



# Instrument rules in monetary policy under heterogeneity in currency trade<sup>☆</sup>

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## ABSTRACT

We embed different instrument rules into Galí and Monacelli's new Keynesian model for a small open economy that is augmented with technical trading in currency trade to examine the prerequisites for monetary policy. Specifically, conditions for a determinate and least squares learnable REE are in focus. When a contemporaneous data specification of the rule is used in policy-making, the degree of trend following in currency trade does not affect these conditions, except in case of an extensive use of trend following, whereas a forward expectations specification makes it less likely to have a determinate and learnable REE when the degree of trend following is increasing. We allow for interest rate inertia in the analysis.

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## 1. Introduction

### 1.1. Interest rate rules

In 1993, Taylor (1993) demonstrated that Federal Reserve's policy could be described by the following interest rate rule:

$$r_t = 0.04 + 1.5(\pi_t - 0.02) + 0.5(y_t - \bar{y}), \quad (1)$$

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where  $r_t$  is Federal Reserve's operating target for the funds rate,  $\pi_t$  is the inflation rate according to the GDP deflator,  $y_t$  is the logarithm of real GDP, and  $\bar{y}$  is the logarithm of potential real GDP. In particular, the rule in (1) prescribes setting the funds rate in response to the inflation rate and the output gap, where the latter is the difference between the two measures of GDP. Taylor (1999) also argues that since the rule in (1) describes Federal Reserve's policy during a successful period, one should adopt a rule like this in policy-making.

The so-called Taylor rule in (1) is an example of an instrument rule since the funds rate, which is Federal Reserve's instrument in policy-making, is an explicit function of the information available to the central bank. The rule in (1) is also named a simple rule since the funds rate is a function of a small subset of this information (see Svensson, 2003). See Clarida, Gali, and Gertler (1999) for a review of interest rate rules in the new Keynesian model, and Zimmermann (2003) for a more introductory text on the same topic. Woodford's (2003) seminal work on rules in policy-making should also be part of the reading list.

Clarida, Gali, and Gertler (2000) estimate different interest rate rules to evaluate Federal Reserve's policy during 1960–1996 utilizing a new Keynesian model similar to the one that we analyze in this paper, and they found that the policy during the Volcker–Greenspan period was more successful to stabilize the economy than the policy during the pre-Volcker period. Even though their evaluation of Federal Reserve's policy is somewhat simplistic, it is very intriguing.

### 1.2. A determinate and learnable REE?

Typically, in the literature, conditions for uniqueness of the rational expectations equilibrium (REE) are investigated since the policy-maker would like to avoid coordination problems in the economy. For instance, without imposing additional restrictions into a rational expectations model, it is not known in advance which of the REE that agents will coordinate on, if there will be any coordination at all. To give an example, the effects of changes in monetary policy may not be known beforehand: is it the case that agents will coordinate on an REE that has undesirable properties, like a very high inflation rate, or on an REE in which the price level is stable?

Another problem in this context is the actual computations of the time-paths of economic variables when agents have rational expectations since one cannot expect that they have perfect knowledge of the economy's law of motion. For example, it is a well-known fact among economists that the transmission mechanism for monetary policy has a complicated structure, and this also means that there are disagreements about the exact nature of this mechanism. The following question arises, however: may agents eventually learn the REE, if they can make use of data generated by the economy itself to improve their knowledge of its law of motion?

The concept of learning that we make use of in this paper is least squares learning, and to have an REE that is least squares learnable, the parameter values in the perceived law of motion (PLM) of the economy have to converge to the economy's actual law of motion (ALM), and this happens when the REE is characterized by expectational stability. In other words, to verify if an REE is expectational stable, or E-stable, answers the following question: if the economy is in the neighborhood of this REE, are agents able to learn it? If this is not the case, there are good reasons to believe that we do not observe such an REE in the economy.

See Evans and Honkapohja (2001) for an introduction to this learning literature, and Bullard (2006) and Evans and Honkapohja (2003) for two reviews of interest rate rules in the new Keynesian model from a learning perspective.

### 1.3. Heterogeneity in currency trade

Questionnaire surveys made at currency markets around the world reveal that currency trade not only is determined by an economy's performance or expected performance. Indeed, a non-negligible fraction is guided by technical trading. This type of trading utilizes past prices (exchange rates) to detect patterns that are extrapolated into the future. Thus, technical trading assumes that information about future prices is contained in past prices, meaning that this strategy is purely behavioristic in

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