

This PDF is a selection from a published volume from the National Bureau of Economic Research

Volume Title: NBER Macroeconomics Annual 2013, Volume 28

Volume Author/Editor: Jonathan A. Parker and Michael Woodford, editors

Volume Publisher: University of Chicago Press

Volume ISBN: 978-0-226-16540-0 (cloth); 978-0-226-16540-0 (paper); 978-0-226-16554-7 (eISBN)

ISSN: 0889-3365

Volume URL: <http://www.nber.org/books/park13-1>

Conference Date: April 12–13, 2013

Publication Date: April 2014

Chapter Title: Comment on "Dormant Shocks and Fiscal Virtue"

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Chapter URL: <http://www.nber.org/chapters/c12937>

Chapter pages in book: (p. 59 – 64)

Comment

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Bianchi and Melosi have constructed a model in which the effects of uncertainty about monetary and fiscal policy regimes can be traced out in a full rational expectations equilibrium, in a model close to the kinds actually used for policy analysis. The model appears capable of being taken to the data and used for explicit probability-based inference.

Probably the closest previous work is that of Davig, Leeper, and Walker (2011) and Eusepi and Preston (2008). Davig, Leeper, and Walker have a framework with a nonstationary stochastic process for policy that passes through a finite number of randomly timed states. As in this paper by Bianchi and Melosi, agents' conditional distributions for the future change as the policy regime changes (i.e., agents learn), and agents fully understand the stochastic structure of the economy. But the Davig, Leeper, and Walker setup is calibrated to annual data and not meant to be close to usable for formal inference. Eusepi and Preston have a model with learning about the policy regime, in which the learning follows the type of ad hoc updating rules that have been studied in most of the macroeconomic learning literature. While ad hoc learning rules are less elegant than Bianchi and Melosi's fully rational expectations equilibrium, they attempt to be behaviorally plausible, in contrast to the high level of sophistication and knowledge about the economy assumed of agents in Bianchi and Melosi's complex model.

Bianchi and Melosi are mistaken to argue that Eusepi and Preston's model "does not feature the mechanism of inflation formation proposed by the fiscal theory of price level, which can only arise in models with fully rational agents." In models with nominal government debt, if the government runs primary deficits—that is, issues new debt—while the price level remains unchanged, the real assets on the public's balance

sheet increase. In some policy configurations, agents may see their real liabilities increase at the same time, because they foresee future tax increases whose present value offsets the increased value of their assets. But in other policy configurations, or in the same policy configuration if people's beliefs about the future are different (whether "rational" or not), people may not expect increased future tax liabilities that fully offset the increases in their assets. This will lead them to spend, putting upward pressure on prices (or, in a Keynesian model, increasing output and possibly thereby increasing tax revenues). This mechanism, in which government debt generates wealth effects on spending if it is not offset by expected future tax increases, is exactly what the fiscal theory of the price level brought out. It is operating in the Eusepi and Preston model fully as much as it is operating in the Bianchi and Melosi model. With rational expectations, the effects of deficits on the price level depend on the actual probability distribution of future fiscal policy, and change instantly when there is new information about future policy. In more general models, beliefs about future fiscal policy may be inaccurate, move sluggishly, be heterogeneous across agents, and so forth. But so long as there is nominal government debt and people eventually increase spending in response to an increased real value of their assets relative to their liabilities, the mechanism of the fiscal theory of the price level is at work.

What we learn from all three of these papers, and also from Bianchi's earlier paper (2010), is that changes in people's beliefs about, and uncertainty about, future monetary and fiscal policy can have important effects on inflation and thus on the economy as a whole, even while current policy remains unchanged. Fiscal policy can affect inflation even during periods of apparent active-money/passive-fiscal policy configurations. The history of US inflation in the twentieth century and policy analysis concerning future inflation cannot be understood without recognizing the possible role of these fiscal theory mechanisms.

The Bianchi-Melosi model stays close to the specification of the type of DSGE policy model that is currently in wide use, and they plan to formally confront their model with data. Doing this with models that have Markov-switching policy rules and agents learning about which policy rule is in effect is a major technical accomplishment. On top of that, the paper shows that the model can be used for storytelling about history and scenario analysis about future economic outcomes. But there is a tension in this type of model between colorful storytelling and honest inference. The paper notes the computational difficulties

still to be overcome before the model can be formally confronted with the data. My view is that honest handling of the inherently weak identification in these models is a more important obstacle.

Consider the paper's deconstruction of the rise and fall of US inflation. People are supposed to have known in the 1950s that fiscal and monetary policy were in a PM/AF mode, with the only uncertainty being about how long this would persist. The fact that the US debt-to-GDP ratio was declining and that the United States was in most years running primary surpluses does not change their firm belief that the policy configuration is PM/AF. They are also supposed to have known that the PM/AF regime was likely to last only a short time, but with a very small probability would have an expected duration of twenty-five years. Only the passage of time affects their beliefs about which of the two PM/AF regimes they are in. Then in 1979 and 1980, the Volcker monetary regime takes over. People immediately understand that both monetary *and* fiscal policy have changed, even though for years after this switch, as can be seen in figure 8, they are continually surprised by the low taxes and high spending of the Reagan deficit years.

Clearly this story cannot be taken seriously if interpreted literally. Its value is in making the general point that fiscal deficits or surpluses that have no immediate inflationary or deflationary effect can, by setting the initial conditions for a later period in which budget balance relies on inflation or deflation as well as direct taxation, have a delayed effect on the rate of price change. But there are other possible stories about this historical period. For example, it can be interpreted as a period in which an AM/PF regime was in place throughout, but with the monetary authority for a while in the 1970s deciding to tolerate somewhat higher inflation because of a belief that reducing it would be too costly in lost output. Then, when the inflation rose rapidly because of non-policy shocks, the monetary authority decided that the price in output loss had to be paid and inflation came back down. This interpretation of history is consistent with what Tao Zha and I found in our 2006 empirical paper. As another example, one could argue that uncertainty about US fiscal policy grew sharply at the time of the Ford deficits. In the Bianchi-Melosi story this was a shock that affected future inflation, but, implausibly in my view, had no effect on beliefs about the policy regime. The Volcker change in monetary policy, which clearly lasted only two to three years, did bring down inflation, but long rates remained high for a while thereafter, very possibly because of uncertainty as to whether, in the fiscal environment, the low inflation was sustainable.

The historical data may help us set probability weights on alternative stories like these, but they will not give us sharp answers to which among many stories about policy commitments and the public's beliefs is correct. At most a few substantial policy shifts occurred. Pure rational expectations theories that insist on the existence of a true probability model for the economy that is known by all agents are not appropriate in this context. When there are only a few observations, widely spaced in time, there is no reason why rational people should not maintain differing beliefs about the uncertainty that is present. And the very notion of a "true" probability distribution for such nonrepeating events is questionable.

Moreover, the distinction between active and passive regimes for monetary and fiscal policy depends on beliefs about how policy would behave on off-equilibrium paths, which are necessarily unobservable. Cochrane (2011) explains at length the difficulty of identifying policy regimes from historically observed data. Any stationary stochastic equilibrium generated by an AM/PF policy regime can also be generated by an equivalent PM/AF regime. There is hope of identifying the difference (*pace* Cochrane), but only by making assumptions about how observed equilibrium behavior can be extrapolated to behavior off equilibrium paths.

Thus there is likely to remain great uncertainty about actual policy commitments and public beliefs about those commitments in any historical period, no matter how sophisticated our models and estimation methods. Studies of these issues should recognize this uncertainty and help us trace out the range of possible interpretations, not pretend, based on implausibly strong identifying assumptions, that the inherently unresolvable uncertainty can be eliminated.

The paper spices up its storytelling about history by turning the story into a morality play. The paper labels the AM/PF regime "virtuous." It is true that in this model the economy would be better off if the AM/PF policy regime persisted forever. Also, in this model, with the initial conditions of the late 1970s or today, the PM/AF regime with the paper's assumed coefficients leads to higher inflation. But this ranking of the two policy configurations depends on the absence of distortionary taxes (PM/AF regimes generally stabilize tax rates), on the particular parameters chosen for the policy rules, and on the assumption that policy shocks to the linear policy rules do not change when the coefficients of the policy rule change.

In general, any time path of inflation and output that is attainable with an AM/PF regime is also attainable with a PM/AF regime, and

PM/AF regimes can be associated with lower, rather than higher, inflation. Furthermore, as Cochrane (2011) points out, AM/PF regimes generally do not lead to price level determinacy and are consistent with explosive inflation. This indeterminacy arises because a truly firm commitment to passive fiscal policy requires that during a period of exploding inflation, conventional deficits themselves explode, so as to keep the real value of debt converging to its steady state. The convention that, as in the Bianchi-Melosi paper, we can ignore these explosive paths, can be justified (as explained at more length in Sims 2012), but only by postulating that if such explosive paths occurred, they would trigger a switch to a PM/AF policy combination. In this context, PM/AF policy configurations are deflationary.

There is no covenant being violated when inflation changes the real value of outstanding government debt, and there is nothing immoral about it. Nominal government debt is useful because it can absorb shocks, in just the way that equity absorbs shock on a firm's balance sheet. Labeling AM/PF regimes, which limit this shock-absorption role, as "Virtuous" is a bad idea.

These comments are not meant to suggest that Bianchi and Melosi should abandon their attempts to estimate their model. One does not have to accept uncritically their particular policy-switching setup to be interested in whether the data would support it over a framework with a constant AM/PF policy. There are few alternative setups for investigating these issues empirically at this point. The fact that this one involves strong assumptions that strain credulity means that it is only a starting point, but a starting point it is.

Endnote

This work is (partially) supported by the Center for Science of Information (CSol), an NSF Science and Technology Center, under grant agreement CCF-0939370. Any opinions, findings, conclusions, or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation (NSF). This document is licensed under the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License. <http://creativecommons.org/licenses/by-nc-sa/3.0/> For acknowledgments, sources of research support, and disclosure of the author's material financial relationships, if any, please see <http://www.nber.org/chapters/c12937.ack>.

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