

# Time consistent monetary policy with endogenous price rigidity

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## Abstract

I characterize time consistent equilibrium in an economy with price rigidity and an optimizing monetary authority operating under discretion. Firms have the option to increase their frequency of price change, at a cost, in response to higher inflation. Previous studies, which assume a constant degree of price rigidity across inflation regimes, find two time consistent equilibria—one with low inflation, the other with high inflation. In contrast, when price rigidity is endogenous, the high inflation equilibrium ceases to exist. Hence, time consistent equilibrium is unique. This result depends on two features of the analysis: (1) a plausible quantitative specification of the fixed cost of price change, and (2) the presence of an arbitrarily small cost of inflation that is independent of price rigidity.

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## 1. Introduction

Central bank policy is best characterized as being set with discretion: monetary policymakers do not simply implement policy plans determined in the past. So while it is crucial to characterize optimal policy under commitment, it is equally important to understand what outcomes can arise when policymakers act with discretion. Recently, this issue has been studied in the context of dynamic general equilibrium models of the monetary transmission mechanism. These studies maintain two assumptions. The first is lack of commitment on the part of the benevolent

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policymaker. The second is that the degree of price rigidity is independent of the inflationary regime. In these economies, equilibria are generally not unique. *Expectation traps* arise in which equilibria associated with expectations of low or high inflation become self-fulfilling.<sup>1</sup> Hence, these models rationalize the view that the experience of the U.S. during the 1970s was due to a high inflation expectation trap.

Using the methods of Chari and Kehoe [8], Chari et al. [7] demonstrate this multiplicity in a sticky price model in which agents play trigger strategies (see also [4, Section IV]). An important shortcoming, however, is that the play of trigger strategies admits many possible equilibria.<sup>2</sup> Two recent papers—Albanesi et al. [2] and King and Wolman [18]—study discretionary policy when reputational mechanisms are ruled out. These papers show that expectation traps remain; that is, multiplicity does not rely on folk-theorem type reasoning, but is a germane feature of monetary discretion.

The intuition can be summarized as follows. Firms are monopolistic and set sticky prices. This provides an incentive for the monetary authority to generate unexpected inflation: since the output of sticky price firms is demand determined, unexpected inflation stimulates output and reduces the monopoly distortion. Costs of realized inflation generate a trade-off, so that the monetary authority produces positive, but finite, inflation. Forward-looking firms account for this when setting prices. If firms expect low inflation to occur, they set accordingly low prices. If firms expect high inflation, they set high prices. Accommodation by the monetary authority validates private sector expectations. Hence, accommodation—the hallmark of policy discretion—generates the possibility of multiple equilibria.

A problem with this reasoning is that it relies heavily on the degree of price rigidity being exogenous. With sticky prices, a firm's future price is simply not permitted to adjust for inflation that happens between now and then. Expectations of high inflation lead firms to set high prices now, thus compelling the monetary authority to deliver on those expectations. While assuming exogenously rigid prices is fruitful for monetary business cycle analysis, it seems problematic in formulating an explanation for high inflation episodes. This is particularly true since the assumption is central to generating high inflation.

I consider an economy in which the degree of price rigidity is endogenous. The objective is to determine the robustness of the expectation trap result in such a model, absent an appeal to reputational mechanisms. In the face of high inflation, firms can choose to incur a fixed cost to increase their frequency of price change. When the degree of price rigidity is allowed to adjust, the high inflation equilibrium ceases to exist. Time consistent equilibrium is *unique*.<sup>3</sup> This result depends on: (a) a quantitatively reasonable specification of the fixed cost of price change, and (b) the presence of an arbitrarily small welfare cost of realized inflation that is independent of rigid prices.

I show this in two steps. First, I consider a 'simplified' model in which realized inflation is costly only when prices are sticky, so that only feature (a) is operational. Two time consistent

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<sup>1</sup> For earlier analysis of the interaction between monetary discretion and a forward-looking private sector, see the seminal work of Kydland and Prescott [20] and Barro and Gordon [4]. These studies describe linear-quadratic economies which display unique equilibrium.

<sup>2</sup> In a highly related framework, Ireland [15] shows that the same model that predicts expectation traps predicts the first-best, commitment solution as an equilibrium outcome as well.

<sup>3</sup> Ireland [16] shows how multiplicity in the class of models considered by Ireland [15] and Chari et al. [7] can be eliminated by relaxing the assumption of rational expectations. For a critical assessment of expectation traps closer in spirit to that considered here, see Barseghyan and Di Cecio [5].

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