



# Heterogeneous response of disaggregate inflation to monetary policy regime change: The role of price stickiness



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## ABSTRACT

This paper explores how a monetary regime change affects headline inflation via differential effects on various sectors in the economy. Using disaggregated CPI data for Canada, we find that the response to the adoption of inflation targeting (IT) was quite heterogeneous across sectors. While sticky-price sectors experienced a notable change in inflation dynamics following IT adoption, little structural change was observed in flexible price sectors. Our analysis based on a common factor model suggests that the structural changes in the sticky price sectors are driven by a decline in their responses to common aggregate shocks, including a monetary shock.

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## 1. Introduction

It is widely recognized in the literature that monetary policy regime shifts have been key contributors to the evolution of headline inflation in major industrialized countries (e.g. Benati, 2008; Cecchetti et al., 2007). Despite extensive research on the effects of these regime changes on macroeconomic performance, not much is known about the channels through which they are transmitted to headline inflation. Recent research highlights the importance of understanding the heterogeneous behavior of subaggregate inflation, and so studying sectoral-level responses to a regime change appears to be a promising avenue of investigation. Given that a growing body of research looking at the microdata generally suggests that inflation dynamics differ considerably at the disaggregate level (e.g. Bils and Klenow, 2004; Nakamura and Steinsson, 2008), the qualitative and quantitative effects of monetary regime change are likely to be very different across sectors (e.g. Carvalho and Nechio, 2011). A deeper understanding of how regime change influences the dynamics of subaggregate price indices could prove useful to policymakers in a number of ways. For example, it could help policymakers choose an appropriate price statistic for their inflation target by obtaining a better sense of which sectors of the economy might be more affected by policy decisions (e.g. Boivin and Giannoni, 2006; Bryan and Cecchetti, 1994; Clark, 2001). It may also allow for a deeper

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understanding of the welfare costs associated with inflation, which have been often linked in the literature to the variability in relative prices (e.g. Choi, 2010).

The primary purpose of this study is to offer some insight into how a change in the monetary policy framework impacts the behavior of headline inflation via its subcomponents. Our analysis centers on two questions: (1) which sectoral prices are more responsive to the change in monetary policy regime, as gauged by three measures of inflation dynamics (level, volatility and persistence) and (2) what sectoral characteristics can explain the heterogeneous responses of sectoral prices. We attempt to address these questions by focusing on Canada's experience with the adoption of inflation targeting (IT) more than two decades ago. As a framework for conducting monetary policy, IT is known to be effective in lowering inflation and inflation variability by stabilizing inflation expectations toward a numerical objective.<sup>1</sup> As an early adopter of IT in 1991, Canada has reasonably long time series of price data with which we can compare effectively the periods before and after IT adoption. In addition, the Canadian economy encompasses a diverse range of sectors, with price indices available for a large number of subcategories, enabling a relatively rich disaggregate analysis of the impact of the monetary policy regime change.

A quick glance at Fig. 1 helps grasp important features of Canadian inflation dynamics since 1978. The upper panel of Fig. 1 plots the evolution of the headline inflation rate and three selected disaggregate inflation rates (solid lines) over time, along with the announced target range of inflation (dotted lines).<sup>2</sup> National headline inflation displays two apparent structural changes: one around the year 1983 at the end of the Great Inflation and the other around the year 1991, when IT was adopted. The Canadian headline inflation rate fell into the intended target range immediately after IT adoption, indicating the effectiveness of IT in stabilizing inflation. At the disaggregate level, however, the effect of IT is rather mixed. While inflation rates for both goods and services exhibit a very similar pattern to that of headline inflation, energy inflation fluctuates consistently far outside the target range. The heterogeneity in the dynamics of disaggregate inflation can also be seen in terms of volatility and persistence (based on the twelve-month rate of inflation). As illustrated in the lower panel of Fig. 1, energy price changes are much more volatile but less persistent than the others, and do not exhibit a clear response to IT adoption.

Further information on the behavior of both headline and disaggregate inflation is provided in Table 1, which lists summary statistics for inflation dynamics before and after IT adoption. To facilitate comparison with earlier studies, we consider two subsamples for the pre-IT period, 1978–1991 and 1983–1991. The adoption of IT was clearly associated with a marked reduction in the level and persistence of headline inflation. The behavior of volatility across time periods, however, is sensitive to the starting point used for the pre-IT period. With 1983 as the starting year of the pre-IT period, we find a slight increase in volatility under the IT regime. This implies that the change in monetary regime was effective in lowering but not necessarily stabilizing inflation.<sup>3</sup> Table 1 also shows the heterogeneous dynamics of inflation at the disaggregate level highlighted in Fig. 1. Whereas the price changes in food and services became less volatile after IT adoption, energy prices were much more volatile under the IT regime. This very different pattern exhibited by energy inflation is consistent with the conventional wisdom that energy prices are highly susceptible to ever-changing global market factors, and their heightened volatility is believed to be responsible for the failure of headline inflation to fall in the post-IT period. It is also worth noting that energy inflation exhibits qualitatively different patterns than food inflation, although both are major constituents of so-called *non-core* inflation. Goods inflation also displays a slight increase in volatility under the IT regime, probably in part because of indirect effects of the higher volatility in energy prices on some of its constituents. A similar categorical difference is noted in the effect on inflation persistence, which is known to reflect the formation of inflation expectations (e.g. Amano and Murchison, 2005). The persistence of inflation did fall after the regime change both at the aggregate and disaggregate levels, in line with the basic intuition that a key anticipated benefit of IT adoption is better-anchored inflation expectations. Apart from service prices, however, the persistence of disaggregate inflation was relatively low (below 0.35 in terms of SARC—almost indistinguishable from white noise) even before the adoption of IT. It is the persistence of service inflation that underwent a significant drop under the IT regime, indicative of inflation expectations formation becoming less inertial.

The key observation here is that the monetary regime change has affected inflation in different sectors in different ways. What then can explain the observed differences? More specifically, what underlying sectoral characteristics might account for the heterogeneous responses to the policy regime change? While a range of sectoral characteristics have featured in the literature exploring pricing behavior, we focus on price stickiness as a potential candidate for explaining the sectoral heterogeneity given the central role played by the distinction between sticky and flexible prices in macroeconomic models (e.g. Aoki, 2001).<sup>4</sup> By relating the degree of price stickiness in the various sectors to the dynamics of Canadian sectoral

<sup>1</sup> Most studies in the inflation targeting literature have focused on the effect of IT at the aggregate level or at a low degree of disaggregation. We are aware of no study that is devoted to highly disaggregated sectoral analysis. For a comprehensive survey of IT, see Walsh (2009).

<sup>2</sup> The Bank of Canada originally set a target inflation range of 2–4%. This was lowered at the end of 1992 to 1.5–3.5% until June 1994 when it was re-adjusted to the current range of 1–3%.

<sup>3</sup> Previous studies (e.g. Longworth, 2002; Benati, 2008) that found a decline in volatility under the IT regime typically had an earlier starting point for the pre-IT period and so included the Great Inflation period. If we extend the pre-IT period to begin in 1978, we also find that volatility declines under the IT regime.

<sup>4</sup> A common practice of distinguishing between core and non-core inflation may have reduced relevance to our case in view of the qualitative difference observed in the dynamics of food and energy inflation.

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