



Inflation variability between central bank's preferences and the structure of the economy: A note

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ARTICLE INFO

Article history:
Accepted 23 June 2010

JEL classification:
E31
E32
E52
E58

Keywords:
Inflation variability
Quadratic loss function
Asymmetric loss function
Central banks

ABSTRACT

The current paper seeks to build a theoretical explanation to understand why many central banks failed to reduce inflation variability despite having the desire. The result proves that central bank's preferences are a necessary condition but not sufficient to guarantee lower inflation variability. The structure of the economy and the types of the shocks are significant factors.

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1. Introduction

Monetary policy regimes in many countries around the world have changed noticeably over the decade of 1990s. Many central banks moved from monetary targeting to inflation targeting. [Cecchetti and Ehrmann \(2000\)](#) mention that in 1990 only 4 central banks either had an explicit monitoring range or an actual target for inflation. By 1998, this number had risen to 40 central banks. Consequently, central banks, particularly in developed countries, have become more independent, more accountable and more transparent. Despite that these changes are real the results are still confusing and astonishing. The main argument against inflation targeting policy is that the inflation rate in inflation-targeting countries is not lower than the inflation rate in countries that adopted other monetary regimes. Moreover, there is a conflict regarding the cost of inflation targeting policy on economic growth. [Arestis and Angeriz \(2007\)](#) have a comprehensive literature review of inflation targeting.

The international empirical evidence from the literature produces mixed results. [Taylor \(1980, 1994\)](#) shows that the short-run trade-off between the level of inflation rate and output-gap implies a long-run trade-off between their respective variances. [Cecchetti and Ehrmann \(2000\)](#) present an evidence of improvement in economic performance. They examine the direction of real output growth and inflation

rate in a sample of 23 developed and developing countries before and after 1990s. They find that inflation rate declines and output growth increases in all countries of their sample. Moreover, they discover that volatility in both output and inflation fell in all countries. They justified this conclusion by suggesting that this period has positive aggregate supply shocks which move output and inflation in opposite directions and force monetary policymakers to make their policy action choices. Further, [Cecchetti and Ehrmann \(2000\)](#) examine the outcomes for 5 years before and 5 years after inflation targeting was implemented by a sub-sample consisting of 9 countries. They aim to evaluate the performance of the new policy, if a country is initially operating on a fixed output-inflation variability frontier, then the shift to inflation targeting would be expected to move the point on the curve where the economy has higher output variability and lower inflation variability. They find just only one country, New Zealand, which succeeds to reduce inflation variability and has more output variability. This means that the relationship between output variability and inflation variability in 8 countries is positive.

[Arestis and Mouratidis \(2003\)](#) explore the credibility of monetary policy in five member countries of the European Monetary System over the period (1979–1998). The results confirm that monetary policy was more sensitive to inflation variability than to output-gap variability. These countries put a lot of emphasis on the price stability objective. [Arestis and Mouratidis \(2004\)](#) state the previous empirical studies focus on the long-run variability trade-off. They suggest studying the short-run variability because it yields useful information on the long-run relationship between output-gap variability and

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inflation variability. For this purpose they focus on an empirical model of the conditional volatilities. Their empirical analysis has been carried out for eleven European monetary union countries. They use quarterly data for the period (1979–1998) and they split it into two groups. The first group starts from the first quarter of 1979 with the commencement of the European Monetary System, through to the last quarter of 1991, when the Maastricht Treaty was launched. The second group starts from the first quarter of 1992 and terminates in the fourth quarter of 1998, just before the introduction of the European monetary union and the euro. Their results prove that most of the countries have an improvement in the output-inflation trade-off which means output and inflation variabilities decline. On the contrary, Netherlands and Greece have an increase in output and inflation variabilities. The results of Arestis and Mouratidis (2004) are consistent with the Cecchetti and Ehrmann (2000) results in terms of none of those eleven countries operates on a fixed output-inflation variability frontier. Thus, none of them moved to a situation where the economy has higher output variability and lower inflation variability.

Taylor (1980, 1992, 1994), Fuhrer and Moore (1995) and Fuhrer (1997) show that any attempt in the USA economy to stabilize inflation leads to higher output-gap variability. Taylor (1992) and Fuhrer (1997) presents a comparison of different output-inflation variability frontiers calculated by many economists using different methodologies over different time horizons. This comparison proves that USA economy operates on a fixed output-inflation variability frontier, but, each estimated output-inflation variability curve has different shapes and slopes. The results of Lee (1999, 2002) regarding the USA output-inflation variability frontiers support the findings of Taylor (1980, 1992, 1994), Fuhrer and Moore (1995) and Fuhrer (1997). Additionally, in Lee (1999) the slope of the frontier is considerably flat, however, in Lee (2002, 2004) it becomes steeper. Moreover, in Lee (1999) variability trade-off is more apparent for the post-October 1979 sub-period. In contrast to his previous finding of the USA economy, Lee (2004) empirical analysis supports the idea that output-inflation variability is equivocal in a sample of 22 OECD members over the (1984–2001). He utilizes both short-run and long-run volatility dynamics.

The abovementioned international empirical evidence from the literature illustrates that the output-inflation variability frontier is not a down-ward sloping curve in all countries and not static in all time horizons. Moreover, it has different shapes and slopes. The current paper intends to examine a theoretical explanation from the literature to understand why in some cases the economy does not have a unique relationship between output variability and inflation variability. Specifically, this paper seeks to answer the following question why the relationship between inflation variability and output variability sometimes is negative and in others it is positive.

The other side of the issue is that central banks of many countries failed to achieve their inflation targets despite having the preferences. The evidence from the literature provides scholars with significant information. Roger and Stone (2005) find that the central banks of a group consists of 22 countries from both industrial and emerging market countries missed their inflation targets in a range of 30% to 60%. These countries have both stable inflation and disinflation rates. Albagli and Schmidt-Hebbel (2004) find several measures such as institutional and policy weaknesses; lack of central bank independence and high country risk-premium contribute notably to inflation target misses. Gosselin (2007) extends the work of Albagli and Schmidt-Hebbel (2004) in order to understand factors affecting inflation rate targets deviations and to identify the empirical determinants of successful monetary policy under inflation targeting. He finds that exchange rate movements, fiscal deficits and differences in financial sector development can explain deviation of inflation rates from their targets. In addition, he finds that higher inflation target and wider inflation control range are associated with more fluctuation in inflation rate and output. Ize (2006) does an empirical study

concerning spending seigniorage and use data from 101 countries. He finds that the trend of world inflation rate is declining during the period (1986–2003) from 16% to 5%. As a result, the central bank's ability to create seigniorage or revenues deteriorates. This opens an imperative question regarding the seriousness of some central banks that achieve losses to reduce inflation rate. Svensson (2006) says that central bankers are not only targeting the inflation rate but also other variables in the economy. This diversification in the objectives might give a stretch to the target. Ball and Sheridan (2005) find no evidence that inflation targeting makes a difference in industrial countries. This means that inflation targeting does not improve economic performance. They justify their results based on the concept of "regression to the mean", which means a country which starts with a high inflation rate tends to find the decline in the inflation rate faster than a country starts with a low inflation rate. Sweidan (2008) proves theoretically that both central bank's ability and preference in developing countries are essential to elucidate the inflation biased and the movement of monetary policy instrument.

The contribution of the current paper is to utilize a model from the existing literature to highlight on the relationship between inflation variability and output variability. We aim to explain the behavior of inflation variability and output variability based on international empirical evidence. The rest of the paper is organized as follows: Section 2 presents the model of the paper. Section 3 has the conclusion of the current note.

2. The model

The current note concentrates theoretically on output variability, inflation variability and the reaction of policy interest rate by focusing on the interrelationship among four variables in the economy; central bank preference, structure of the economy, aggregate supply shocks and inflation uncertainty. Literature review shows that the widespread method in monetary economics analysis is using loss functions. The goal of monetary policy is to increase the welfare level. Thus, it is trying to protect price stability as the prime target, with some concern for the real economy, either explicitly or implicitly, usually by stabilizing real output around potential output. The shape of these functions is consistent with this view. The current paper utilizes two loss functions with the same economy structure to guarantee a comprehensive analysis, and as follows: first, quadratic loss function. Second, asymmetric loss function.¹ The mathematical behavioral forms of the functions are as follows.

2.1. Quadratic loss function case

2.1.1. The structure of the economy

Following Cecchetti and Ehrmann (2000), we have an economy in which the dynamics of output and inflation rely on policy interest rate (r_t), aggregate demand shock (d_t) and aggregate supply shock (s_t). We can write these two functions as follows;

$$Y_t = -\gamma r_t + \gamma d_t + s_t, \quad \gamma > 0 \quad (1)$$

$$\pi_t = -r_t + d_t - \omega s_t, \quad \omega > 0 \quad (2)$$

where Y_t is the real output, π_t stands for the inflation rate. The parameter γ is the response of output to either a policy shock or an aggregate demand shock, and can be read as the inverse of the slope of the aggregate supply. The parameter ω is the response of inflation to aggregate supply shock, and can be thought of as the slope of the aggregate demand. Based on the information of Eqs. (1) and (2), the

¹ For details about the difference between quadratic and asymmetric loss functions see Nagar (2007).

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