

# Price Level Targeting and the Financial Accelerator: Welfare Analysis in an Open Economy DSGE Model.

Ali Dib      Caterina Mendicino      Yahong Zhang

March 31, 2008

## Abstract

How important are the benefits of low price-level uncertainty? This paper explores the desirability of a price-level path targeting in the presence of the "Fisher-debt-deflation channel". The analysis rely on an estimated multi-sector small open economy model fit to Canadian data. We estimate the model using Bayesian methods. The model features nominal debt contracts denominated in domestic and foreign currency and credit frictions *a la* Bernanke, Gertler and Gilchrist (1999). The policy implications are based on social welfare evaluations of two alternative monetary regimes: inflation targeting and price level targeting. Preliminary findings indicates that higher welfare is achieved under a strict price-level targeting rule.

# 1 Introduction

The maintenance of price stability is established as the principal objective of most central banks worldwide.<sup>1</sup> Inflation targeting, aiming at bringing inflation back to target, has been proved successful in sustaining low inflation and low inflation volatility. However, some central banks have recently started investigating the costs and benefits of defining the target in terms of a price level path rather than an inflation rate. In particular, the Bank of Canada is involved in assessing the desirability of a price-level path targeting in view of the 2011 renewal of the agreement on the monetary policy framework with the Government of Canada.

Announcing a path for the price level would provide an operational target and be equivalent to target a long-run average inflation rate, but it would not require to stabilize inflation in the short-run. Under such a regime, the central bank would aim at correcting deviations of the price level from the target, using inflationary or deflationary policies to bring the price level back to its target in a certain period of time. As a result, uncertainty about the price level in the long-run would be reduced. Lower price level uncertainty could be relevant for investment and financial planning, specially in the presence of nominal debt contracts.

In this paper, we assesses the benefits of low price level uncertainty in the presence of a "Fisherian-debt-deflation channel". In fact, the introduction of nominal debt contracts generate unnecessary redistribution of wealth between borrowers and lenders as a result of unexpected changes in the price level. If entrepreneurs borrow from households to finance part of their capital expenditure, variations in the price level, generating distortions in the allocation of resources, affects economic activity. Thus, it is resonable to conjecture that, stability around a price level path could minimize the allocative distortion generated by the debt-deflation channel and improve welfare.

We quantify the benefits of price level targeting relying on a multi-sector

---

<sup>1</sup>Nowdays, Australia, Canada, European Monetary Union, New Zealand, South Africa, Sweden and United Kingdom adopt an explicit target for inflation.

small open economy model enriched with credit frictions *a la* Bernanke, Gertler and Gilchrist (1999). The model relies on nominal debt contracts and imperfections in the domestic and international credit market.<sup>2</sup> Our model does not aim at explaining why different types of contracts co-exist. For simplicity, we impose that different sectors of the economy (tradable and non-tradable goods producers) rely on different sources of external financing.

The policy implications are based on social welfare evaluations of two alternative monetary regimes: inflation targeting and price level targeting. The analysis is conducted in three steps. To provide a quantitative assessment of different sources of business cycle fluctuations we first fit the model to Canadian data using data from 1981:1 to 2007:2 assuming that the central bank targets inflation. Estimates rely on Bayesian methods. Second, we characterize the optimal design of monetary policy under the two alternative regimes, based on social welfare evaluations. We assume that at the end of time 2007:2 the monetary authority is interested in the optimal design of interest rate rules. For a fair treatment of the inflation targeting framework we compare the optimal price-level path targeting and inflation targeting rule. Last, we disentangle the effects of different features of the model in generating the results. In particular, we compare the two regimes under different sources of business cycle fluctuation such as supply, demand, financial and foreign shocks. We also contrast the role of the distortions associated to the credit market with the distortions related to prices and wages stickiness.

**Layout.** The paper proceeds as follows. Section 2 summarizes related literature and highlights the contribution of our paper. Section 3 presents the model. Section 4 discusses the estimation method and section 5 the quantitative properties of the model. Section 5 describes the monetary policy evaluation and section 6 conducts sensitivity analysis. Section 7 comments on the policy implications of the model. Section 8 presents the conclusions of the study.

---

<sup>2</sup>See Christiano, Motto and Rostagno (2004, 2007) for close economy models with nominal contracts and frictions in the domestic credit market.

## 2 Related Literature

Since Taylor (1979), the output-inflation volatility trade-off criterion has been used to rank alternative policy rules. According to the conventional view in central banking, dated back to Fisher (1994), in presence of nominal rigidities, a price level targeting regime would increase both inflation and output volatility in the short-run.<sup>3</sup> Thus, there would be a trade off between long-term price-level variability and short-term volatility of inflation and output gap. However, Duguay (1994) and Coulombe (1997) document that a price level target path implies expectations to help resisting deflation and profound downturns if the economy falls into a zero-lower-bound situation. More recently, Svensson (1999) showed that under rational expectations a price-level targeting path leads to lowers inflation and identical output variability, delivering a free lunch. Clarida, Gali and Gertler (1999) and Svensson and Woodford (2005) also show that in a simple New-Keynesian model optimal monetary policy under commitment is characterized by a stationary price level. If the central bank commits to price-level targeting, then, rational expectations become automatic stabilizers.

The objective of this paper is to investigate the benefits of lower uncertainty about the price level in the presence of a "Fisher-debt-deflation channel" and financial imperfection in the domestic and international credit market. We document how the allocative friction coming from the existence of nominal debt affects the choice of the optimal monetary policy regimes. This paper is closely related to Meh, Rios-Rull and Terajima (2008). According to their findings, in the presence of nominal government and foreign bonds, an unexpected one percent increase in the price level, generates consistently higher redistribution and more sizeable effects on aggregate output, under inflation targeting than price level targeting. Differently from them, we compare the two monetary policy regimes relying on welfare evaluations. Moreover, we base our analysis on a medium-scale DSGE model that takes

---

<sup>3</sup>See also Lebow, Roberts and Stockton (1992), Fillion and Tetlow (1994), Haldane and Salmon (1995), Laxton, Ricketts and Rose (1994).

into account several sources of business cycle fluctuations. Understanding the source of business cycle fluctuations is particularly relevant for addressing this question. In fact, according to Christiano, Motto and Rostagno (2007) under an inflation targeting central bank, the Debt-Deflation channel amplifies the effects of shocks which drive output and the price level in the same direction while dampening the impact of shocks that move the two variables in opposite directions.

This paper is also linked to the growing literature on estimated small open economy models. Among others see Adolfson et al. (2007), Bergin (2003), Ghironi (2000), Lubik and Schorfede (2003, 2005), Lubic and Teo (2005), Rabanal and Tuesta (2005, 2008), Del Negro (2003), Curdia and Finocchiaro (2007), Smets and Wouters and Linde' et al (2004). In particular, we relate to previous estimated small open economy models of the Canadian economy. Among others, see Ambler, Dib and Rebei (2004), Justiniano and Preston (2006,b) for standard one-sector models; Ortega and Nooman (2006) for a two-sector model; Dib (2008) for a multi-sector model that includes commodity, manufacturing, tradeables, non-tradeables and imports; and Christensen, Corrigan, Mendicino and Nishiyama (2008) for a small open economy with collateralized household debt.

### **3 The Model**

In this section we describe the model economy. We consider a small open economy populated by households, producers of final goods for consumption and investment purposes, tradable and non-tradable intermediate-goods producing firms, intermediate-foreign-goods importers, producers of physical capital, entrepreneurs, a government, and a central bank. Final consumption and investment goods are produced combining tradable, non-tradable and imported goods. Sectorial output is produced aggregating different brands through the Dixit-Stiglitz aggregator. Branding firms buy intermediate domestic and foreign homogeneous intermediate inputs, slightly differentiate them and sell the products on the market in a competitive manner. They set

the prices as in Calvo (1983). We follow Yung (1996) and assume that firms that cannot change their prices, index last period price to the average inflation rate. Domestic manufactured firms produce goods for both domestic use, and exports. Following Obstfeld and Rogoff (1995), we assume the producers' *currency pricing* behavior in the manufacturing sector. Thus, the *law of one price* holds for exported domestic goods. However, due to the presence of nominal rigidities in the import sector, exchange rate movements are partially passed through to domestic prices. Capital producers use investment goods to produce new capital purchased from entrepreneurs. In particular, we assume that entrepreneurs borrow to partly finance their acquisitions of capital used in the production processes. Entrepreneurs produce intermediate tradable and non-tradable goods using sector-specific capital and labor services. Households supply specialized labor services in a monopolistic manner to employment agencies as in Erceg, Henderson and Levin (2000). Households that cannot change their wages index them to the average inflation rate. Since entrepreneurs are ex-ante identical but face idiosyncratic shocks, lending to them involves an agency problem. Thus, as in Bernanke et al. (1999) external finance is more expensive than internal funds and the external finance premium depends on the entrepreneur's leverage ratio. The model contemplates two different sources of external credit finance. For simplicity, we assume that entrepreneurs in the tradable and non-tradable sector have access to different credit markets. Entrepreneurs in the non tradable sector borrow from domestic intermediaries while entrepreneurs that produce tradable goods raise funds on the international credit market. Debt is issued in nominal terms.

## 4 Preliminary Results

*Preliminary findings indicates that higher welfare is achieved under a strict price-level targeting rule. Only exception is the case in which business cycle fluctuations are only driven by supply-side shocks. In this case inflation targeting would overcome a price-level targeting.*