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Monetary policy and stability during six periods in US economic history: 1959–2008: a novel, nonlinear monetary policy rule

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Abstract

We investigate the monetary policy of the Federal Reserve Board during six periods in US economic history 1959–2008. In particular, we examine the Fed's response to changes in three guiding variables: inflation, π, unemployment, U, and industrial production, y, during periods with low and high economic stability. We identify separate responses for the Fed's change in interest rate depending upon (i) the current rate, FF, and the guiding variables' level below or above their average values and (ii) recent movements in inflation and unemployment. The change in rate, ΔFF, can then be calculated. We identify policies that both increased and decreased economic stability.

JEL classification: C22; C54; E3; E5

Keywords: Monetary policy rule; Economic stability; Taylor rule; Nonlinear methods; USA

1. Introduction

We explore the role of monetary policy on the stability of business cycles during six periods in US economic history from 1959 to 2008. We examine in particular the Federal Reserve's response to three candidate target, or guiding, variables: inflation, industrial production and unemployment.

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The first two correspond to the guiding variables in the Taylor rule (Taylor, 1993; Doran & Hickey, 2009). We develop a nonlinear (compass-type) policy reaction function in which the reaction coefficients depend upon movements in both FF and the explanatory variable and how the movements relate to their average values. The method is based upon the assumption that the chosen candidate explanatory variables are sufficient to explain differences in economic volatility among periods.

The Taylor rule is currently debated (2012) because of its role during the current recession both in the US and the EU (Cancelo, Varela, & Sanchez-Santos, 2011; Fernandez, Adriana, Koenig, & Nikolsko-Rzhevskyy, 2010; Fourcans & Vranceanu, 2007; Giammarioli & Valla, 2004; Rudebusch, 2009). Recently, nonlinear Taylor rule functions have been discussed by Taylor and Davradakis (2006), Aksoy, Orphanides, Small, Wieland, and Wilcox (2006), Orphanides and Wieland (2008) and Hayat and Mishra (2010). Below, we give our working version of the Taylor rule, e.g. (Taylor, 2009), and then we discuss Okun's law that links unemployment to output (GDP). The latter rule helps explain why a response to output may be confounded with a response to unemployment.

The Taylor rule in its original formulation states how much the central bank should change the nominal interest rate, in US, a federal funds rate, i, in response to the difference between actual inflation π_t and the target inflation, π^*, and to the actual output, GDP, from the potential output GDP. The output parameters y_t and y_t^* are defined as the logarithm of the GDPs:

$$i_t = r^* + \pi^* + \beta_\pi(\pi_t - \pi^*) + \beta_y \left(100 \times \frac{y_t - y_t^*}{y_t^*}\right) \tag{1}$$

Here r^* is the equilibrium real interest rate corresponding to the potential GDP. $r^* + \pi^*$ is the long-term equilibrium interest rate. According to the rule, both β_π and β_y should be positive. Taylor (1993) proposed the values $\beta_\pi = 1.5$ and $\beta_y = 0.5$. Clarida, Gertler, and Galí (2000) showed that during the highly volatile pre-Volcker era $0 < \beta_\pi < 1$, and in the much more stable post-Volcker era (from 1982) the slope β_π was $\gg 1$ (pre- and post aggregate volatility indicators were 2.77 and 1.00 respectively). Rudebusch (2006) found that $\beta_\pi = 1.39$ and $\beta_y = 0.92$ for the period 1988–2005 with least squares regression. Hayat and Mishra (2010) found that the β_π-coefficient would be zero at less than 6.5–8.5% changes in inflation, independent of period.

Okun's law states that the gross domestic product, y_t, is negatively related to unemployment, u:

$$\frac{y - y^*}{y^*} = -\omega(u - u^*) \tag{2}$$

Okun's law is reported to show a consistent negative correlation where ω is about 2, as summarized by Dornbusch, Fischer, and Stratz (2008).

We construct phase plots for the variables (one variable on the x-axis and the other variable on the y-axis, Fig. 1 lower panels). For 6 variables there will be 15 such pairs. These phase plots describe graphically the relationship between paired variables. The relationship is formally quantified by calculating the slopes $\nu_{i,i+1}$ for the trajectories between sequential states i and $i+1$ and the x-axis. We also determine if the initial values of the trajectories are below or above the average value of the variables, and we determine from which of six historic periods the observations were taken. We thereafter calculate a measure of the stability of business cycles during the six periods. This allows us to examine which moves were characteristic during periods with low or high stability. The technical method is called the angle frequency method, AFM (Sandvik, Jessup, Seip, & Bohannan, 2004), and to our knowledge it is the only method that allows detection of