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Good luck or good policy? An expectational theory of macro volatility switches

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ABSTRACT

In an otherwise unique-equilibrium model, agents are segmented into a few informational islands according to the signal they receive about others' expectations. Even if agents perfectly observe fundamentals, rational-exuberance equilibria (REX) can arise as they put weight on expectational signals to refine their forecasts. Constant-gain adaptive learning can trigger jumps between the equilibrium where only fundamentals are weighted and a REX. This determines regime switching in macro volatility despite unchanged monetary policy and time-invariant distribution of exogenous shocks. In this context, a tight inflation-targeting policy can lower expectational complementarity preventing rational exuberance, although its effect is non-monotone.

1. Introduction

What are the determinants of switches in the volatility of macro-variables? In principle, a persistent reduction in the amplitude of business fluctuations can be thought to be either the result of *good policy*, namely a change of policy by some major actor within the economy, or of *good luck*, that is, a decrease of volatility of the exogenous shocks hitting the economy. It is not always easy to distinguish between the two. An example is provided by the intense debate on the sources of the "great moderation" in the 80s (Stock and Watson, 2002; McConnell and Perez-Quiros, 2000).

This paper presents a simple model where the introduction of signals about expectations of others jointly with adaptive learning can generate shifts in macro volatility with unchanged monetary policy and time-invariant distribution of exogenous shocks. Still, it assigns to monetary policy an important but ambiguous role. Policies of tight targeting on inflation can in fact prevent the possibility of regimes of high volatility, although marginal hardening is counter productive once high volatility occurs.

I consider a monopolistic competition economy where producers have to set their price before knowing the aggregate price. A policy maker enforces a flexible targeting rule according to his preferred trade-off between output gap and inflation volatility. In this model the actual output gap responds to actual inflation which in turn responds to the producers' average

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expectation about current inflation. Under homogenous information a unique rational expectation equilibrium exists. In this context two main twists are introduced.

First, the economy is split into two symmetrical islands. On each island, the expectation of each producer is his own noisy perception of the forecast of an island-specific type of professional forecaster. The latter is intended as a medium or a statistical office that releases reports on the future course of inflation. Thus, there is an information transmission channel that maps professional forecasts into naive producers' expectations depending on the distribution of the perception noises across the population.

The professional forecasters perfectly observe all the fundamental determinants of inflation, but they also receive a private signal of the other professional forecaster's expectation. That is, each professional forecaster can anticipate the forecasts of the other with some uncertainty. Expectational signals are the only sources of heterogeneity between the professional forecasters since each one observes a private signal from the other's expectation.

The introduction of heterogeneous expectational signals can give origin to a multiplicity of rational expectation equilibria. A fundamental equilibrium always exists in which experts just use fundamental information and do not put weight on expectational signals. Then, two rational exuberance equilibria can arise in which experts put weight on expectational signals self-fulfilling rational exuberance. In particular, a multiplicity of equilibria exist under two conditions: (i) the monetary policy is not aggressive enough about the inflation target and (ii) the map from professional forecasts to producers' expectations entails an amplification of the non-fundamental component. The sum of these two effects can provide the degree of complementarity needed to self-fulfil the predictive power of expectational signals. In the case of a rational exuberance equilibrium, non-fundamental volatility driven by observational noises transmits to actual inflation entailing a regime of higher volatility.

As in a typical sunspot equilibrium, at a rational exuberance equilibrium it is optimal to put weight on some non-fundamental signal if everybody does the same. Nevertheless rational exuberance equilibria and sunspot equilibria[1] are essentially different. The latter require that a commonly understood exogenous signal drives the coordination of agents' beliefs, the former instead originate with *heterogeneous* signals that are *endogenous* to the forecasting rule. Expectational signals are not simple coordination devices, but they entail a signal extraction problem that sustains a multiplicity of equilibria. In fact, as with the model at hand, rational exuberance equilibria can exist where typical sunspots do not.

The second twist is to explore the consequences of professional forecasters acting like econometricians, that is using linear regressions on observables to form their forecasts (Evans and Honkapohja, 2001). In particular, I explore the possibility that they learn with a constant gain, so that exponentially decreasing weights are given to earlier data. This class of learning algorithms is particularly suited to learn about stochastic processes that are potentially open to sudden structural changes.

The paper proves that whenever rational exuberance equilibria exist at least one of them is learnable under adaptive learning.[2] Moreover, the learnability of rational exuberance equilibria and of the fundamental equilibrium coexists in a large region of the parameter space. Therefore, in this region, constant gain learning selects among them and potentially triggers unpredictable and endogenous jumps among learnable equilibria following several lucky or unlucky expectational aggregate shocks. This is possible as long as a small number of types is considered, so that, when expectational signals are weighted, the impact of observational noises does not vanish into the aggregation. In this way different regime switching in volatility can occur despite unchanged monetary policy and a time-invariant distribution of exogenous shocks.

Nevertheless, the monetary authority still has an important role. By implementing a flexible targeting rule the central bank can amplify or dampen the impact of aggregate expectation on actual inflation. In particular, a sufficiently high focus on price stability can prevent a multiplicity of equilibria. In this perspective, periods of price stability are not necessarily the result of *good policy* although *good policy* ensures against *bad luck*. However, a hardening of the monetary policy that is only *marginal* can increase inflation volatility when rational exuberance is already in play. The change of monetary policy must be substantial, possibly drastic, to be beneficial. An insufficient focus on price stability is fated to generate periods of even greater volatility.

In the final section the dynamic system is simulated for few parametrizations in the cases of two and more-than-two informational islands. With a finite number of islands the same qualitative results obtain, although the quantitative dimension becomes less important as the number of islands increases.

2. Related literature

Angeletos and Werning (2006) and Hellwig et al. (2006) have emphasized the importance of endogenous signals in restoring multiplicity in the static version of the benchmark currency attack model when agents are privately uncertain about the fundamentals. As shown in Gaballo (2012), private endogenous information does not just restore multiplicity, but they can be a source of a multiplicity in otherwise unique-equilibrium models.

[1] For comprehensive reviews on sunspots see Benhabib and Farmer (1999) and Guesnerie (2001).

[2] This is another difference with typical sunspot equilibria that instead are learnable only in some limited cases under special representations (see Evans and McGough, 2011).