

# The inflation-targeting framework from an historical perspective

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*This article provides an historical perspective on the post-1992 inflation-targeting regime in the United Kingdom. It assesses nearly 400 years of UK economic history using three alternative gauges of stability: business-cycle fluctuations, the Phillips correlation between inflation and unemployment and the degree of inflation persistence. The first of these measures suggests that the inflation-targeting regime has been characterised by the most stable macroeconomic environment in recorded UK history. The second points to a significant improvement in the stability of the Phillips inflation-unemployment correlation during the post-1992 period. The third stability measure suggests that inflation persistence in the United Kingdom has been the exception, not the rule.*

## Introduction

On 8 October 1992, three weeks after sterling's departure from the Exchange Rate Mechanism of the European Monetary System, Norman Lamont, then Chancellor of the Exchequer, established a new framework for monetary policy based on a range of 1%–4% for annual RPIX inflation.<sup>(1)</sup> In 1997 this framework was further developed with the Bank of England being given operational independence and a symmetrical target of 2.5% for annual RPIX inflation, subsequently changed to 2% for CPI inflation. Throughout the inflation-targeting period, UK macroeconomic performance has been characterised by low and stable inflation, historically low nominal interest rates, and, as of 2005 Q1, 51 quarters of uninterrupted output growth.

In previous research<sup>(2)</sup> we used statistical methods to investigate changes in UK economic performance since the end of World War 2 (WWII). Empirical evidence clearly suggested that the inflation-targeting regime has been, in a very broad sense, significantly more stable than the previous monetary regimes/historical periods in the post-WWII era.

This article provides an historical perspective on the inflation-targeting regime, assessing its performance under three alternative gauges of stability: the amplitude of business-cycle fluctuations, the unemployment-inflation trade-off and inflation

persistence (whereby the rate of inflation is positively correlated with its recent past).

The first of these stability measures — the size of business-cycle fluctuations — looks at the volatility of the main expenditure components of GDP, such as consumer spending and business investment, over the business cycle. The greater the degree of macroeconomic stability, the lower the volatility of these components. The second measure looks at the short-run Phillips trade-off between unemployment and inflation. The move to a low-inflation environment should be associated with a flattening of the trade-off: in other words, given fluctuations in output and unemployment are accompanied by smaller fluctuations in inflation.<sup>(3)</sup> The final measure looks at inflation persistence. Traditionally,<sup>(4)</sup> economists have assumed that inflation is highly persistent — ie positively correlated over time so if inflation is comparatively high in one period, it will also tend to be high in subsequent periods. As we show, this is no longer the case under the current monetary framework.

Our main results may be summarised as follows. First, the inflation-targeting regime has been characterised, to date, by the most stable macroeconomic environment in recorded UK history. The conclusion from our earlier study, namely that cyclical fluctuations in the economy post-1992 have on average been smaller than in the rest of the post-WWII era, can now be extended to cover any

(1) The government's objective was for inflation to be in the lower half of the 1%–4% range by the end of that Parliament.

(2) See Benati (2004).

(3) See for example Ball, Mankiw and Romer (1988).

(4) See for example Fuhrer and Moore (1995).

previous historical period since the metallic standards era. Second, since 1992 the Phillips correlation between unemployment and inflation has exhibited the greatest stability in recorded history. Third, inflation persistence appears to have been the exception, rather than the rule, with inflation having been highly persistent only during the period between the floating of the pound in June 1972 and the introduction of inflation targeting, in October 1992. Under inflation targeting post-October 1992, inflation is estimated to have been slightly negatively correlated with its lagged values, based on all the price indices we consider.

## Monetary regimes and macroeconomic performance

The remainder of this article assesses the following monetary regimes/historical periods against our three ‘stability’ measures:

- *De facto* (actual) silver standard, from the beginning of our sample in 1661 up until 1717.
- *De facto* gold standard, from 1718 up until the beginning of the suspension period associated with the wars with France of the late XVIII century, in February 1797.
- *De jure* (declared) gold standard, from May 1821 up to the beginning of the second suspension period, in August 1914.
- Inter-war period, from the constitution of the Irish Free State as a British dominion in December 1921,<sup>(1)</sup> to the United Kingdom’s declaration of war on Germany, in September 1939.
- Bretton Woods regime: from December 1946 up to the floating of the pound against the US dollar, in June 1972.
- From July 1972 up to the introduction of inflation targeting, in October 1992.
- Inflation-targeting regime: from November 1992 to the present.

Although the period between the floating of the pound and the introduction of inflation targeting was characterised by a succession of different monetary arrangements and measures, we treat it as a single period for two reasons. First, the short length of several of the subperiods prevents us from deriving reasonably robust results (similarly, we treat the inter-war period as a unique ‘regime’, in spite of the several changes during those years). Second, breaking the 1972–92 period down into subperiods would be difficult to do with precision.

## Stability measure 1: the amplitude of business-cycle fluctuations

We start by looking at the size of business-cycle fluctuations. Table A reports the standard deviations of the business-cycle elements for the series in our data set<sup>(2)</sup> by monetary regime/historical period.

Several facts are readily apparent from the table. First, based on annual data, the volatilities of the business-cycle parts of real GDP and its main expenditure components have been systematically lower post-1992 than during any of the previous monetary regimes/historical periods, in several cases markedly so. For example, the volatility of the cyclical part of real GDP post-1992 has been around two thirds and one half of that under Bretton Woods and in the period 1972–92 respectively, and just one third of that between the wars (confirming the remarkable instability of the inter-war period). The volatility of the cyclical part of real GDP associated with the *de jure* gold standard regime was twice that of the inflation-targeting regime, but was the same as from 1972–92.<sup>(3)</sup>

In summary, there was a period of extreme turbulence in the inter-war years; one of remarkable stability under the current inflation-targeting regime; and three periods (namely 1821–1914, 1946–72 and 1972–92) that are ‘in-between’. For example, the cyclical volatility of real GDP under the gold standard of 1821–1914 was essentially the same as 1972–92.

Based on quarterly data for the post-WWII period, the inflation-targeting regime appears, again, the most stable by far for both real GDP and all expenditure measures (with the single exception of government

(1) Several series in our data set include the Irish Republic up to 1921, and exclude it thereafter.

(2) Business-cycle analysis is based on the notion that (economic) time series can be divided into different frequency components: very slow-moving components, intuitively associated with the notion of a trend; fast-moving ones, associated with ‘noise and seasonal’ factors; and components ‘in-between’, traditionally associated with the notion of business-cycle fluctuations. On this, see eg Stock and Watson (1999) and Christiano and Fitzgerald (2003).

(3) An important point to stress is the high quality of UK 19th century real GDP data: the Feinstein (1972) ‘compromise estimate’ of real GDP we use is based on three alternative, independent estimates of real output, based on income, expenditure and production data.

**Table A**  
**Standard deviations of business-cycle components by monetary regime/historical period**

	<i>De facto</i> silver standard	<i>De facto</i> gold standard	<i>De jure</i> gold standard	Inter-war period		Bretton Woods		Bretton Woods to inflation targeting		Inflation targeting	
	A	A	A	A	Q	A	Q	A	Q	A	Q
<i>Logarithms of real national accounts components:</i>											
GDP			1.71	2.69	—	1.28	1.20	1.68	1.54	0.86	0.73
Consumption			1.32	1.03	—	1.31	1.26	1.90	1.80	0.95	0.72
Government expenditure			4.81	3.06	—	2.51	1.49	1.25	0.86	0.73	0.90
Investment			6.22	5.78	—	3.19	2.68	3.95	3.72	2.19	1.82
Exports			3.37	7.36	—	4.51	2.18	2.86	2.36	2.13	2.02
Imports			3.06	3.78	—	3.85	2.80	4.03	4.17	1.18	0.93
<i>Inflation rates based on:</i>											
E Schumpeter price indices for:											
<i>consumer goods</i>	9.28	7.41									
<i>producer goods</i>	7.17	7.20									
GDP deflator			3.81	1.26		1.98	1.68	4.30	4.22	0.88	1.13
CPI <sup>(a)</sup>		6.74	6.14	1.73	—	1.89	—	3.88	2.73	1.45	0.62
Retail prices index				—	4.15	—	2.66	—	4.10	—	1.30

Note: A = Annual and Q = Quarterly.

(a) Annual data: composite price index from the ONS. For details on the construction of the index, see O'Donoghue, Goulding and Allen (2004).

expenditure, for which the lowest volatility arose under the Bretton Woods regime).

A very similar picture emerges for inflation. First, the inflation-targeting regime has had the lowest cyclical volatility of inflation on record, based on any of the measures of inflation for which comparisons are possible. Results based on quarterly RPI inflation, available from 1914 Q4, confirm the reduction in volatility during the latest period, with the standard deviation of the cyclical component of inflation under the current regime having been equal to less than half of that during the inter-war years, under Bretton Woods and from 1972–92.

Second, the difference in inflation volatility between the current regime and its predecessors is generally extremely marked. For example, based on annual GDP deflator inflation, volatility post-1992 has been under one half of that under Bretton Woods, one fifth of the 1972–92 period and one quarter of that under the gold standard. Intriguingly, the volatility of inflation fluctuations in the inter-war period was only slightly higher than in the current regime. Standard deviations of inflation fluctuations (based on the CPI inflation measure) for the inter-war period and the current regime are respectively 1.7 and 1.5. Comparable figures for the *de facto* gold standard and the *de facto* silver standard range from 6.7 to 9.3, indicating a remarkable amount of volatility of inflation under those regimes.

These figures, however, are likely to overstate the true reduction in volatility in the most recent era, for two reasons. First, the prices data were likely subject to sizable measurement error in the earlier periods. This

exaggerates the true reduction in volatility in the most recent era. Second, the composition of overall output, and the average consumption basket in previous historical periods was markedly 'skewed' (compared with today) towards agricultural goods, whose prices are much more volatile than those of industrial goods. Again, this would exaggerate the true extent of volatility reduction over the most recent era.

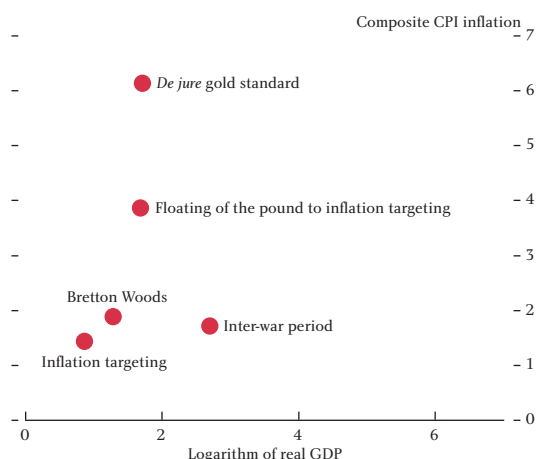
Chart 1 shows scatter plots of the standard deviations of the business-cycle components of real GDP and two measures of inflation, namely the ONS's composite price index (annual data) and the RPI (quarterly data). Although based on an extremely limited number of observations, the correlation is clearly positive based on quarterly data. That is, when comparing different regimes, an increase in the volatility of inflation is associated with increased volatility of real GDP. Based on annual data, the correlation is positive if we exclude the inter-war era, which might be regarded as anomalous. By contrast, the vast majority of the macroeconomic models used in monetary policy analysis imply a trade-off (that is, a negative relationship) between inflation and output volatility: other things being equal, if monetary policy aims to reduce the volatility of inflation, an increase in the volatility of output necessarily results.

The positive correlations reported in Chart 1 have at least two possible interpretations. First, the greater volatility in both inflation and output during the pre-1992 regimes/period may have reflected sub-optimal monetary policy. A second possibility is that, while there may be a short-run trade-off between inflation and

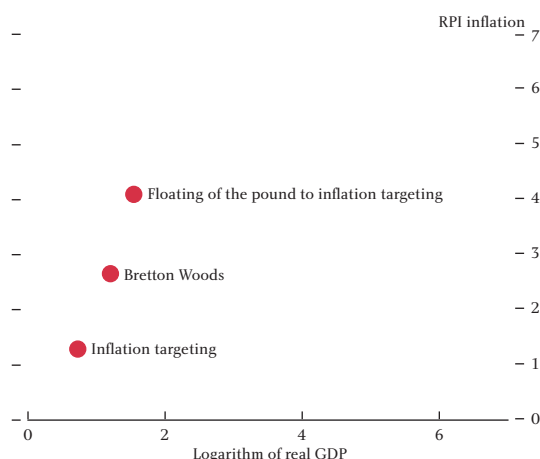
Chart 1

## Standard deviations of business-cycle components of log real GDP and inflation by monetary regime

(a) Annual data



(b) Quarterly data



output volatility within a given monetary regime, changes in the volatility of structural shocks to the economy have tended to account for most of the changes in the volatilities of inflation and output across regimes.

## Stability measure 2: the Phillips correlation

Since A W Phillips' 1958 seminal paper, the Phillips correlation<sup>(1)</sup> between unemployment and inflation has probably been the single most intensely investigated macroeconomic relationship, playing a key role in shaping macroeconomic thinking. Panels (a) to (e) of Chart 2 show scatter plots of business-cycle components of unemployment and inflation over different monetary regimes and historical periods. Panel (f) shows for each period a scatter plot of average inflation and the slope of the Phillips curve.<sup>(2)</sup>

Table B reports standard deviations of regression residuals by regime/period. The lower the standard deviation, the more stable is the unemployment-inflation trade-off. Several findings stand out:

- the inflation-targeting regime has been characterised to date by the most stable (although not the flattest) unemployment-inflation trade-off in recorded history, with a standard deviation of regression residuals less than half of that under previous regimes/periods;

- in stark contrast with the current regime, the 1972–92 period had the steepest and most unstable trade-off in recorded history. The slope of the Phillips curve was equal to -2.3, so that a 1% reduction in inflation would typically be associated with an increase in unemployment of 2.3%. The standard deviation of regression residuals was up to four times that of other regimes/periods. So if policymakers in that period had tried to reduce unemployment, the consequences for inflation were particularly uncertain; and
- the gold standard had the flattest trade-off ever, indicating that a given change in inflation was associated with only relatively small changes in unemployment. Even so, unemployment was remarkably volatile in this period. A qualitatively similar result is found for the inter-war period.

Panel (f) of Chart 2 shows a scatter plot of average inflation and the slope of the Phillips curve across monetary regimes and historical periods. Although admittedly based on just five observations, the evidence clearly suggests a positive correlation between average inflation and the slope of the Phillips curve. Chart 3 presents analogous evidence, based on monthly data for rolling ten-year samples, for the inter-war era and the post-WWII period. Evidence of a positive correlation is clear for the latter period, much less so for the former.<sup>(3)</sup>

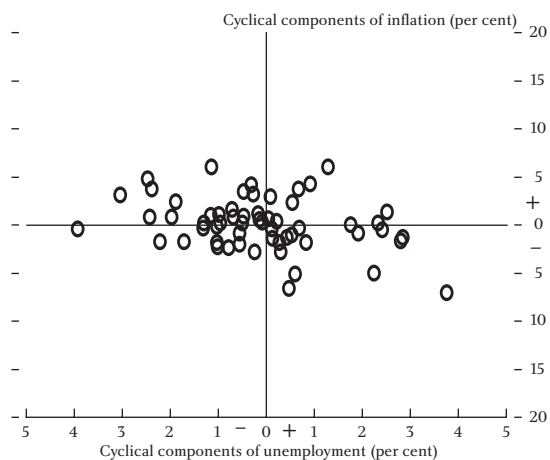
(1) It is important to stress that correlation by no means implies causation. In the present paragraph we interpret the Phillips correlation between unemployment and inflation as purely reduced form, without any structural and/or causal meaning.

(2) The Phillips curve is estimated using least-absolute deviations (LAD) in the regression of cyclical inflation on cyclical unemployment and a constant. The LAD estimator minimises the sum of absolute deviations from the regression line, instead of the sum of squared residuals as with the traditional ordinary least squares (OLS) estimator. Because of this, the former is generally regarded as the more robust methodology.

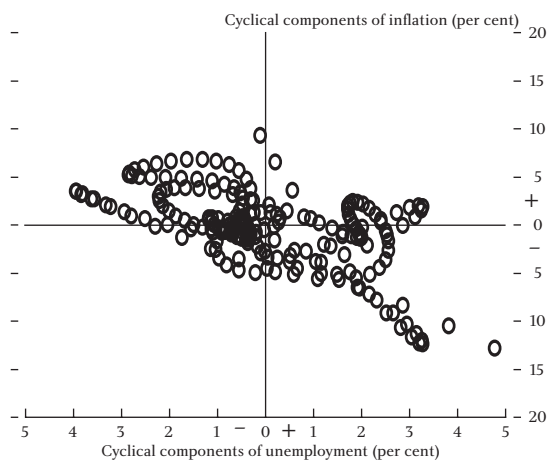
(3) As stressed by Ball, Mankiw and Romer (1988), such a stylised fact provides an important litmus test for discriminating between alternative theories/models of the Phillips trade-off, tending to falsify (eg) 'Lucas' islands'-type explanations of the trade-off, and favouring instead New Keynesian theories emphasising the link between mean inflation, the frequency of price/wage adjustments, and the steepness of the trade-off.

**Chart 2**  
**The UK Phillips correlation across monetary regimes, 1855–2004**

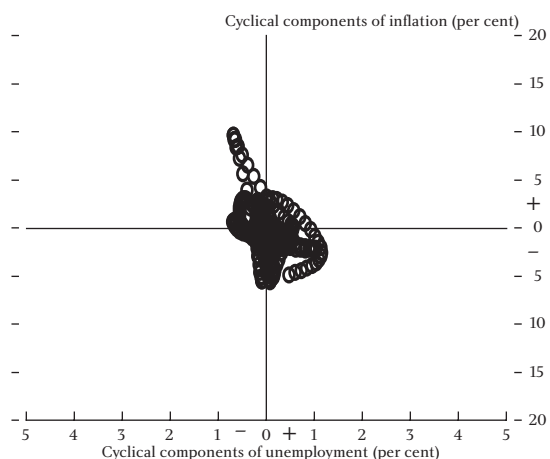
**(a) Gold standard (1855–1913)**



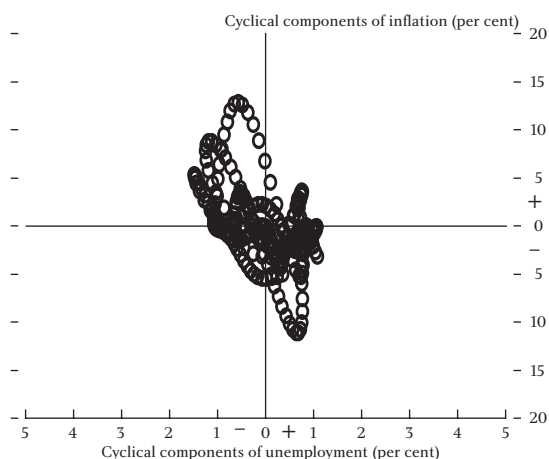
**(b) Inter-war period (January 1922–August 1939)**



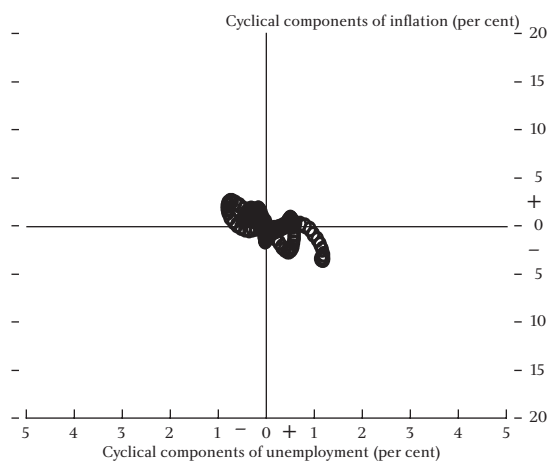
**(c) Bretton Woods (July 1948–May 1972)**



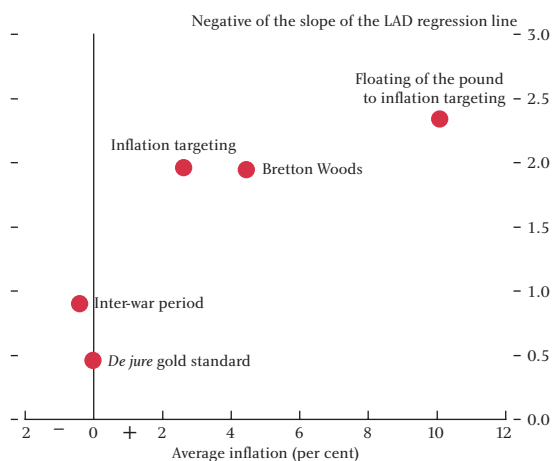
**(d) June 1972–September 1992**



**(e) Inflation targeting (October 1992–June 2004)**



**(f) Average inflation and the slope of the Phillips curve**



**Table B****The Phillips correlation: standard deviations of LAD regression residuals by regime/period**

Gold standard (1855–1913)	Inter-war period (January 1922–August 1939)	Bretton Woods (July 1948–May 1972)	June 1972 to October 1992	Inflation targeting (October 1992–June 2004)
2.602	3.270	2.410	3.699	0.935

Note: From LAD regression of cyclical inflation on cyclical unemployment and a constant.

Providing an explanation of historical changes in the slope of the UK Phillips correlation is beyond the scope of this article. Nevertheless, the UK experience clearly points to a positive correlation — both across regimes and over time (especially over the post-WWII era) — between average inflation and the slope of the Phillips correlation.

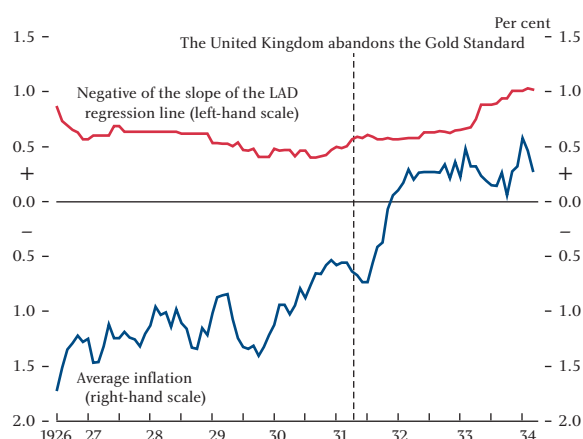
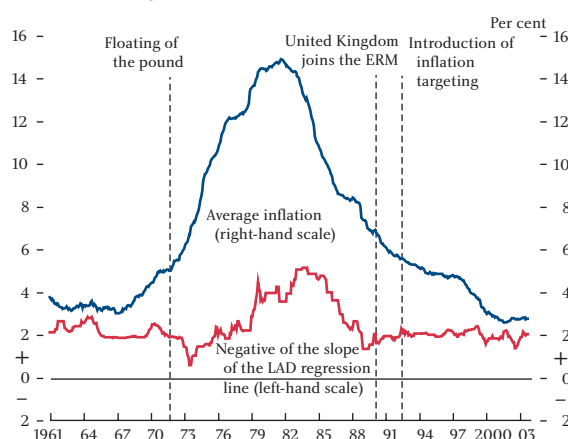
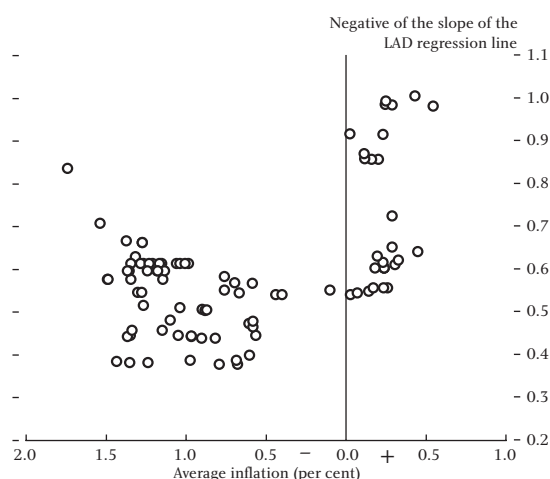
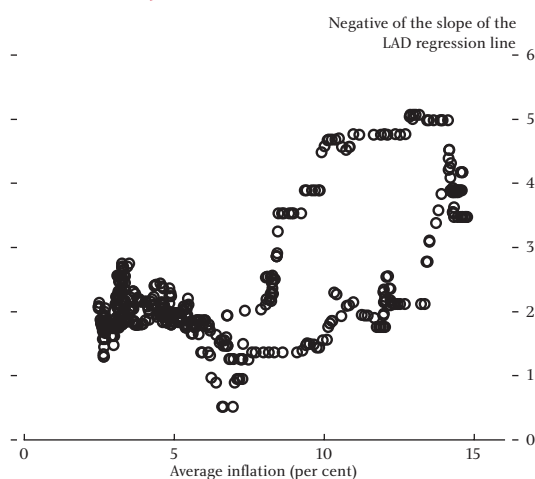
**Stability measure 3: inflation persistence**

Inflation persistence — the tendency for inflation to be comparatively high (low) in one period, having been comparatively high (low) in previous periods — plays a crucial role in monetary policy. For example, it partly

determines the speed at which inflation reverts to its equilibrium level following an unforeseen shock to the economy.

In the past, high inflation persistence has been regarded as a robust macroeconomic stylised fact. But in recent years several papers<sup>(1)</sup> have produced empirical evidence (mostly for the United States) suggesting that high persistence may have been ‘chronologically concentrated’ around the time of the Great Inflation of the 1970s.

The notion that inflation may be intrinsically persistent should be regarded with suspicion: inflation trends can

**Chart 3****The UK Phillips correlation in the 20th century, rolling ten-year samples****(a) Inter-war era****(b) Post-WWII period****(c) Inter-war era****(d) Post-WWII period**

(1) See in particular Cogley and Sargent (2002, 2005).



not be viewed as being entirely independent of the underlying monetary regime. By stabilising the price level, for example, a successful price-level targeting regime would make its rate of change — ie, inflation — perfectly negatively serially correlated. In other words, an inflation rate of +1% in one period would be followed by one of -1% in the next. Similarly, it is hard to believe that inflation may be highly persistent under an inflation-targeting regime in which the central bank counters any prospective deviation of inflation from target.

For each inflation series, we estimate (using ordinary least squares (OLS)) a model in which inflation has a linear relationship with its past values — technically, an AR( $\rho$ ) model. For each series, Table C reports our preferred measure of persistence, the sum of the coefficients ( $\rho$ ) on lagged inflation, together with the 90%-coverage confidence interval in square brackets. Values of  $\rho$  that are close to 1 indicate that inflation is persistent; values close to zero indicate almost no inflation persistence. (The special case where  $\rho$  is equal to 1 is a useful yardstick, as in this case shocks to inflation are permanent.)

The table shows that high inflation persistence appears to have been the exception, rather than the rule. Inflation has only been very highly persistent during the period between the pound floating in June 1972 and the introduction of inflation targeting in October 1992. Specifically,

- the current inflation-targeting regime exhibits some mildly negative serial correlation for inflation based on either the RPI, the CPI or the GDP deflator. In all cases, the upper limit of the 90% confidence interval around  $\rho$  is well below 1. So based on experience to date, it is likely that a shock to the rate of inflation during the current regime would not only be transitory but would also dissipate quickly;
- in stark contrast with the current regime, the 1972–92 period exhibits very high persistence for each inflation measure, with point estimates of  $\rho$  only slightly less than 1 and upper limits of 90% confidence intervals exceeding 1 in all but one case;
- persistence is entirely absent under metallic standards, either *de facto* or *de jure*, and based on either gold or silver. The *de facto* gold standard in particular displays a mild, although not statistically significant, negative serial correlation based on all three inflation measures;
- intriguingly, the turbulent inter-war period only displays a mildly positive serial correlation for inflation; and
- Bretton Woods displays some evidence of serial correlation for inflation, but that is nowhere near as strong as for the 1972–92 period.

**Table C**  
**Inflation persistence: estimates of  $\rho$ , and 90% confidence intervals**

	<i>De facto</i> silver standard	<i>De facto</i> gold standard	<i>De jure</i> gold standard	Inter-war period	Bretton Woods	Bretton Woods to inflation targeting	Inflation targeting
<i>Annual series:</i>							
E Schumpeter price indices for:							
<i>consumer goods</i>	-0.31 [-0.71; 0.11]	-0.24 [-0.61; 0.14]					
<i>producer goods</i>	0.19 [-0.04; 0.41]	-0.22 [-0.41; -0.03]					
GDP deflator			0.05 [-0.13; 0.22]		0.51 [0.15; 0.93]	0.79 [0.44; 1.04]	
ONS' composite CPI		-0.17 [-0.62; 0.29]	-0.21 [-0.45; 0.02]		0.56 [0.19; 1.02]	0.91 [0.53; 1.04]	
<i>Quarterly series:</i>							
Retail prices index				0.37 [-0.05; 0.80]	0.56 [0.33; 0.83]	0.91 [0.72; 1.03]	-0.05 [-0.57; 0.49]
Consumer prices index						0.93 [0.89; 0.98]	-0.12 [-0.51; 0.24]
GDP deflator					0.44 [0.07; 0.83]	0.88 [0.70; 1.04]	-0.19 [-0.70; 0.35]

Note: 90% confidence intervals are in square brackets underneath the respective estimator of  $\rho$ , which is the sum of the coefficients of the lagged terms in the auto regressive equation for inflation. If identical circumstances were to prevail on 100 occasions, the estimate of  $\rho$  would fall within the range indicated by the confidence interval on 90 of these occasions. When the upper end of the range is well below 1, we can be confident that a shock to inflation would not be permanent.

These results refute the notion that inflation is intrinsically persistent. Rather, they are compatible with the alternative notion that the degree of inflation persistence crucially depends on the monetary regime in place at the time. In particular, persistence appears to have been entirely absent under both metallic standards and the current inflation-targeting regime, both monetary policy arrangements providing strong nominal anchors. By contrast, inflation persistence was stronger during the 1972–92 period, when there were several changes to monetary arrangements and policy may not have been entirely credible.

## Conclusions

By historical standards, the performance of the UK economy under inflation targeting has been unique. The size of business-cycle frequency fluctuations has been to date the lowest in recorded history; the unemployment-inflation trade-off displays the greatest stability ever; and the high-inflation persistence typical of the period between 1972 and 1992 has entirely vanished.

These results can be regarded as especially robust for two reasons. First, they are very consistent across series.

Second, they have been derived using relatively simple statistical techniques, which do not depend on possibly invalid underlying assumptions.

What has caused such remarkable and historically unprecedented stability since 1992? Although it may be unreasonable to explain the increase in macroeconomic stability only by the impact of the new monetary framework, it appears equally implausible to ascribe it solely to plain good luck. A more balanced interpretation of the evidence is probably that the introduction, and continued application, of inflation targeting from 1992 was one of the key factors behind what the Governor of the Bank of England recently labelled as the ‘NICE decade’ — ‘Non-Inflationary Consistently Expansionary’.<sup>(1)</sup> Other important contributory factors may have been a substantial fiscal consolidation, which turned a deficit of 8% of GDP in 1993 into a sustainable position for the public finances; a continuing programme of supply-side reforms over a period of 25 years, which made it possible to reduce unemployment without generating higher inflation; and finally, some luck, whereby the economic effects of unexpected events tend to balance out over time, rather than cumulate in either an upward or downward spiral.

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(1) See King (2003).



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