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Relative price variability and inflation: New evidence☆,☆☆

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ABSTRACT

This paper investigates the relationship between relative price variability (RPV) and inflation using monthly micro-price data for 128 goods in 13 Turkish regions/cities for the period 1994–2010. The unique feature of this data set is the inclusion of annual inflation rates ranging between 0% and 90%. Semi-parametric estimations show that there is a hump-shaped relationship between RPV and inflation, where the maximum RPV is achieved when annual inflation is approximately 20%. It is shown that this result is consistent with a region- or city-level homogenous menu cost model that features Calvo pricing with an endogenous contract structure and non-zero steady-state inflation.

1. Introduction

Given the implications for the welfare cost of inflation and monetary neutrality, the relationship between inflation and relative price variability (RPV) has long been debated in the literature. Although theoretical models have generally predicted a positive relationship,[1] the direction and functional form of this linkage have not always been verified by empirical studies. Despite the existence of a large body of empirical studies reporting a positive relationship,[2] a number of studies have supported a reverse relation between RPV and inflation.[3] Reinsdorf (1994) found that this relationship is negative during the 1980s for the U.S. (Fielding and Mizen, 2000), and Silver and Ioannidis (2001) reported the same result for several European countries.

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[1] Whereas menu cost or Lucas-type confusion models predict linear and positive associations between inflation and RPV, recent monetary search and Calvo-type models (see Head and Kumar, 2005; Choi, 2010) predict an inflation–RPV nexus with a U-shaped form.

[2] See Van Hoomissen (1988), Lach and Tsiddon (1992), Parsley (1996), Dabús (2000), Kucuk-Tuger, Tuger, (2004), and Lastrapes (2006), among others. More recently, Ukoha et al. (2007) find that inflation has a significant positive impact on RPV among agricultural commodities in Nigeria, and Gerling and Fernandez Valdovinos (2011) document a positive relationship for eight countries from the West African Economic and Monetary Union.

[3] In addition to the detailed literature review provided here, a brief summary of empirical studies on the inflation–RPV nexus is given in the Appendix in Table A1.

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Starting with the work of Parks (1978), who first noted that RPV increases more during periods of price decreases than during periods of price increases, the asymmetric or generally nonlinear effects of RPV on inflation have attracted some attention in the literature. This new direction of research has questioned the underlying functional form of the relationship and has provided evidence of a quadratic relationship or threshold effects. The evidence of threshold effects differs somewhat by countries, depending on the nature of the inflation–RPV nexus. Jaramillo (1999) showed that in the U.S., the impact of inflation on RPV, though it is always positive, is stronger when it is below zero. Similarly, Caraballo et al. (2006) report that for Spain and Argentina, the positive effect is stronger when inflation is high and exploded during the hyperinflationary period in Argentina. Using data from Turkey, Caglayan and Filiztekin (2003) also showed that the association is significantly different during low and high inflation periods. Contrary to these aforementioned studies, during highly inflationary episodes, the association between inflation and inflation variability is significantly lower. However, Bick and Nautz (2008) found that for the U.S., both positive and negative effects of inflation on RPV are observed in the sense that inflation increases RPV only if it exceeds a threshold value. The results for the Euro area presented by Nautz and Scharff (2012) indicate that inflation significantly increases RPV only if inflation is either very low or very high in the range of their sample values.[4] More recently, conformable with recent monetary search and Calvo-type model predictions (see Head and Kumar, 2005; Choi, 2010), evidence has been provided of a U-shaped relationship between inflation and RPV by Choi (2010) for the U.S. and Japan; Choi and Kim (2010) for the U.S., Canada and Japan; Becker (2011) for a panel of European countries; and Fielding and Mizen (2008) for the U.S.[5] Moreover, in a more recent study of the effect of inflation targeting (IT) on the inflation–RPV nexus, Choi et al. (2011) analyzed a data set of twenty industrial and developing countries consisting of 12 targeters and eight non-targeters, including Turkey, during the so-called great moderation period. They show that the underlying relationship between inflation and RPV is U-shaped in most cases under study, in line with the findings by Choi and Kim (2010) and Fielding and Mizen (2008).[6]

In this paper, we contribute to the existing literature by estimating the relationship between RPV and inflation using a semi-parametric method that allows us to estimate varying coefficients capturing changing effects of inflation, if they exist, on RPV at different levels of inflation. In this respect, we use an estimation method similar to those of Choi (2010), Choi and Kim (2010), Choi et al. (2011) and Fielding and Mizen (2008) in a panel data context by introducing further regional dimensions in addition to goods levels. This unique data set covers quite a large range of (annual) inflation levels varying from 0% to 90%. In our opinion, this specific feature of the data constitutes an important opportunity to examine the inflation–RPV nexus in different inflationary environments.[7]

The empirical evidence provided clearly indicates the fact that the relationship between RPV and inflation is nonlinear and varies significantly with the level of inflation. However, unlike the previous studies, our empirical evidence indicates a hump-shaped relation between inflation and RPV, where the maximum dispersion is achieved when annual inflation is approximately 20%. We show that this result is consistent with a region- or city-level homogeneous menu cost model. This homogeneous menu cost model features Calvo pricing with an endogenous contract structure and non-zero steady-state inflation, where the Calvo parameter is determined through optimization. This model is capable of generating a hump-shaped relation between RPV and inflation and significantly differs from the model of Choi (2010), which produces a U-shaped relationship. Choi (2010)'s model, unlike ours, uses sectoral heterogeneity in an exogenous contract setting in which the Calvo parameter is determined in an ad-hoc manner and is assumed to differ across sectors.[8] The existing literature has also distinguished between the effects of anticipated and unanticipated components of inflation on RPV, although the evidence is mixed. The corresponding theoretical literature includes studies such as those by Lucas (1972) predicting a non-negative relationship between RPV and the absolute value of unanticipated inflation, as well as studies such as by Rotemberg (1983) and Head and Kumar (2005), who predict a U-shaped relationship between anticipated inflation and RPV. The corresponding empirical literature includes studies finding a convex relationship between RPV and unanticipated inflation (e.g., see Parks, 1978; Hesselman, 1983; Glezakos and Nugent, 1986), as well other studies focusing on linear in anticipated inflation and V-shaped in unanticipated inflation (e.g., see Lach and Tsiddon, 1992) versus studies focusing on quadratic in anticipated and unanticipated inflation (e.g., see Aarstol, 1999; Becker and Nautz, 2009). Therefore, the consideration of the anticipated versus unanticipated components of inflation has been shown to be important in the literature.

[4] In their studies, a very low level of inflation refers to a per annum rate below 0.95%, and a very high level is 4.96%. As we will see below, in our samples, both of these rates are considered low inflation because our study includes inflation rates up to 90%.

[5] Similarly, Akmal (2011) showed a U-shaped relationship for Pakistan, and Ndou and Redford (2014) showed another U-shaped relationship for South Africa. Further, Tommasi (1992), Debelle and Lamont (1996) and Caglayan et al. (2008) reported a symmetric V-shaped relationship between inflation and RPV.

[6] They also reported that while the U-shaped profile is found among low-inflation countries regardless of IT adoption, it is observed among high-inflation targeters only after IT adoption. However, no such shift to a U-shaped relationship is observed among the high-inflation non-targeters studied, including Turkey. Although Turkey adopted explicit IT in January 2006, it is classified as a non-targeter in the study by Choi et al. (2011) because it was a non-targeter for most of the sample period. As a non-targeter, the break date for the decrease in inflation is February 2002, which is consistent with our data. Note that Turkey pursued implicit IT during the period 2002–2005 (see Kara, 2012). We discuss their results for Turkey further in Section 2.2 below.

[7] Only a few previous studies covered such high rates of inflation along with considerably lower values. In this regard, Choi et al. (2011) constitutes the main exception together with Caraballo et al. (2006) and Caglayan and Filiztekin (2003).

[8] Choi (2010) notes that the shape of the inflation–RPV nexus depends on the average degree of price rigidity. For sectors in which the average degree of price rigidity is high, the relationship is U-shaped, but this link weakens when price adjustment is highly flexible (see Becker, 2011).