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The dynamics of UK and US inflation expectations

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ABSTRACT

The relationship between short term and long term inflation expectations in the US and the UK is investigated with a focus on inflation pass through (i.e. how changes in short term expectations affect long term expectations). An econometric methodology is used which allows for the uncovering of the relationship between inflation pass through and various explanatory variables. Empirical results are related to theoretical models of anchored, contained and unmoored inflation expectations. For neither country are anchored or unmoored inflation expectations found. For the US, contained inflation expectations are found. For the UK, empirical findings are not consistent with the specific model of contained inflation expectations presented here, but are consistent with a broader view of expectations being constrained by the existence of an inflation target.

1. Introduction

Knowledge of how agents form inflation expectations is necessary for central bankers and economic theorists alike. In the UK, the Bank of England has an official inflation target. Until 9 December, 2003 the target was 2.5% (at an annual rate measured using the retail price index, RPI). After this date, the inflation target was 2% (measured using the consumer price index, CPI, which has historically been roughly 0.5% below the RPI). The decision to adopt such a target was motivated partly by the desire to fix inflation expectations (at least in the long run). But, it is possible that agents will not believe that the target is credible or, even if it has some credibility, that the target only tends to weakly pull inflation expectations towards it. Arguments such as those presented in Gurkaynak et al. (2006) imply that if the inflation target is believed, then long term inflation expectations should be drawn to this target. Although the US has no official target, the Federal Open Market Committee (FOMC) does have a mandate for price stability along with other goals such as maximum sustainable output growth and moderate long term interest rates. The existence of this mandate suggests that US inflation expectations might be constrained in some manner.

Are inflation expectations always anchored? If not, are they contained? Or are they unmoored? Are there differences between the UK, with its official target for inflation, and the US which has no such explicit target? These are questions of great policy relevance that we try and address in this paper. We do this by using data on short-term and long-term expected inflation derived from real and nominal UK and US government bonds. Our particular focus is on inflation pass through: how changes in short-term inflation expectations influence long-term expectations. We begin by discussing various models of inflation expectations and describe their implications for a key parameter which we call the inflation pass through coefficient. Then we describe our econometric methodology which uses the smoothly mixing regression approach of Geweke and Keane (2007). The advantage of this approach is its extreme flexibility in modelling the inflation pass through coefficient.

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It allows us, in a data based fashion, to investigate whether this coefficient is constant, or varies over time, or depends on the level of inflation, or depends on how far inflation is from the target, etc. We then tie our empirical findings with our theoretical models of inflation expectations to see if any of them receive support from the data. For the US, we find support for a model of contained inflation expectations. For the UK, empirical results are not completely consistent with any of our theoretical models of inflation expectations. However, we present strong evidence against unmoored inflation expectations. UK results are closest to those suggested by our model of contained inflation expectations and clearly suggest that inflation expectations are constrained in some manner in the UK.

2. Models of inflation expectations

In this section, following Potter and Rosenberg (2007), we briefly describe various popular models of inflation expectations (anchored, contained and unmoored inflation expectations) and discuss their implications for the inflation pass through coefficient. Before doing so, we must define what we mean by the inflation pass through coefficient. Consider the simple regression model:

$$\Delta y_t = \beta \Delta x_t + \varepsilon_t, \tag{1}$$

where y_t is a measure of long term inflation expectations at time t and x_t are short term inflation expectations. β measures the impact of changes in short term expectations on long term expectations and is called the inflation pass through coefficient. If the Bank of England's inflation target is $\overline{\pi}$ and is fully credible, then we should observe $\beta = 0$ in the UK data. That is, short term fluctuations should have no impact at all in the long run, since in the long run, it is believed that the Bank of England will always act to correct any deviation from the target. But, as we shall see, if the target is not fully credible, then the inflation pass through coefficient might not be zero. Indeed, it might not even be a constant, but might vary with the level of inflation or its deviation from the target. In this section, we will define β_{h_1,h_2} to be the pass through of changes in inflation expectations at horizon h_1 to changes in inflation expectations at horizon h_2 (where h_1 and h_2 are chosen to be short-term and long-term, respectively). We are not necessarily assuming β_{h_1,h_2} to be a constant parameter. Its magnitude could vary with expected inflation or other explanatory variables.

To define what we mean by anchored, contained and unmoored inflation, consider a standard decomposition of observed inflation (π_t) into underlying inflation (π_t^*) and a transitory component (c_t):

$$\pi_t = \pi_t^* + c_t,$$

where

$$E_t(\pi_{t+h}) \to E_t\left(\pi_{t+h}^*\right),$$
$$E_t\left(c_{t+h}\right) \to 0 \quad \text{as } h \to \infty.$$

To illustrate the concept of anchored inflation expectations, consider Faust and Henderson (2004). This paper has a model of underlying inflation involving a target which is credible in the long run, $\overline{\pi}$:

$$\pi_t^* = \overline{\pi}(1-\theta) + \theta\pi_{t-1}^* + u_t,$$

where u_t is a stationary residual and $|\theta| < 1$. In this model, long run inflation expectations are $\overline{\pi}$ and, thus, inflation expectations are anchored about this target. Potter and Rosenberg (2007) show that inflation pass through takes the form:

$$\beta_{h_1,h_2} = \theta^{h_2-h_1}.$$

Thus, as h_2 gets larger, the inflation pass through coefficient goes to zero. This is the result described informally in the preceding paragraph: if the Bank of England's target is credible, then the inflation pass through coefficient should simply be a constant (and this constant goes to zero as h_2 increases).

An alternative to anchored inflation expectations is contained inflation expectations. In this case, the central bank's target is not fully credible, but the bank is believed to have a target interval outside which it is unlikely to let inflation go. In the US, the FOMC's combined mandate, involving inflation, output growth and interest rate concerns, preclude the investors' belief in a precise inflation target, but it is possible that they still believe that the FOMC will act if inflation gets either too high or too low. This suggests a target interval for inflation which would be reflected in the investors' beliefs. In the UK, although there is no official target band in which inflation should lie, the Bank of England must write an open letter to the Chancellor of the Exchequer if inflation deviates by more than 1% from the target. This suggests that it is possible that investors believe that the Bank, in practice, has a target band inside which it strives to keep inflation. Potter (2007) develops a model where underlying inflation is restricted to lie in such a band. Formally, this paper has:

$$\pi_t^* = \pi_{t-1}^* + u_t,$$

where

$$u_t \sim TN(a - \pi_{t-1}^*, b - \pi_{t-1}^*; 0, \sigma_u^2),$$

where $TN(a - \pi_{t-1}^*, b - \pi_{t-1}^*; 0, \sigma_u^2)$ is the truncated Normal distribution (i.e. the $N(0, \sigma_u^2)$ distribution truncated to the interval $[a - \pi_{t-1}^*, b - \pi_{t-1}^*]$). This model restricts underlying inflation to lie in the interval $[a, b]$, but within this interval,