Rational Expectations and Volcker's Disinflation

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I am grateful to the authors of Goodfriend and King (2005) for letting me watch two masters of modern macroeconomics at work as they marshal both quantitative and narrative evidence and then carefully choose simple, but not too simple, theoretical tools to interpret the evidence. I lived through the turbulent times they describe, and their account rings true, as I tell at the end of this essay. I write this with mixed feelings because the theory that they use with so much success abandons the rational expectations equilibrium concept that I love so.[1]

People inside a rational expectations model share a unique statistical model. For given parameters that describe technologies, preferences, and information flows, there is typically a manifold of rational expectations equilibria that are indexed by distinct budget-feasible government polices. Credible government plans are special rational expectations equilibria in which government policies are chosen by a sequence of policy makers who always choose to continue a possibly history-dependent plan.[2] A government strategy is a sequence of history-dependent functions that map a history at time t into government actions at time

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[1]Baxter (1985) and Ball (1994, 1995) also either refined or abandoned rational expectations equilibria in order to understand episodes in which the credibility of fiscal-monetary policies were focuses of public discussions.

[2]Chang (1998) provides sharp definitions of a manifold of rational expectations equilibria and of credible government policies within an elementary monetary model.

t. A government strategy is effectively a sequence of conditional distributions for future actions that government decision makers choose to confirm. In models of credible government policies, government decision rules thus play two roles, one as decision rules for policy makers, and another as the public's *forecasting functions*. The "communism of statistical models" that prevails within a rational expectations equilbrium and the subgame perfection that prevails within a model of credible government policy have the consequence that it is subtle if not impossible to tell who chooses a government policy – government decision makers or private forecasters. In a rational expectations model of credible public policy, the conditional probability distributions that the public uses to forecast are the very same ones that government policy makers want to confirm.[3] In such an equilibrium, an FOMC would never want statistically to disappoint or surprise the market. Such an FOMC feels no urge to "acquire credibility".[4]

Goodfriend and King (2005) were accomplished architects of rational expectations models. But for good reasons, they chose not to interpret the Volcker disinflation by constructing a rational expectations model. Their thorough readings of FOMC transcripts and other sources left Goodfriend and King (2005) without a coherent description of an FOMC decision rule or evidence that the Fed thought systematically about designing one. They described disagreements and confusions about macroeconomic structures among FOMC members. They documented FOMC concerns that the market's expectations about inflation and other outcomes differed systematically and persistently from FOMC targets. Goodfriend and King spotted "inflation scares" in high long term interest rates that had disappointed the FOMC's intention that by pushing short term nominal interest rates *up* it could *lower* long term nominal interest rates by permanently lowering inflation rates.[5] Disconnection of the market's forecasts from those of policy makers is impossible in a rational expectations equilibrium. These considerations led Goodfriend and King to abandon a rational expectations equilib-

[3]See Chari and Kehoe (1990) and Stokey (1991).

[4]This statement is an accurate description of a large class of plain vanilla rational expectations models in the Ramsey plan tradition and its extension to models of credible policies by Chari and Kehoe (1990) and Stokey (1991) as refined by Bassetto (2005). For example, see Chang (1998). These models have a single type of policy maker who together with private agents inside the model all trust the same single statistical model. It is a less accurate description of rational expectations models that like Backus and Driffill (1985a,b) and Lu et al. (2008, 2016) posit multiple types of policy makers who have different objective functions. In these models, a policy maker has incentives to pretend to be another type. The claim in the text is also dubious in rational expectations models in which policy makers have multiple statistical models about which they are uncertain, so that what constitutes "the unique model" for a rational expectations equilibrium concept is possibly what a Bayesian statistician would dub a "hierarchical model" that involves Bayesian model averaging over the distinct statistical models.

[5]See Goodfriend (1993) for a definition of an inflation scare and a technique for diagnosing one.

rium concept in creating their model of a central banker striving to "acquire credibility". Thus, Goodfriend and King (2005, p. 34) summarized their paper in this way:

> In contrast [to what goes on in a rational expectations model], during the Volcker disinflation the Fed needed to acquire credibility for low and stable inflation. We studied this episode without having a firm understanding of Fed behavior, so instead we adopted an analytical strategy that focused on the interplay between inflation, expected inflation, credibility and real activity without specifying the monetary policy rule. We sought to document how the Volcker FOMC tried to acquire credibility: with an initial appeal to monetary targets as a nominal anchor, with new operating procedures designed to allow greater scope for short-term interest rates to be determined by market forces, and ultimately by employing an interest rate and reserve aggregate policy mix to work the actual inflation rate down. Our methodology for studying the disinflation without a firm understanding of the Feds behavioral rule places us in a position similar to the public and the FOMC itself. To improve our understanding of the Volcker disinflation, it will be necessary to specify Fed behavior explicitly and to model the interaction of Fed policy with the dynamics of private sector beliefs about inflation. Requiring these beliefs to be consistent with the financial market data will allow a clearer understanding of the role of imperfect credibility in the Volcker disinflation. Goodfriend and King (2005, p. 34)

Goodfriend and King's model combines an artfully parameterized inflation "forecast credibility gap" with an expectational Phillips curve and a Fisher equation. By intentionally taking their "forecast credibility gap" equation as a primitive and intentionally not providing "microfoundations" for it, they got a convenient tool for precisely defining and quantifying a credibility gap. They calibrated their model to do a good job of approximating inflation, unemployment, and long and short term interest rate paths under the Volcker-led FOMC and inferred private sector beliefs about prospects for inflation. Their concluding section, part of which I just quoted, called for more work to learn about the imperfect credibility that challenged Volcker's FOMC and our assessment of how well the FOMC had coped with it.

I admire Goodfriend and King's thoughtful marshalling of the evidence that led them to their sparsely-parameterized non-rational expectations model as well as the roadmap they provide for further work. In the spirit of their concluding section, I mention just

two routes opened up by their abandoning of rational expectations, each of which involves belief-heterogeneities and model uncertainties. The first, exemplified by the Bayesian model-averaging setup of Cogley and Sargent (2005), acknowledges that in the 1970s and 1980s neither the academic macroeconomic community nor the Federal Reserve staff nor FOMC members had settled on a macroeconomic model. Competing views about dynamic tradeoffs between inflation and unemployment were embedded in alternative conceptions of a Phillips curve. Cogley and Sargent describe a setting in which part of the FOMC's information is a Bayesian posterior over three distinct Phillips curves, each of whose coefficients are themselves updated as data accrue. The FOMC's initial 1960 prior puts almost all probability on a Samuelson-Solow Phillips curve and very little on a Lucas rational expectations version of an expectational Phillips curve.[6] An intertemporal objective function tells the FOMC to pay attention not only to posterior probabilities attached to each model but also to the continuation values implied by each of them. Then a peculiar thing happens. Even though observations gathered during the 1970s tell the policy maker to put most weight on the Lucas model, the updated Samuelson-Solow model tells the policy maker that very bad continuation values would be associated with the rapid inflation stabilization policy that the Lucas model recommends. It is only after enough data cause updated coefficients of the Samuelson-Solow model to imply that less adverse outcomes would occur under the recommended actions from the Lucas model that the FOMC ultimately decided sharply to reduce inflation toward zero. Thus, posterior probabilities attached to the three models are not all that matters. When they predict sufficiently adverse consequences of following advice delivered by higher posterior probability models, models with low posterior probabilities can derail recommendations that come from higher posterior models. Consequently, the FOMC will decide to stabilize inflation only after estimated coefficients of the Samuelson-Solow model have adapted to imply low enough inflation-unemployment "sacrifice ratios". Note how this special type of "model averaging" recommendation system gives special weight to models that set off Cassandra warnings like those proclaimed by Arthur Okun (see Goodfriend and King (2005, pp. 982-83)) and many others.

"Expectations management" is a second research agenda opened by Goodfriend and King's decision not to use a rational expectations model. To make progress on this topic requires a setting in which, first, private agents and the government have different beliefs, and second, the government has a model of how its actions affect private agents' beliefs, and third, discrepancies of beliefs between government and private agents can be rationalized.

[6]Goodfriend and King's model includes such a Phillips curve.

Filling all three of these requirements simulataneously is a tall order. Karantounias (2013, 2018) offers a promising approach based on a multi-agent application of robust control theory. In his setting, a representative agent and a Ramsey planner share a common approximating statistical model, just as they do in a rational expections model. But now one or both of them distrusts the approximating model. In Karantounias (2013), the Ramsey planner completely trusts the approximating model, but private agents don't; the Ramsey planner knows this. Because private agents choose policies that are best responses, not to the shared approximating model, but to their worst-case model, an object that is affected by the Ramsey planner's policy, the Ramsey planner is thrust into manipulating private agents' beliefs. In a similar vein, Presno and Orlik (2016) study expectations management as components of credible government policies in a Chang (1998) monetary environment that they alter by having private agents manage their distrust of an approximating model by using techniques from robust control theory.[7]

Goodfriend and King's story rings true to me as an eyewitness to events they describe so well. In June 1976, I attended a meeting of a group of "academic consultants" at the Federal Reserve Board in Washington D.C. I had been invited by George Leland Bach, the organizer of the meeting, at the urging of Milton Friedman, who also attended. I think that I had been invited because Milton Friedman had told Lee Bach that I was one of "those crazy economists up in Minnesota" who talked about macro models in which the FOMC is just a decision rule that maps its information into its actions, a rule that everyone inside and outside a macroeconomic model knows.[8] Arthur Burns chaired the meeting. Academics were supposed to discuss a report the Fed staff had prepared. Lead speakers for the academics were Milton Friedman and Arthur Okun, representing contending "monetarist" and "Keynesian" perspectives. Friedman spoke first and offered a scholarly discussion of the Fed staff report, drilling down especially on two or three footnotes. Then Arthur Okun brought out fireworks based on his passionate belief in sacrifice ratios like those summarized by Goodfriend and King (2005, pp. 982-83). Okun did not mention the Fed staff report. Instead he lambasted the FOMC for the crusade that he said it was now pursuing to stamp out inflation quickly, while foolishly ignoring what he said were big social costs in terms of GDP and unemployment. He said that the Fed had decided to do that on its own authority against what Okun understood to be the preferences of the public and the Congress. Okun concluded by warning Burns

[7]Robert King and others have rolled up their sleeves and worked on this problem using a quite different approach than I describe here, and one that I think is very fruitful. See Lu et al. (2008, 2016).

[8]According to Silber (2012, p. 176), the quotes indicate what Paul Volcker thought of those of us then working in Minnesota.

and the other governors that if they chose to persist in so abusing their independence, they would have nobody to blame but themselves if Congress were soon to take away their independence. After moments of silence as he puffed his pipe while looking straight at Okun, Chairman Burns said, "Would the next speaker please confine himself to economics?" Burns then sequentially asked the other academics present to comment on the Fed staff report. Before my turn, Governor Henry Wallich said, "Mr. Sargent, your tribe always talks about monetary policy rules and rational expectations. OK. Please tell me what you think our rule is." I answered "I can't tell." Goodfriend and King's careful sifting of more documentary evidence than I certainly had at that time indicates that, like me at the time, they could not fathom a coherently thought-out FOMC decision rule. The gap between actions at the FOMC and how we "crazy Minnesota economists"[9] thought choices should be framed did not reflect well on the FOMC.[10]

References

Backus, David and John Driffill. 1985a. Inflation and Reputation. *American Economic Review* 75 (3):530–538.

———. 1985b. Rational Expectations and Policy Credibility Following a Change in Regime. *Review of Economic Studies* 52 (2):211–221.

Ball, Laurence. 1994. Credible Disinflation with Staggered Price-Setting. *American Economic Review* 84 (1):282–289.

———. 1995. Disinflation with imperfect credibility. *Journal of Monetary Economics* 35 (1):5–23.

Bassetto, Marco. 2005. Equilibrium and government commitment. *Journal of Economic Theory* 124 (1):79–105.

[9] And of course also at Chicago and Carnegie-Mellon and Rochester.

[10] For an extended account of Volcker's struggle permanently to lower US inflation that mostly agrees with Goodfriend and King's, see Silber (2012, Part III). Silber recently offered an ominous comparison of discrepancies between current bond traders' market-revealed inflation forecasts and those of monetary policy analysts like himself and the opposite sign of such discrepancies that Volcker confronted. Silber fears that a "credibility gap" of opposite sign now threatens us. See Silber, William L., "Why Last Weeks Higher Inflation Left Bond Yields Unchanged." Linkedin Post, July 18, 2021, available at https://www.linkedin.com/in/william-silber-0a854b158/detail/recent-activity/shares/.

Baxter, Marianne. 1985. The role of expectations in stabilization policy. *Journal of Monetary Economics* 15 (3):343–362.

Chang, Roberto. 1998. Credible Monetary Policy in an Infinite Horizon Model: Recursive Approaches. *Journal of Economic Theory* 81 (2):431–461.

Chari, V V and Patrick J Kehoe. 1990. Sustainable Plans. *Journal of Political Economy* 98 (4):783–802.

Cogley, Timothy and Thomas J. Sargent. 2005. The conquest of US inflation: Learning and robustness to model uncertainty. *Review of Economic Dynamics* 8 (2):528–563.

Goodfriend, Marvin. 1993. Interest rate policy and the inflation scare problem: 1979-1992. *Economic Quarterly* (Win):1–24.

Goodfriend, Marvin and Robert G. King. 2005. The incredible Volcker disinflation. *Journal of Monetary Economics* 52 (5):981–1015.

Karantounias, Anastasios G. 2013. Managing pessimistic expectations and fiscal policy. *Theoretical Economics* 8 (1):193–231.

Karantounias, Anastasios G. 2018. Optimal Fiscal Policy with Recursive Preferences. *Review of Economic Studies* 85 (4):2283–2317.

Lu, Yang K., Robert G. King, and Ernesto Pasten. 2008. Managing Expectations. *Journal of Money, Credit, and Banking* 40 (8):1625–1666.

———. 2016. Optimal reputation building in the New Keynesian model. *Journal of Monetary Economics* 84:233–249.

Presno, Ignacio and Anna Orlik. 2016. On Credible Monetary Policies under Model Uncertainty. 2016 Meeting Papers 1280, Society for Economic Dynamics.

Silber, William L. 2012. *Volcker: The Triumph of Peristence*. New York, London, New Delhi, Sydney: Bloomsbury Press.

Stokey, Nancy L. 1991. Credible public policy. *Journal of Economic Dynamics and Control* 15 (4):627–656.