



# Inflation and relative price variability: Evidence for India



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## ABSTRACT

This study decomposes relative price variability into a component due to inflation and a component due to real factors. The empirical results for India suggest that real factors account for 55% and inflation accounts for 45% of the variability in relative price changes. The proportion of inflation induced relative price variability increases with the rise in inflation, implying that inflation has distortionary effects on the structure of relative prices. Further, larger part of variability in the relative price changes seems to have been generated by fluctuations in the relative prices of a few commodities. The sector wise analysis shows that the major share of total relative price variability is contributed by fluctuations in the prices of manufactured products. The more crucial inference that emerges from the empirical analysis is that the inflation rate at which variability of relative price changes is minimum is found to be 4.5%, which is consistent with the official threshold rate often claimed by the Reserve Bank of India.

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## 1. Introduction

There is a plethora of theoretical and empirical literature that provides evidence in favour of the proposition that inflation affects the economy through its impact on relative price variability.<sup>1</sup> Theoretically, the link between inflation and relative price variability is explained by models based on information asymmetry and menu cost that is associated with price adjustments. Under information asymmetry, firms adjust quantity in response to unanticipated demand shocks if supply is price elastic and adjust prices if supply is price inelastic. Hence, unanticipated demand shocks that generate inflation tend to affect relative price variability (Barro, 1976; Cukierman, 1983; Hercowitz, 1981; Lucas, 1973). The menu cost model developed by Sheshinski and Weiss (1977) suggests that firms' price adjustment is discrete/heterogeneous as it incurs menu cost that varies across firms and thus, at higher levels of inflation, price changes get more dispersed thereby resulting in larger variability in relative price changes. Moreover, Ball and Mankiw (1994) demonstrate that due to the menu costs involved in price adjustment, firms adjust prices only in response to large shocks but not to small ones. Also, in presence of trend inflation, price adjustments are sluggish downward, thereby generating larger variability in relative price changes. More specifically, when a firm need a downward adjustment in its relative price in response to a shock, it is unlikely to respond because inflation itself tend to reduce its relative price over time. Thus, in presence of such asymmetry in the price adjustment across firms, inflation at higher levels generates larger variability in relative price changes.

Apart from inflation, the relative price variability is also sourced through changes in real factors such as income, family composition, tastes, technology etc. (Parks, 1978). The relative price adjustments in response to changes in such real factors

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<sup>1</sup> See among others, Parks (1978); Fischer (1981); Blejer and Leiderman (1980); Buck and Gahlen (1984); Horwitz (2003).

are essential for efficient allocation of resources as they reflect the signals purely from the market and real sector of the economy (Fischer, 1981). However, variability in relative price changes generated through inflation is distortionary as it is believed to reduce the information content of nominal prices, which in turn leads to inefficient allocation of resource and welfare loss.<sup>2</sup> Although vague, the effect of inflation on the structure of relative prices is an important channel through which negative effects of inflation are transmitted to the real sector of economy (Ball & Romer, 2003).<sup>3</sup>

There is a large body of empirical studies focusing on the relationship between inflation and relative price variability (Chang & Cheng, 2000; Choi, 2010; Debelle & Lament, 1996; Fielding & Mizen, 2008; Jaramillo, 1999; Miszler & Nautz, 2004; Nath, 2004; Nautz & Scharff, 2012; Reinsdorf, 1994). A common feature of these empirical studies is that they have restricted their analysis mainly to understand the nature of this relationship. However, the issue of relative importance of inflation and real factors in causing variability in relative price changes has been ignored.<sup>4</sup> To understand the distortionary effects of inflation on the structure of relative prices, it is crucial to have an idea about the extent to which variability in relative prices is induced by the inflation. Further, from policy perspective, the nature of relationship between inflation and relative price variability has significant bearing for the conduct of monetary policy. For example, the existence of *positive* threshold inflation rate – that is the inflation rate which minimizes variability of relative price changes – imply that relative price variability cannot be reduced monotonically by maintaining inflation at lower rates.<sup>5</sup>

The present study contributes to the existing literature by addressing the following issues: (i) decomposing variability of relative price changes into a component due to inflation and a component due to real factors; (ii) quantifying the contribution of each commodity price changes to the relative price variability; (iii) analysing the nature of relationship between inflation and inflation induced relative price variability; and (iv) finding out the rate of inflation which minimizes variability of relative price changes. To our knowledge, there is no study that examines such issues in the context of an emerging country.

Further, most of the empirical studies in literature used aggregate/group indices instead of commodity wise data on prices. In this context, Ball and Mankiw (1994, 1995) and Balke and Wynne (2000) argue that aggregate supply/demand shocks are likely to cause asymmetric reactions by price setting agents. Thus, aggregate commodity price indices may not reveal this asymmetry; hence, the measure of relative price variability obtained from group indices tends to have an element of error. Also, this error tends to increase in magnitude as the level of aggregation increases. Thus, we have used data on commodity-wise price indices for the empirical analysis as it contains additional information about the dynamics of price adjustments across firms instead of aggregate/group price indices.<sup>6</sup>

The rest of the paper is organized as follows: Section 2 presents the methodology; Section 3 provides the dynamics of inflation and relative price variability in four Asian countries; Section 4 discusses the empirical results for India; and concluding remarks are given in Section 5.

## 2. Decomposition of relative price variability

In this paper, we use the methodology of Clements and Nguyen (1981, 1982) to decompose relative price variability into a component due to real factor and a component due to inflation. The advantage of using this methodology is that it enables us to identify the commodity prices which are mainly responsible for higher variability in relative prices and also provides the information on the sources of change in relative prices of respective commodities. This helps to understand the relative contribution of each commodity to relative price variability as well as measures the extent to which it is caused by inflation. Further, it provides an estimate of the minimum-variance inflation rate which means the inflation rate at which variability of relative price changes is minimum.

### 2.1. Measuring relative price variability

Let  $\pi_{it}$  be the rate of change in price of  $i$ th commodity; measured as:

$$\pi_{it} = \ln\left(\frac{p_{it}}{p_{it-1}}\right) \quad (1)$$

where  $p_{it}$  is price of  $i$ th commodity in time period  $t$  and  $\ln$  is natural logarithm. The aggregate inflation is defined as:

$$\pi_t = \sum_{i=1}^n \omega_i \pi_{it} \quad (2)$$

<sup>2</sup> See, Misperception models of Lucas (1973) and Hercowitz (1981).

<sup>3</sup> Blejer and Leiderman (1980) emphasized three channels through which higher relative price variability affect the real output: (i) it leads to costly search activities; (ii) it results in shortening of optimal contract length; and (iii) it leads to resource misallocation. Further, Green (2005) terms the dispersion in the prices as 'the root of all evil' caused by inflation.

<sup>4</sup> The exceptions are Clements and Nguyen (1981, 1982) and Ram (1990).

<sup>5</sup> For a detailed discussion see Fielding and Mizen (2008).

<sup>6</sup> Further, Fischer (1981) suggests that it is appropriate to use highly disaggregated data in the measurement of relative price variability.

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