries, including Agustin Carstens (2015) and Raghuram Rajan (2016), have noted the adverse spillovers, and many have had to resort to unusual policy actions. Policymakers in developed countries, including Japan and Europe, have reacted to the adverse exchange rate effects of monetary policies. International economists have raised concerns about currency wars.¹

While there is general agreement about the first shift in policy in the early 1980s, there is still disagreement about the second shift and its timing. An alternative view is that the monetary policies have been appropriate during the past dozen years, even if they are not rulelike, and the recent deterioration in economic performance was not due to monetary policy deviating from a rules-based approach. Mervyn King (2012) argues that the policy tradeoff in many countries shifted in an unfavorable direction because financial stability eventually bred instability as investors got complacent. “Relative to a Taylor frontier that reflects only aggregate demand and cost shocks,” he writes, “the addition of financial instability shocks generates what I call the Minsky-Taylor frontier.”

And there is also disagreement about the international spillovers and the related problems with the international monetary system. Bernanke (2013) argues that it was appropriate for coun-

1. See Bergsten (2013).

tries around the world to deviate during the years from 2009 to 2013 from the policies that worked during the 1980s and 1990s.

Empirical evidence on global effects

Because of these disagreements about the more recent shift in policy and especially the international impacts, it is important to look for and examine evidence that bears on this shift and its effects.

According to the IMF's main multicountry monetary model, GPM6 described in Carabenciov et al. (2013), the impact of a deviation from a monetary policy rule in the United States has impacts on real output around the world. A deviation which initially causes the US interest rate to decline results in a negative effect on output in Latin American emerging economies (including Brazil, Chile, Colombia, Mexico, and Peru) and Asian emerging economies (China, India, South Korea, Indonesia, Taiwan, Thailand, Malaysia, Hong Kong, Philippines, and Singapore). For each percentage point monetary-policy-induced increase in output in the United States, output falls by .25 percentage points in the Latin American countries and by .13 percentage points in the emerging Asian countries. As described by the builders of the IMF's GPM6 model, this occurs because "the exchange rate channel is stronger than the direct output gap effect." The impact on other developed economies' output is not negative, but it is quite small. For example, Japan's output increases by only about 1/20th of the US output increase in the model.

Note that these simulations contradict the view that deviations from the rules-based policy are beneficial abroad. Bernanke (2013) argued that "The benefits of monetary accommodation in the advanced economies are not created in any significant way by changes in exchange rates; they come instead from the support for domestic aggregate demand in each country or region. Moreover, because stronger growth in each economy confers beneficial spillovers to

trading partners, these policies are not ‘beggar-thy-neighbor’ but rather are positive-sum, ‘enrich-thy-neighbor’ actions.” The policy simulations do not support an enrich-thy-neighbor view.

Given these simulations it is not surprising that policy deviations at one central bank put pressures on other central banks to deviate also. A reduction in policy interest rates abroad causes their exchange rate to appreciate, and even with offsetting effects due to economic expansion abroad, the overall spillover effect may well be negative. For the emerging market countries in Latin America and Asia, the exchange rate effect dominates. Central banks will tend to resist large appreciations of their currency, and one way to do so is to reduce their own policy rate relative to what it would be otherwise. This will reduce the difference between the foreign interest rate and the domestic interest rate and will thus mitigate the appreciation of their exchange rate.

There is considerable empirical evidence of the impact of foreign interest rates on central bank decisions.² The best evidence comes from central bankers themselves, many who readily admit to these reactions in conversations. The Norges Bank provides a great deal of detail about its decisions and the rationale for them. In 2010, for example, the Norges Bank explicitly reported that it lowered its policy interest rate because interest rates were lower abroad. It also reported that a policy rules with external interest rates included came much closer to describing the actual decisions than the policy rules without external interest rates.

Regressions or estimates of policy rules provide considerable evidence of the international spread of central bank policies. The recent work of Edwards (2015), Carstens (2015), and Gray (2013) is quite definitive. The usual approach is to estimate policy rate reaction functions in which the US federal funds rate or other measures of foreign interest rates are entered on the right-hand side as

2. See Taylor (2013) for more details.

deviations from their respective policy rules. The usual finding is that the reaction coefficient on the foreign rate is positive, large, and significant.

In addition, this type of deviation from interest rate policy rules can create large international multiplier effects. In a two-country model in which one central bank's policy rate has a response coefficient of .5 on the second central bank's policy interest rate and the second central bank has a response coefficient of 1 on the first central bank's interest rate, an initial cut in interest rate results in a reduction in global interest rates of twice as much.

Just as interest rate policy deviations can be transmitted globally, so can quantitative easing. Following the financial crisis and the start of the US recovery from 2008 to 2012, the yen significantly appreciated against the dollar while the Fed repeatedly extended its large-scale asset purchases along with its zero interest rate policy with little or no response from the Bank of Japan. However, the adverse economic effects of the currency appreciation in Japan became a key issue in the 2012 election, and, when the Abe government came into power, it urged the Bank of Japan to implement its own massive quantitative easing, and this is exactly what happened. As a result of this change in policy, the yen reversed its course and depreciated to the same levels as those before the panic of 2008. In this way the quantitative easing policy of one central bank appeared to cause quantitative easing at another central bank.

The moves of the ECB toward quantitative easing in the past year seem to have similar motivations. An appreciating euro was, in the view of the ECB, a cause of the weak European economy, and the response was to initiate another large round of quantitative easing. At the Jackson Hole conference in August 2014, Mario Draghi spoke about his concerns about the strong Euro and hinted at quantitative easing. This shift in policy was followed by a weaker euro and a stronger dollar.

These actions were accompanied by widespread depreciations of currencies in emerging market countries as capital flows reversed. The dollar index rose sharply against a large group of countries: Mexico, China, Taiwan, Korea, Singapore, Hong Kong, Malaysia, Brazil, Thailand, Philippines, Indonesia, India, Israel, Saudi Arabia, Russia, Argentina, Venezuela, Chile, and Colombia. The Taper Tantrum of May–June 2013, in which the Fed first indicated it was going to wind down QE, was a big turning point for currency markets and capital flows.

With these currency developments in the background, the actions of China to start to let the yuan move with other currencies and away from the dollar in August 2015 are understandable. There is also econometric evidence that quantitative easing has an impact on monetary policy decisions abroad. Chen et al. (2012) find that “the announcement of QE measures in one economy contributed to easier global liquidity conditions.”

Concerned about the ramification of deviating from their normal monetary policy, many central banks have looked for other ways to deal with the impacts of policy deviations abroad. These include imposing capital controls, the proliferation of macroprudential tools, and currency intervention.

Controls on capital flows, or what the IMF staff calls “capital flow management,” are usually aimed at containing the demand for local currency and its appreciation, but they also mitigate risky borrowing and volatile capital flows. However, capital controls create market distortions and may lead to instability as borrowers and lenders try to circumvent them and policymakers seek even more controls to prevent the circumventions. Capital controls are one reason why the output and price stability frontier will shift adversely. Capital controls also conflict with the goal of a more integrated global economy and higher long-term economic growth.

Currency intervention is another way countries try to prevent unwanted changes of a currency, either as an alternative, or as a

supplement, to deviations of interest rates from normal policy. Currency intervention has been used widely in recent years by many emerging market countries. However, currency interventions can have adverse side effects even if they temporarily prevent appreciation. If they are not accompanied by capital controls, they require a change in monetary policy (nonsterilization) to be effective.

The spread of macroprudential policies is another impact of monetary policy deviations from abroad. This is most obvious in small open economies closely tied to the dollar. With low interest rates, those central banks have had no choice but to resort to discretionary interventions in housing or durable goods markets. These policies are also becoming more popular in inflation targeting countries with flexible exchange rates. But so-called macroprudential actions are inherently discretionary, and they expand the mission of central banks and bring them closer to politically sensitive areas. They also run the risk of becoming permanent even after unconventional policies abroad are removed. A regulatory regime aimed at containing risk-taking is entirely appropriate, but that entails getting the levels right, not manipulating them as a substitute for overall monetary policy.

The flows of capital in and out of emerging markets as well as the recent swings in exchange rates seem quite related in time to changes in monetary policy. Regarding the volatility of capital flows, Rey (2014) writes that “our VAR analysis suggests that one important determinant of the global financial cycle is monetary policy in the center country, which affects leverage of global banks, credit flows and credit growth in the international financial system.” Carstens (2015) showed that there has been a marked increase in volatility of capital flows to emerging markets since the recent deviation from rules-based policy began. Regarding exchange rate movements, there has also been an increase in volatility. The 12-month percent change in the US dollar index against “major” currencies as defined by the Federal Reserve (Euro Area, Canada,

Japan, United Kingdom, Switzerland, Australia, and Sweden) has showed an increase in volatility.

A proposal for implementing a rules-based international monetary system

The evidence indicates that the key foundation of a rules-based international monetary system is simply a rules-based monetary policy in each central bank. There is already an established body of research showing that the move toward rules-based monetary policy in the 1980s led to improved national and international performance in the 1980s and 1990s. And, although more research is needed, economic evidence indicates that the recent spread and amplification of deviations from rules-based monetary policy in the global economy are drivers of current instabilities in the international monetary system. Finally, research shows that each country following a rules-based monetary policy consistent with achieving national economic stability—and expecting other countries to do same—would take the world toward an international cooperative equilibrium.

The process of each country reporting on its monetary policy strategy and agreeing to commit to that strategy can be an important means of building this foundation. It is essential that the process not impinge on other countries' domestically optimal monetary strategies. Emerging market countries should be part of the process. A clear commitment by the Federal Reserve—still the world's most significant central bank, with responsibility for the world's most significant currency—to move in this rules-based direction would help start the process.

The barriers to implementing an international agreement along these lines may be surprisingly low. Of course some form of renormalization of monetary policy, or at least intent to renormalize, is needed. After that come goals and strategies for the instruments

of policy to achieve the goals. The major central banks now have explicit inflation goals, and many policymakers use policy rules that describe strategies for the policy instruments. Thus, explicit statements about policy goals and strategies to achieve these goals are feasible. That there is wide agreement that some form of international reform is needed would help move the implementation along.

Such a process poses no threat to either the national or international independence of central banks. It would be the job of each central bank to formulate and describe its strategy. Participants in the process or parties to the agreement would not have a say in the strategies of central banks in other countries or currency unions other than that they be reported. And the strategies could be changed or deviated from if the world changed or if there was an emergency. A procedure for describing the change in strategy and the reasons for it would presumably be part of the agreement.

Many policymakers and economists have called for reforms of the international monetary system, reflecting concerns about instabilities, international policy spillovers, volatile capital flows, risks of crises, or simply less than stellar economic performance. I already cited Paul Volcker (2014). In addition, Jaime Caruana (2012) at the Bank for International Settlements has been researching the issues and also making proposals. Raghuram Rajan (2016) argues that “what we need are monetary rules that prevent a central bank’s domestic mandate from trumping a country’s international responsibility.” Hélène Rey (2014) argues that we need macroprudential policies or even capital controls to slow down the flow of capital that she connects to independent monetary policy actions.

The approach suggested here is supported by historical experience and extensive research over the years. It is attractive because each country can choose its own independent strategy, avoid interfering with the principles of free and open markets, and contribute to the common good of global stability and growth.

References

- Ahrend, R. 2010. Monetary ease: A factor behind financial crises? Some evidence from OECD countries. *Economics: The Open Access, Open Assessment E-Journal* 4.
- Bergsten, C. F. 2013. Currency wars, the economy of the United States and reform of the international monetary system. Stavros Niarchos Foundation Lecture. Peterson Institute for International Economics, Washington, May 16.
- Bernanke, B. 2013. Monetary policy and the global economy. Speech at the Department of Economics and Suntory and Toyota International Centres for Economics and Related Disciplines (STICERD), London School of Economics, London, March 25.
- Carabenciov, I., C. Freedman, R. Garcia-Saltos, D. Laxton, O. Kamenik, and P. Manchev. 2013. *GPM6: The global projection model with 6 regions*. IMF Working Paper WP/13/87. Washington, DC: International Monetary Fund.
- Carlozzi, N., and J. B. Taylor. 1985. International capital mobility and the coordination of monetary rules. In *Exchange rate management under uncertainty*, ed. J. Bhandhari. Cambridge: MIT Press.
- Carstens, A. 2015. Challenges for emerging economies in the face of unconventional monetary policies in advanced economies. Stavros Niarchos Foundation Lecture, Peterson Institute for International Economics, Washington, DC, April 20.
- Caruana, J. 2012. Policymaking in an interconnected world. Paper presented at the Federal Reserve Bank of Kansas City Policy Symposium on The Changing Policy Landscape, Jackson Hole, August 31.
- Chen, Q., A. Filardo, D. He, and F. Zhu. 2012. *International spillovers of central bank balance sheet policies*. BIS Paper 66p. Basel, Switzerland: Bank for International Settlements.
- Clarida, Richard, Jordi Gali, and Mark Gertler. 2000. "Monetary Policy Rules and Macroeconomic Stability: Evidence and Some Theory," *Quarterly Journal of Economics* 115, 1 (February): 147–180.
- De Gregorio, J. 2014. *How Latin America weathered the global financial crisis*. Washington, DC: Peterson Institute for International Economics.
- Edwards, S. 2015. Monetary policy independence under flexible exchange rates: An illusion? NBER Working Paper 20893. Cambridge, MA: National Bureau of Economic Research.
- Gray, C. 2013. Responding to a monetary superpower: Investigating the behavioral spillovers of US monetary policy. *Atlantic Economic Journal* 21 (2): 173–184.

- Hofmann, B., and B. Bogdanova. 2012. Taylor rules and monetary policy: A global Great Deviation? *BIS Quarterly Review*, September.
- Kahn, G. A. 2010. Taylor rule deviations and financial imbalances. *Federal Reserve Bank of Kansas City Economic Review* 2nd quarter: 63–99.
- King, M. 2012. Twenty years of inflation targeting. Stamp Memorial Lecture, London School of Economics, London, October 9.
- Nikolsko-Rzhevskyy, A., D. H. Papell, and R. Prodan. 2014. Deviations from rules-based policy and their effects. In *Frameworks for central banking in the next century*, ed. Michael Bordo and John B. Taylor. Special issue, *Journal of Economic Dynamics and Control* 49 (December): 4–18.
- Rajan, R. 2016. New rules for the monetary game. *Project Syndicate*, March 21.
- Rey, H. 2014. Dilemma not trilemma: The global financial cycle and monetary policy independence. In *Global dimensions of unconventional monetary policy*, symposium sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, WY, August 22–24, 2013.
- Shin, H. S. 2015. Macroprudential tools, their limits and their connection with monetary policy. Presented at IMF conference entitled Rethinking macro policy III: Progress or confusion?
- Taylor, J. B. 1985. International coordination in the design of macroeconomic policy rules. *European Economic Review* 28: 53–81.
- Taylor, J. B. 2007. Housing and monetary policy. In *Housing, housing finance, and monetary policy*. Federal Reserve Bank of Kansas City, September: 463–76.
- Taylor, J. B. 2013. International monetary coordination and the Great Deviation. *Journal of Policy Modeling* 35 (3): 463–72.
- Taylor, J. B. 2016a. A rules-based cooperatively managed international monetary system for the future. In *International monetary cooperation: Lessons from the Plaza Accord after thirty years*, ed. C. F. Bergsten and R. Green, 217–36. Washington, DC: Peterson Institute for International Economics.
- Taylor, J. B. 2016b. The Federal Reserve in a globalized world economy. In *The Federal Reserve's role in the global economy*, ed. M. Bordo and M. Wynne, 195–217. Cambridge: Cambridge University Press.
- Taylor, J. B. 2016c. Rethinking the international monetary system. *Cato Journal* 36.2 (Spring/Summer): 239–50.
- Volcker, P. A. 2014. Remarks. Bretton Woods Committee Annual Meeting, Washington, DC, June 17.

PART 2

**National Monetary Policies often Correlate, May Sometimes Coordinate, but Rarely Cooperate
(And That’s Probably a Good Thing!)***Richard Clarida*

The topic of this panel is “rules-based international monetary reform,” and my goal is not only to offer a perspective informed by macroeconomic models that give a prominent role to policy rules but also, by my ongoing effort as a student of global monetary policy—and of the two panelists I am sharing the stage with—to square those models with what we (think we) see in the world. The title of this note reveals the punch line: we *observe* that national monetary policies are often correlated (eras of global monetary easing; global rate hike cycles), and they also *appear* sometimes to be coordinated (after all, what else are central bankers doing at all those G7, G20, IMF, and Basel meetings?), but rarely (if ever) do major central banks respect a binding commitment to pursue cooperative policies, policies that would differ from non-cooperative policies aimed solely at satisfying their objectives for domestic inflation and employment. It has long been well appreciated (Taylor 1985) that, in small- or large-scale open economy macro models, the calibrated gains to international monetary policy cooperation (see, for example, Obstfeld and Rogoff 2002) are found to be modest relative to the welfare achieved under a Nash equilibrium in which each country runs a sensible policy, taking as given the (sensible) policy of the other countries. Today, I will make a somewhat different and less often discussed case against global monetary policy cooperation, namely, that, in practice, adopting it—or succumbing to it!—could plausibly erode central bank credibility and public support for sound, rules-based policies. If I’m right, the all-in cost to a regime of policy cooperation

could swamp the theoretical benefits, and, if so, we should not bemoan the absence of formal monetary policy cooperation—we should celebrate it!

In a world in which policy rules provide (or should provide) an important reference point and anchor for monetary policy, international monetary policy *coordination*—which I define as including the sharing of information and analysis regarding estimates of the unobservable inputs to policy rules such as the equilibrium real rate of interest and potential output as well as the considerations that would govern the timing and trajectory of a baseline policy (rule) path as well as triggering deviations from such a path—can enhance the design and effectiveness of baseline policy rules. I will give examples below. But while international monetary policy *coordination* may enhance the efficiency of a policy rule framework if it is in place, I am skeptical that in practice there are additional material, reliable, and robust gains that would flow from a formal regime of binding monetary policy *cooperation*, at least among major G7 economies and even a number of emerging economies with flexible exchange rates and relatively open capital accounts. In such a regime, national monetary policies in *each* country are constrained to be set so as to jointly maximize *world* welfare. In these models, as in the earlier literature they build on, there are externalities to monetary policy that create such theoretical gains to cooperation. However, as Clarida, Gali, and Gertler (2002) and Engel (2009) illustrate in “new Keynesian” models, to achieve the theoretical gains to international monetary policy cooperation, policy rates in *each* country must be set with reference to an index of inflation deviations from target in both *the home and the foreign countries*. In other words, whereas optimal policy in the absence of cooperation can be implemented with a policy rule that reacts to domestic inflation, output gaps, and the appropriately defined equilibrium—or neutral—real interest rate, a policy increasing global welfare must bind central banks to policy rules that react to

foreign as well as domestic inflation, policy rules that they would not chose were they not bound.

I believe that, in practice, beyond the time consistency problem, there could well be another problem with policy cooperation that is absent from most theoretical discussions. Simply stated, the problems as I see them are the threat to the credibility of the central bank, the challenges to central bank communication, and the resulting potential loss of support for its policy actions from the public when the policy choices required by cooperation react not only to home inflation but also to deviations of foreign inflation from target. For example, if home inflation is above target but foreign inflation is below target, the optimal policy rule under cooperation calls for the home (real) policy rate to be lower—more accommodative—than it would be in the absence of cooperation (Clarida, Gali, and Gertler 2002). In theoretical models, the commitment to the inflation target is just assumed to be perfect and credible, but in practice credibility appears to be a function of central bank communication and of the policies actually implemented pushing inflation toward—and, in the absence of shocks, keeping inflation at—target. I suspect that, in practice, central banks would have a hard time maintaining credibility as well as communicating a policy that kept home real interest rates low—or in extreme cases negative—not because home inflation is too low but because foreign inflation is too low! Or, imagine the opposite case, with home inflation below target when foreign inflation is above target. In this case, the optimal policy rule under cooperation calls for the home (real) policy rate to be higher—less accommodative—than it would be in the absence of cooperation, not because home inflation is too high but because foreign inflation is!

While, perhaps for these reasons, we do not have many confirmed sightings of genuine monetary policy *cooperation*, we do perhaps observe rather more examples of what I think of as policy *coordination*. The Clarida, Gali, and Gertler (2002) model provides

an illustration of the value of policy coordination in the noncooperative Nash equilibrium of that two-country model. In the “home” country, the optimal Nash monetary policy rule can be written as a forward-looking Taylor rule:

$$R_t = \bar{r}_t + \left(1 + \frac{\lambda(1 - \rho)}{\alpha\rho} \sigma_0 + \frac{\lambda}{\rho} \right) E_t \pi_{t+1} + \alpha \tilde{y}_t$$

where \bar{r}_t is the equilibrium real interest rate consistent with the flexible price equilibrium given by

$$\bar{r}_t = \sigma_0 E_t \{\Delta \bar{y}_{t+1}\} + \kappa_0 E_t \{\Delta y_{t+1}^*\}.$$

Here $\sigma_0 = \sigma - \gamma(\sigma - 1) > 0$, $\kappa_0 = \gamma(\sigma - 1)$, and Δy_{t+1}^* is growth in foreign output with $1 / \sigma < 1$ the intertemporal elasticity of substitution, $\gamma < 1$ the share of imports in the consumption basket, λ the slope of the open economy Phillips curve, ρ the persistence of “cost push” shocks, and α the relative weight the policymaker places on stabilizing output. Thus, the best Nash policy in this two-country model is a Taylor type rule for setting the policy rate as a function of expected home inflation, the home output gap y_t , and time varying equilibrium home real interest rate, *which is a function of expected foreign output growth!* In the baseline specification $\kappa_0 > 0$, the equilibrium real interest rate that is relevant for setting home monetary policy depends on expected foreign, as well as home, output growth. Thus, to the extent the foreign central bank has some comparative advantage in tracking or forecasting foreign output growth and the foreign equilibrium real interest rate, sharing this information with the home central bank can improve its estimate of the home equilibrium real interest rate and thus the effectiveness of its policy rule in meeting its domestic objectives.

As discussed above, to achieve the theoretical gains from monetary policy cooperation in these models, it no longer suffices for the policymaker to follow an instrument rule based solely on domestic

variables. Instead, under cooperation the home central bank must set the policy rate as a function of home and foreign variables. In its simplest form, this rule can be written as

$$R_t = \bar{r}r_t + \left(1 + \frac{\lambda(1 - \rho)}{\alpha\rho} \sigma_0\right) E_t \pi_{t+1} + \frac{\kappa_0}{\kappa} \left(\frac{\lambda(1 - \rho)}{\alpha\rho} \sigma_0\right) E_t \pi_{t+1}^*$$

with the parameter $\kappa > 0$. In sum, not only do the quantitative gains from time inconsistent cooperative monetary policy rules appear to be modest, but also the policy rules required to implement the cooperative outcome could well be difficult to communicate and to adhere to without sacrificing the credibility of the inflation target and the policy regime itself.

To conclude, we have reviewed some simple examples based on rigorous models which can (1) generate monetary policy correlation via the global factor present in each country's equilibrium real interest rate; (2) rationalize the alleged benefits to monetary policy coordination; but (3) provide some intuition for why binding monetary policy cooperation is rare in practice if not in academic papers.

References

- Clarida, R., J. Gali, and M. Gertler. 2002. A simple framework for international monetary policy analysis. *Journal of Monetary Economics* 49: 879–904.
- Engel, C. 2009. Currency misalignments and optimal monetary policy: A reexamination. Mimeo. University of Wisconsin, January.
- Obstfeld, M., and K. Rogoff. 2002. Global implications of self-oriented national monetary rules. *Quarterly Journal of Economics* 117 (May): 503–536.
- Taylor, J. 1985. International coordination and the design of macroeconomic policy rules. *European Economic Review* 28: 53–81.

PART 3

Reforming the International Monetary System in Practice*George P. Shultz*

I'm going to tell three stories—first, about international monetary reform; second, about saving the monetary system while not bailing out firms; and, third, about the dangers of monetary policy drifting away from market principles. Then I'll make two observations about the Federal Reserve that are relevant for reform.

International monetary reform through diplomacy, negotiation, and prayer

The first story involves the international exchange rate system. The story begins when I was director of the Office of Management and Budget. It was obvious that the United States couldn't keep the gold window open. There was too much demand; it would end Fort Knox. So the gold window was closed in August 1971, and that meant the exchange rate system was totally shifted around, and it was sort of sloppily floating. John Connally, who was secretary of the Treasury—it was the Treasury's responsibility—developed something called the Smithsonian Agreement in December 1971, which really didn't work. I kept asking the Treasury people what their plan was, and they said it was a secret. So then I become secretary of the Treasury in June 1972, and I say, "Okay, what's the plan?" They say, "We don't have one," and I say, "Okay, that's what I thought."

I had a terrific consultant. His name was Milton Friedman. And Paul Volcker was my undersecretary. Milton thought—and I agreed with him—that we should have a much more flexible exchange rate system, and Paul kept pointing out that that wouldn't

sell internationally. The Europeans, the Japanese, all wanted something more formal, a par value system. And so through discussion, we designed a floating exchange rate system in the clothing of a par value system. It was very clever. Milton was a big contributor. He was a good consultant, and the price was right: it didn't cost anything. The idea was that we'd have a par value system, but the par values would change automatically when the reserve balances changed. So we proposed this system. We had it all written out, and I orchestrated it within the US government. Arthur Burns even signed on, which was hard. We had the big World Bank/IMF meeting coming up in September 1972, and the president was to speak, and I was to speak. I took a draft over to the president and said, "Mr. President, here's your speech." He looked it over and said, "That's not my speech, that's your speech." And so he goes before this big gathering and says, "Tomorrow my secretary of Treasury will unveil the United States' plan." The pressure was on.

So I did something that seemed natural to me, but I learned later it had never been done before. I invited the finance ministers of the key countries—France, Germany, Japan, Britain—to come in and look at my speech and give me their observations, so they all did. And they were good people, such as Helmut Schmidt and Valéry Giscard d'Estaing. Later, Takeo Fukuda was added to this group. They looked at it, and nobody touched the structure of the speech, but they all had little changes and words they thought would go down a little easier. I took practically all of their suggestions, so the speech I read had a usual kind of support. And I think in the spirit of those days, people didn't do what the United States wanted, necessarily. But when the United States comes to the party with ideas, and substance, and readiness to discuss, constructive outcomes take place. That's leadership in these areas, and in that way we reached an international agreement.

These discussions led to the formation of a little group that came to be called the Library Group. As a means to facilitate a meeting

between all these countries, I mentioned to the president that I wanted to have a meeting before the IMF/World Bank meetings. He said, "Well, I'm not going to be in the White House that weekend. Why don't you use the White House? It'll give your meeting a little class." So we met in the library on the ground floor of the White House. It's a beautiful room with a fireplace.

At the time, a larger group of 20 countries was supposed to be working on reform, but it was too unwieldy to get anything done. Everyone knew the key countries had to come together and figure out what they thought, but nobody wanted the whole world to know that. You wanted a meeting to happen, but you didn't want everyone to know. So we met, and we said, "Well, we've got to have a name for our group that doesn't disclose what it's about," so we decided to call ourselves the Library Group. And we became very good friends in the sense that members of the group were always candid about their views and what they intended to do, so that developed trust.

I learned a lot from this process, which served me well when I was secretary of state. One of my observations in these international meetings and other kinds of dealings is that trust is the coin of the realm. You've got to be able to develop that kind of relationship with people.

Then there was the Arab oil boycott and the huge increase in the price of oil that had enormous international financial implications. So in the winter of 1974, there was a meeting in Rome of the finance ministers of the world, and two things happened there that impressed me. First, Takeo Fukuda, who was there as the finance minister of Japan, took me aside and said, "George, you're going to be visited by a stream of businesspeople and bankers and other officials from Japan complaining about me. So I want to explain to you what I'm doing." He said, "Inflation in Japan right now is out of control. I, Fukuda, am going to wring inflation out of the Japanese system, and I know how to do it, namely, restrict the money

supply.” Then he said, “And I am going to run the policy; I have a deal with the LDP, my party, that I, Fukuda, alone am in charge of economic policy.”

So when people did come and complain, I supported my friend Fukuda and he brought about the softest landing from an inflation problem I think anyone has ever done. It was a beautiful piece of work.

The other thing that I remember about that time in Rome involved my late wife, O’Bie, who was a devout Irish-Catholic girl. Somehow, I managed through the White House to arrange a private audience with the Pope, knowing that it would be a high point of her life. So we go to the Vatican, and we are put in a little holding room. A rather severe monsignor comes out and looks at me and says, “When the Holy Father is ready, you will come in for ten minutes.” And he looks at my wife and says, “And then you will come in for two minutes, during which time there will be pictures.” And he leaves.

We look at each other: well, if that’s the deal, that’s the deal. A little while later, out comes an American cardinal, who says, “The Holy Father’s ready! Come on in!” So I start to go in, and my wife hangs back. “Come on in, come on in!” he says. So we both go in. And we start talking with the Pope about oil prices and the financial repercussions and the impact on the poor countries. I’m astonished at how much the Pope knows about the subject. He was well versed and a lot of his instincts were very much compatible with what we in the US delegation were saying in these meetings. Fifteen minutes go by, half an hour goes by, three-quarters of an hour go by, and we’re still talking. And I say to myself, maybe it’s up to me to bring this to an end, and I ought to do it on a humorous note. So I say, “Your Holiness, the finance ministers of the whole world have been meeting for two full days and nothing we’ve been able to think of has done as much good in dealing with this problem as the mild weather we’re having this winter. We thank you for your

intervention.” He did not laugh. He said, “Mr. Secretary, you can be sure it will continue.” And I noticed we had another mild winter the following year, so it’s not all economics.

Saving the monetary system without bailouts

My second story also begins when I was at the Office of Management and Budget. In 1970, I have just become the director, so I’m finding out what’s happening on a broader scale than I did as secretary of labor. I find out there’s a company named the Penn Central (a big financial organization) that has mismanaged its affairs and is about to go bankrupt. I also find out that Arthur Burns, the chairman of the Fed, thinks that this would put big stress on, maybe destroy, the financial system. And he has arranged through a reluctant David Packard, who was deputy secretary of defense, for what amounted to a bailout.

I think it’s a lousy idea, for obvious reasons, so I’m arguing with Arthur and half of me is saying, “What am I doing arguing with Arthur Burns about financial markets? I’m a lousy labor economist. What do I know?” But I had some views. At a critical moment, in walks the savviest political counselor the world has ever seen, a guy named Bryce Harlow. He says, “Mr. President, the Penn Central, in its infinite wisdom, has just hired your old law firm to represent them in this matter. Under the circumstances, you can’t touch this with a ten-foot pole.” So there was no bailout.

What happened? The financial system was strengthened. It was not ruined. And everybody had to look around and say, “Hey, they let them go. We have to look at our hole card.” Arthur did not have the pleasure of intervening and being the guy who saved the system, but he was not idle. He flooded the system with liquidity. So it allowed the market to sort things out. It seemed to me that’s the right role for the Fed: to protect the system and not the company.

Dangers of monetary policy drifting away from market principles

The third story goes back further. To my way of thinking, it explains something about the problems in the 1970s. In the 1960s, there was a lot of talk from the Council of Economic Advisors about guidelines for wage and price changes. I'm at the University of Chicago listening to this, and I'm saying to myself, this is the underlying conceptual structure for wage and price controls, so it's not a good idea. And with a colleague named Bob Aliber, I organized a big conference. Milton talked. Bob Solow had a wonderful talk called "The Case against the Case against the Guideposts." Bob Aliber and I published a book on the conference in 1966.

The subject is on my mind by the time I become OMB director. I can just feel that the wage and price control issue is going to be a big problem. So I give a speech called "Steady as You Go" arguing that we have the budget under control and a good monetary policy and that "if you have the guts to stay with it," the policy will work.

But inflation was increasing, and closing the gold window gave John Connally an additional argument that we needed to deal with this inflationary pressure. So we had the big Nixon decision to close the gold window and we also put on wage and price controls. It was a battle I lost, but it happened, and it was very destructive.

For a while, it seemed to work very well and was almost intoxicating. It scared the hell out of everybody. It started with a wage-price freeze, and we could see the economy beginning to get badly distorted. At any rate, after I become secretary of the Treasury, the office in charge of wage and price controls now reports to me. And guess who is running it: Don Rumsfeld and Dick Cheney. Later on, I said to them, "I don't see on your resume that you ran the wage and price controls." We were trying to diminish them, very quietly getting rid of this and getting rid of that. We had a good program going.

Then, over my objections, the president reinstated wage and price controls in a big way. And I had to say to him, “Mr. President, it’s your call. I think it’s a mistake, so you have to get yourself a new secretary of the Treasury. I resign.” And my opinion is, as these controls stayed on, they were a huge regulatory impediment to the economy. I remember the Jimmy Carter gas lines. And they were responsible for the stagflation that we had. I was glad to see that in the first three days of his presidency, Ronald Reagan abolished them all. He also eliminated the group of people who were administering them, so there was nobody left to administer anything. That gave us a chance to get loose from this.

I mention this story at this conference on the Fed because the Fed chair Arthur Burns kind of liked the guidelines. Arthur was chairman of the Council of Economic Advisors in the Eisenhower administration, where I was an economist for a while, and we became good friends. Back then he had the idea that it’s not enough to look at the statistics, though he was good at that; he wanted to get out and talk to businesspeople and get a feel for their attitudes. He wanted to talk to labor leaders, but he didn’t have a way of doing it, so I figured out a way for him to meet quietly with Walter Reuther and George Meany and a few other people.

Though Arthur and I were friends, we battled about wage and price controls. Arthur liked the idea that somebody other than the Fed was going to do something about inflation. And I think part of that was a reason why the Fed had a looser policy during this period than they should have.

Diversity of views and a limited purpose as preconditions for reform

Those are my three stories, but I now want to make a couple of observations. The first is that, as I look at it, the Fed was originally organized in a very interesting way, though with Allan Meltzer

here, I hesitate to say anything about the history of the Fed. If you're managing over diversity, how do you do that? You have to set yourself up so you understand that diversity. And the way the Fed is organized, it isn't just the guys in Washington. There are regional banks, and they come to the meetings and are heard. They rotate in being able to vote, so there's genuine representation of the huge diversity of our country. And I think as time goes on and as people think about how the Fed should be organized, one essential feature should be to keep the strength of our regional entities and their ability to talk. So this isn't a beltway organization. It's an organization that has to listen to the great diversity of our country.

The other thing that worries me a lot is the drift in the Fed to become an all-purpose organization. I have read some testimony where somebody says to the chairman of the Fed, "Look, Congress can't do anything. Nobody can do anything. You're the only people who can do anything, so you've got to do everything." It's a mistake. There is no such thing as an all-purpose organization. You have things you can do, and, when you go too much beyond that, you do things that you don't want to do.

Right now, the Fed is kind of driving the exchange rate system along with the actions of other banks. That's not their role. That is one of the reasons people are calling again for some kind of international monetary reform.

The huge liquidity plows into the stock market and other assets. That exacerbates the inequality of wealth. It's almost as if there's a deal with Bernie Sanders to give him something to complain about. But it's an unintended consequence of trying to do too much. I think there should be a sense of, "Look, our job is to do this. It would be nice if other problems got solved, but we can't do anything about that." We have to have some ability to say no, and that comes through the stories I've been telling.

I'll wind up by describing a cartoon I've always liked that goes back to the Eisenhower administration. The first secretary of state

who traveled a lot was John Foster Dulles. And Ike—who knew something about the world, too—was a little annoyed by all the time he spent flying here and there. In the *Washington Post* cartoon, Ike’s got his hands on his hips and he’s looking at Foster Dulles. He says, “Dammit, Foster, don’t just do something! Stand there!” Sometimes you have to stand there and not be the guy who reaches out and tries to solve all the world’s problems.

GENERAL DISCUSSION

STEVE CHAPMAN: I just had a question for John Taylor, which is: Given that so many countries were following the Taylor rule in the 1990s and the early part of this century, and the results were very good, why do you think so many of them deviated from that afterward?

JOHN TAYLOR: Well, I've thought about that question a lot. My answers are mostly speculative. I've talked to many people at the Fed who were there at the time of the deviation, and their explanations vary. Alan Greenspan's explanation differs from that of Ben Bernanke, who was on the board at the time. To paraphrase Greenspan, he would say, "Well, if we raised the interest rate, it would not do much to long rates or to mortgage rates. The long rate is determined by other forces—global forces." That's the so-called Greenspan conundrum. Ben Bernanke argues that there was a global savings glut creating a capital inflow into the United States holding interest rates down. I've studied both of those explanations and discussed them in my 2009 book, *Getting Off Track*, where I argued that they do not add up to a satisfactory explanation. But it is interesting that different people who were a part of the decision have different explanations. So I've come to the conclusion that it's more of the "perfect becomes the enemy of the good" story. Greenspan's term as chair was, until that time, extraordinary. It was the Great Moderation continuing what Volcker had begun. And in that situation, you might think, "Well, I can do even better." For example, there was the idea of "risk management," which meant holding the rate a little bit lower could reduce downside risks. That was kind of the argument that was made. So I think it was more or less like that. Things were going well, but they tried to do even better,

and that way of thinking frequently gets you off course. That's my explanation for the Fed.

And then there is the question of other central banks. To some extent there was contagion. I gave a paper about this in 2007; it was called "Globalization and Monetary Policy: Missions Impossible." In it I reviewed two successful missions of monetary and financial policy: the end of the 1970s stagflation with much improved performance in the 1980s and 1990s and the taming of emerging market crises in the early 2000s: two good missions that had been accomplished. I then asked, "What's the third mission?" And I argued that it was dealing with contagion of policy between countries. I looked at the ECB decisions around the same time as the Fed's low interest rate decisions and found that there was some evidence of extra low interest rates at the ECB. I think that was the beginning of the policy contagion that we're now talking a lot about today.

DAVID PABELL: What John Taylor and Rich Clarida are saying is that if each country picks its own policy rule and says what it's doing, then you're going to get a good outcome. I would add to that what George Shultz said that the Fed should not try to do too much and what John said in his answer to Steve Chapman about not trying to be too ambitious. The policy rule legislation that has passed the House of Representatives does all of this. It just asks the Fed to pick its own rule and be transparent—say what the rule is, how it would adhere to it, or, if it's not adhering to it, explain why. But the reaction within the Fed has not been tremendously positive, to say the least. And so my question is for John. You seem optimistic that the barrier to reform is low while, as far as I can see, the barrier has, at least so far in the United States, not been particularly low. So do you have any ideas for how to get there from here?

JOHN TAYLOR: Well, first of all, it's not unusual for the Fed to resist suggestions like this. I give the example of when the money

growth requirements came in the 1970s. Arthur Burns was the chair, and he objected strenuously to any notion that they would have to report on money growth. But as soon as it became apparent that some legislation was going to pass, he and his staff started working with the Hill, and they came up with something that the Fed could live with. It didn't specify what aggregates to report. And it was a little vaguer than maybe what was aimed for, but they decided to go along. It took time. It didn't happen overnight. So that's the way I think about it now. It's something on the shelf ready to be implemented. Implementing it, to me, is fascinating. I think George's stories, especially the one about implementing the flexible exchange rate system, are very important to understand. Ultimately, he and Milton Friedman wanted a flexible exchange rate system. So what do they do? They come up with this little adjustment mechanism with exchange rate and reserves, and, without emphasizing that it was their idea, they got people to adopt it. And sometimes you have to be there to make it happen, and I'm not there. I'm outside of the system.

A more recent example, from last year, was the proposal to increase the voting rights of emerging market countries at the IMF; the proposal had been sitting around without Congressional approval since 2010, when the Obama administration negotiated it. I saw there was a simple deal to solve this: if the IMF would reinstate its exceptional access framework for making loans, the Congress would approve the negotiated agreement. I was not there to work the deal internally, but I could talk and write about it, and eventually it happened. It was such a simple deal. And it worked.

GEORGE SHULTZ: I wonder, John, if one of the reasons is that the Fed gets distracted with other things. You act as though monetary policy is the only thing it does. But it does a lot of other things. It's a major regulatory agency, and it will intervene. Whenever there's some kind of economic crisis, the Fed

will think it has to do something about it. So it has a wide range of impacts.

JOHN COCHRANE: And it increasingly—sorry to put two cents in there—is mixing its regulatory and macroeconomic roles. This new call for macroprudential regulations says, well, if I don’t like the way the economy’s going, and I don’t want to fiddle with interest rates, I’ll just tell banks who they should lend to.

GEORGE SHULTZ: But I think, listening to all you people here today, it seems obvious that everybody agrees that having some sort of a rules-based policy that John has proposed is essential. That will work. And somehow, it’s important to get the politics such that it can happen within the Fed and around the Congress and elsewhere where it’s needed.

ANDREW LEVIN: One obstacle to adopting a systematic policy benchmark is that some people think it would be too mechanical, and Secretary Shultz’s remarks today are really helpful for dispelling that notion. In fact, John Taylor’s Carnegie-Rochester paper specifically says that a rules-based approach should not be purely mechanical. But it seems like a purely semantic obstacle is that the word “rule” sounds too rigid and mathematical, whereas just referring to a “strategy” may be a bit too vague. Perhaps the use of the phrase “systematic and transparent strategy” would help avoid that sort of confusion and move this debate forward.

I think it’s been very unfortunate that Federal Reserve officials started promoting the idea of making “meeting-by-meeting” decisions, because that doesn’t sound like a systematic strategy at all. And it’s not sufficient to state that policy will be “data dependent.” Any effective strategy has to be data dependent. But policymakers need to explain what that means in practice. Which types of data? Which specific indicators? What magnitude of responses? And again, the strategy doesn’t necessarily just have to

be a mathematical rule; it can also be very helpful for the central bank to emphasize alternative scenarios and contingency plans.

Moreover, as Secretary Shultz has noted, there are real benefits of transparency. When you become more transparent, you open yourself up to criticism and critique. And as John Taylor has suggested, it would be terrific to have an international forum at which every central bank would explain its own systematic and transparent strategy and other central bankers could provide comments and feedback. That would enable economists at the IMF and elsewhere to analyze and assess these strategies. We can even imagine that John would test those strategies in his multicountry model to determine whether or not there's a unique and stable global equilibrium. But that sort of analysis can only happen when there's a sufficient degree of transparency about each central bank's policy strategy.

Finally, it may be helpful to envision the development of an international standard for the essential elements of a systematic and transparent strategy. Perhaps it could be named the "Taylor Standard for Transparency" or TST. Such a TST framework would be similar in spirit to accounting standards like GAAP (Generally Accepted Accounting Principles). In fact, there could even be a verification process for assessing whether each central bank's strategy is consistent with the international standard. And if a central bank fell short, it would have an incentive to refine and clarify its strategy in order to achieve the certification.

CHRISTOPHER CROWE: I just wanted to ask a quick question, and it has a little bit of an element of devil's advocate to it, because I don't think I disagree with what's been said. But I just have a query and sort of a concern, that when we use economic models and say, "Well, the model suggests that rules-based policy is best." I just wonder whether there's an element of tautology to that, because a model is basically a set of rules itself. You say the

economy follows a set of rules. And so, isn't it kind of inevitable that the best policy will also look like a rule?

RICHARD CLARIDA: Well, I think, yes. But I think the point is models often times have 80—the big ones have 87—equations, and what comes out through all the permutations and the literature is not that there's a rule. You're right. At some level, that will be a tautology of an optimal control system. It's that in comparison to the general solution of the optimal control problem, as we know from John Taylor's work 35 years ago, instead of getting 87 variables on the right-hand side to get the optimal path, you can oftentimes get it with 2. So the insight is not that there is a solution, but that a similar solution across countries and regimes and periods within a pretty narrow range of parameters does a good job. So that's the sweet spot.

JOHN COCHRANE: I'd like to abuse my privilege and ask one question of John Taylor. You put up a graph with a policy rule with 18 years of downside deviations bigger than we've seen since the 1970s, and yet there's no inflation. You must have a story for that.

JOHN TAYLOR: The graph is based on research by Hyun Shin at the BIS, which I refer to in my paper. It pertains to policy deviations in many countries. There are two periods in that graph. One was prior to the crisis in which inflation did pick up. I didn't look at every country in that chart, but the US inflation rate rose fairly substantially actually—1.7% to 3.4% in terms of the GDP deflator during that period. But you also had other inflationary forces. The housing price boom accelerated at that point. There's an inflexion point there. And so I think we want to take that into account. I also think that there's different ways to measure the effect of monetary policy. It can cause high inflation, but also it can cause other bad things, too. To the extent that it caused a search for yield, risk taking, it was a factor, not the only factor, in the financial crisis crash that came about.

Then during the panic, I think the Fed did a good job as lender of last resort, and that was kind of rules-based policy. Maybe you can quibble with some of it, and I have, but it basically was on the right track during the panic of 2008. Then you move to the QE and the changes in forward guidance, and there's a question about whether that even had a contractive effect. Evaluating monetary policy during that period is still very hard.