Volume 32, Issue 4

Inflation Persistence: Does Credibility of the Monetary Regime Matter?

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Abstract

Despite widespread recognition that credibility is an important determinant of inflation persistence, surprisingly little empirical evidence exists to support this hypothesis. We investigate this hypothesis using data for US and UK. Our results suggest that the degree of inflation persistence is strongly influenced by regime credibility.

1   Introduction

The notion that inflation persistence may not simply be an inherent feature of staggered price (or wage contracts) but may be strongly influenced by the level of credibility and transparency of the underlying monetary regime is not new.[1] Despite widespread recognition that credibility is an important determinant of lag dynamics in inflation, surprisingly little empirical evidence exists to support this hypothesis.[2]

The starting point for the credibility literature is that following a prolonged period of inflation an announcement by the central bank that in future the inflation target will be consistent with price stability does not command immediate credibility. Agents must judge the central bank's credibility of intent, that is, whether the target represents the true goal of the central bank and its credibility of action, that is, whether the central bank has the ability to meet the target even if it wants to (say, in the face of fiscal constraints). Learning takes time. And the longer the period during which inflation was high, the longer it is likely to be before the private sector is persuaded that policy has changed.

From an empirical standpoint the credibility hypothesis predicts that a monetary regime that lacks credibility, learning by private agents can generate a significant amount of inflation persistence. In contrast, in a stable and transparent monetary regime agents learn quickly, resulting in a drop in inflation persistence.[3] That is, the degree of inflation persistence should

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[1]See Sargent (1986), Bomfim and Rudebusch (2000), Erceg and Levin (2003) and Westelius (2005).

[2]Although a large body of empirical work examines the joint facts of inflation persistence and regime shift, this literature does not explicitly test for credibility effects. The analysis in Cogley and Sargent (2001) and Levin and Piger (2002) suggest that shifts in the persistence of US inflation correspond reasonably well to shifts in monetary policy regime. For the UK, a variety of studies have created a consensus that persistence has varied with changes in monetary regime (Meenagh et al. (2009)). Erceg and Levin (2003) is an important first step in this direction. They formulate a DSGE model, in which households and firms use optimal filtering to disentangle persistent and transitory shifts in the central bank's inflation target. Their calibrated model for the US exhibits moderate persistence when monetary regime is transparent and credible and much higher persistence when agents use signal extraction to make inferences about the central bank's inflation target.

[3]The intuition behind this result is straightforward. Suppose the announced inflation target lacks credibility, then the policymaker perceives a quick disinflation to be extremely

negatively covary with regime credibility.

The rest of the paper is organized as follows. Section 2 describes our empirical methodology, data used in the analysis, and discusses our empirical results. Section 3 concludes.

2   Methodology

Our empirical strategy is to estimate the path of the time-varying persistence parameter. We track inflation persistence by estimating the autoregressive process in our inflation reduced-form, treating inflation as an observable variable and inflation persistence parameter (and the intercept) as an unobserved time-varying state variable.[4] The model for inflation is couched in annual terms. To preserve this interpretation we estimate the model with twelve-month ended inflation data but at a monthly frequency. We estimate the following model:

$$\pi_t = \alpha_t + \rho_t \pi_{t-1} + u_t + \sum_{j=1}^{q} \theta_j u_{t-j}, \tag{1}$$

$$\alpha_t = \alpha_{t-1} + \xi_t, \tag{2}$$

$$\rho_t = \rho_{t-1} + \gamma C_t + \eta_t, \tag{3}$$

where the order-q moving-average (MA) error term is motivated by the use of year ended data (Beechey and Österholm, 2007). The first equation represents the *measurement equation* and the remaining two equations are

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costly and consequently finds it optimal to gradually reduce inflation. The problem is that the private sector assesses the likelihood of a regime change from observing realized inflation. If there is a gradual reduction in inflation the announced target is given less weight by the private sector in the formation of expectations of future inflation. This of course, forces the policymaker to continue to reduce inflation gradually - higher persistence (see Westelius (2005)).

[4]We allow for time-variation in both the intercept and slope coefficient of our inflation equation. Levin and Piger (2002) found strong evidence for a break in the intercept and report that for many countries the persistence estimates obtained conditional on an intercept shift was found to be substantially below those conditional on no shift (also see Cogley and Sargent, 2001).

transition equations.[5] The disturbances ξ_t and η_t are serially uncorrelated disturbances with zero mean and constant variances, and are assumed uncorrelated with each other in all time periods.

The variable C_t is the month-on-month change in long term interest rate - our proxy for credibility.[6] When credibility is low (characterized by substantial month-on-month variation in the long rate) we would expect substantial inflation inertia. In contrast, when a monetary regime is credible and inflation expectations are well anchored (characterized by lower month-on-month variation in the long rate) we would expect inflation persistence to drop significantly. These equations represent a state space form, in which the unknown parameters, γ, σ_ξ^2, and σ_η^2 can be estimated by maximum likelihood techniques. The Kalman filter recursions can then be applied to yield optimal estimates of the state variable sequence. The resulting estimate of γ should be positive: the lower credibility is (substantial month-on-month variation in the long rate), the higher the 'inertial' effect on inflation.

Data and Estimation Results

The state-space model described above is estimated with monthly observations of year-ended inflation data for US and UK (all items consumer price index) from 1963:1-2010:12. This data is collected from the Bureau of

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[5]When it comes to measuring inflation persistence, a common practice in empirical research is to estimate univariate autoregressive moving average (ARMA) time series models and measure persistence as the sum of the estimated AR coefficients. However, there is little consensus on why persistence has changed over time. For example, time-varying inflation target could be one source of changes in lag dynamics in inflation. Policymakers' preference for output stability could be another source of inflation persistence. Although the reduced-form solution for inflation in all these models have an ARMA(p,q) representation, the source of persistence differs from one model to the other. The reduced-form evidence offered in support of these theories in the literature suffers from a serious lack of identification. In contrast, the econometric methodology we adopt explicitly links policy regime credibility with inflation persistence. We note that Agénor and Taylor (1993) adopt a similar approach to evaluate the role of credibility in the context of stabilization policies in high-inflation countries.

[6]Goodfriend and King (2005) also use the behaviour of long-term interest rates as an indicator of credibility. They argue that Volcker and other FOMC members also regarded long-term interest rates as a key indicator of inflation expectations and of their disinflation policy credibility. Similarly, Minford (1991) notes that the Thatcher administration in the UK also regarded long-term interest rates as an important indicator of credibility of their disinflation programme in the early 1980s.

Labour Statistics and OECD respectively. For US long term interest rates we use 5-year constant maturity rate from the FRED database and for the UK we use British Government Securities 2.5% consols gross flat yield from the Office for National Statistics. The estimated series, $\hat{\alpha}_t$ and $\hat{\rho}_t$, for both US and UK based on MA(12) process for the errors are plotted as the solid line in Figure 1 along with two root mean-square error bands (95% confidence interval). Evidence of a shift in intercept is very strong for both countries.

The pattern of time variation in inflation persistence is largely consistent with a reading of US and UK policy history, with inflation persistence high and more volatile during the 1970s than in surrounding years. For the US, the persistence estimates obtained conditional on an intercept shift are substantially below those reported by Beechey and Österholm (2007). This result supports the view that some of the persistence in inflation may be due to intercept shift. In the 1970s, the point estimate of persistence is close to one for the UK. The standard error bands are sufficiently wide for this not to be troubling. Nevertheless, Meenagh et al. (2009) and Fan and Minford (2010) consider some reasons that could generate such a result.[7] Since the mid-1980s inflation persistence has been significantly less than one in both countries, and persistence today is significantly below that of the 1970s and early 1980s.

Table 1: Maximum Likelihood Estimates

	$\hat{\gamma}$	$\hat{\sigma_{\xi}^2}$	$\hat{\sigma_{\eta}^2}$
US	1.22 (0.69)	4.99×10^{-2}	9.6×10^{-4}
UK	2.19 (0.85)	5.91×10^{-2}	36.8×10^{-4}

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[7]Fan and Minford (2010) estimate an ARMA model for UK inflation for the period 1970-1978. They find that any ARMA coefficients added to a random walk are insignificant, suggesting that UK inflation first difference may well be a pure random walk during this period. They argue that in 1972 when the UK government floated the pound, there was nothing to anchor inflation expectations. Fiscal policy was highly expansionary and interest rates were held at rates that would accommodate growth and falling unemployment. To control inflation the government introduced statutory wage and price controls, which of course failed miserably.

Table 1 reports our estimates of $\hat{\gamma}$ (asymptotic standard errors in parentheses). The coefficient γ is positive for both countries, as predicted by the model, and highly significant. Figure 2 plots our estimates of persistence for both US and UK along with our proxy for credibility - month-on-month change in the long rate. In both countries the long rate exhibits substantial variation in the 1970s.[8] This period was also characterized by substantial inflation inertia. In contrast, during the pre-1970s and post-1980s, the long rates exhibit far less variability i.e., inflation expectations were well anchored.

What explains the rise and fall of the estimated persistence coefficient? Prior to the 1980s, British post-war administrations, whether Conservative or Labour, had pursued policies which could broadly be described as Keynesian in their orientation and philosophy (see Minford (1991)). Large public sector pay increases had been promised by the Clegg Commission under the Labour government in the late 1970s. The budget was in crisis and was expected to deteriorate further with these pay awards on top of the usual spending pressures. Inflation was rising rapidly as the policy of wage controls that had been put in place to hold it down crumbled in the 'winter of discontent' of 1979. Similarly, US macroeconomic policy prior to the 1980s suffered from a serious lack of credibility in counter-inflation policy. In 1980, Paul Volcker explained "In the past, at critical junctures for economic stabilization policy, we have usually been more preoccupied with the possibility of near-term weakness in economic activity or other objectives than with the implications of our actions for future inflation...The result has been our now chronic inflationary problem...The broad objective of policy must be to break that ominous pattern...Success will require that policy be consistently and persistently oriented to that end. Vacillation and procrastination, out of fears of recession or otherwise, would run grave risks" (cited in Romer and Romer, 2004, p.145).

The return of the Conservative government in May 1979 under Thatcher

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[8]Direct evidence on the beliefs of financial markets suggest that there was considerable doubt as to whether the Fed was committed to inflation reduction; in particular, doubts were fueled, in the spring and summer of 1980, by a decrease in short term nominal rates in the face of the first recession. This decrease was interpreted by many as showing the unwillingness of the Fed to accept the recession (see Blanchard (1984) and Goodfriend and King (2005)). Credibility was a serious problem for the Thatcher administration as well when it embarked on its disinflation program in the late 1970s (Minford, 1991).

signalled a milestone in the history of UK post-war macroeconomic policy. The Thatcher government adopted a decidedly monetarist stance in which fiscal policy became subordinate to meeting money supply targets. In order to achieve durability, policy was cast in the form of a Medium-Term Financial Strategy (MTFS). This consisted of a commitment to a five-year rolling target for gradually decelerating £M3 backed by parallel reduction of the PSBR/GDP ratio - the usual measure of deficit in the UK. Clearly, the new policy framework was aimed at securing a reduction in inflationary expectations.

As in the UK, a programme of monetary restraint characterised the deflationary package of the Republican administration in the US, also elected to office in 1979. The Reagan administration began with promises of a supply-side revolution. Most evident was a general change in policy away from inflationary accommodation which had been evident for two decades previously. This was accompanied with what was seen as an important change in operating procedures - a shift from interest rate to money stock targets under Volcker. This change in emphasis was seen, in part, as a deliberate attempt to gain public confidence in the planned monetary contractions and to endorse the administration's anti-inflationary commitment.

This approach to policy was unequivocally vindicated by events. It turned out to be a significant tipping point both in terms of the public's acceptance of the determination of government policy and economic performance. Inflation and inflation expectation were down decisively in both countries by the mid-1980s. We see a substantial drop in the persistence coefficient during this phase. In sum, our results lend credence to the view that regime credibility is an important determinant of inflation persistence.

3   Conclusion

Empirical evidence is consistent with the view that lag dynamics in inflation depends on the credibility and transparency of monetary policy regime. Our results are inconsistent with models that incorporate inherent inflation persistence due to contract structure. More generally, our results suggest that efforts to enhance credibility can facilitate the effectiveness of monetary stabilization programme.

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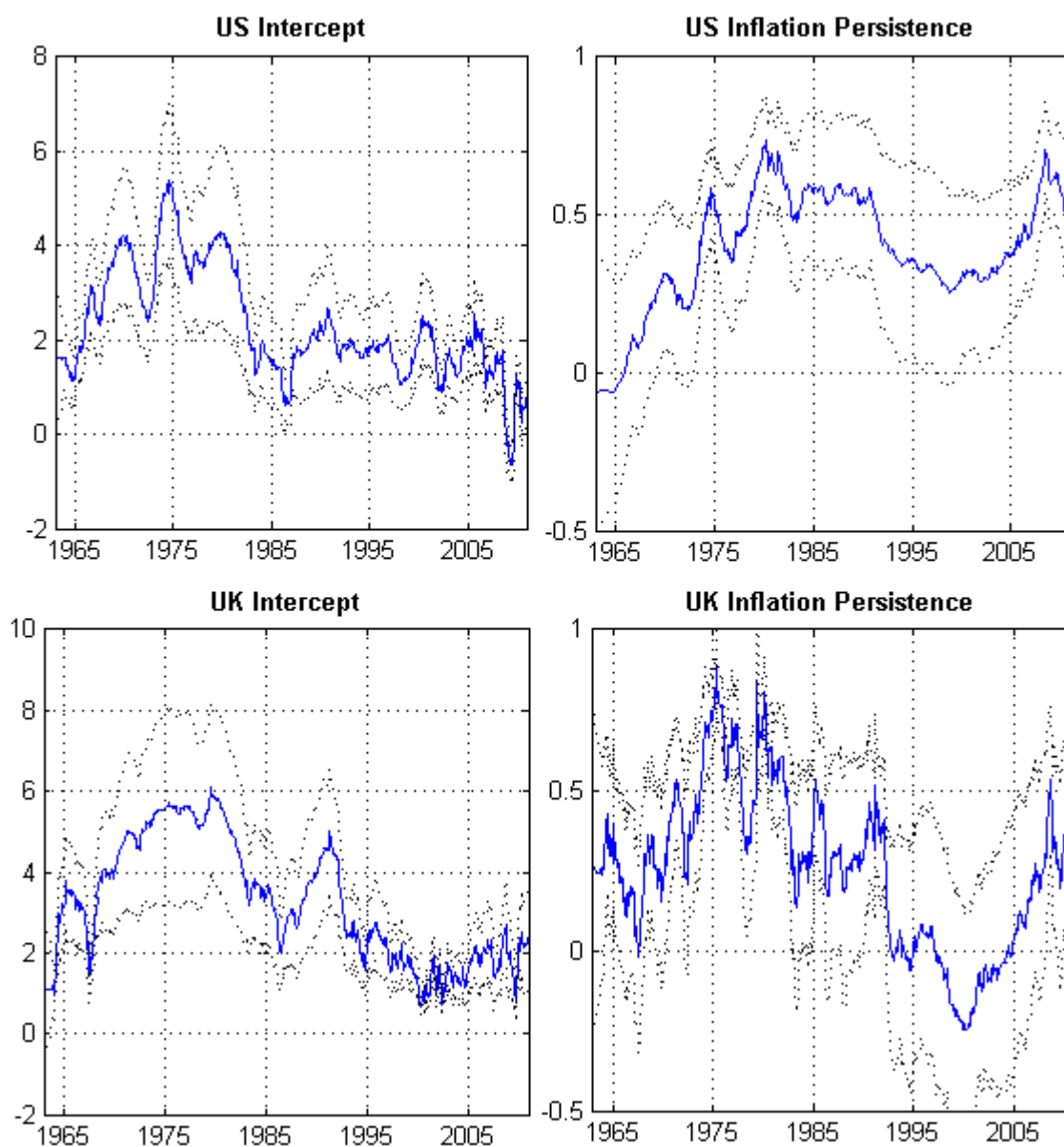Figure 1: Estimates of Intercept and Inflation Persistence with Standard
Error Bands

Figure 2: Inflation Persistence and Month-on-Month Variation in Long Interest Rate