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How relevant are nominal contracting schemes for monetary policy?

Matthias Paustian ^{a,b,*}, Jürgen von Hagen ^c

^a Bowling Green State University, Bowling Green, OH 43403, United States

^b Bank of England, Monetary Assessment and Strategy Division, Threadneedle Street, London EC2R 8AH, United Kingdom

^c University of Bonn, Indiana University and CEPR, Lennestr. 37, D 533113 Bonn, Germany

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ABSTRACT

Due to the scarcity of pertinent evidence, there is currently no general agreement on how to introduce nominal rigidities into monetary macroeconomic models. We examine the role of alternative assumptions about the wage and price setting mechanisms for the assessment of the welfare costs of nominal rigidities and the performance of alternative monetary policy rules in an otherwise standard New Keynesian general equilibrium model. We find that the choice of a particular price and wage setting scheme matters quantitatively for the welfare costs of nominal rigidities. However, the ranking of the welfare costs associated with alternative wage and price setting schemes is robust to changes in the monetary policy rule, and the ranking of the welfare costs associated with alternative monetary policy rules is robust to changes in the wage and price setting scheme. The difference between sticky nominal contracts and sticky information matters more than the difference in the age distribution of prices wages and information implied by alternative price and wage setting schemes.

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1. Introduction

A large part of contemporary monetary macroeconomics builds on the assumption of nominal rigidities to explain the propagation of macroeconomic shocks and macroeconomic dynamics at cyclical frequencies. Such rigidities are an essential ingredient of the New Keynesian macroeconomic (NKM) models commonly used to study short-run fluctuations and optimal monetary and fiscal policies. Their importance is underscored by recent estimates indicating that the welfare costs of nominal rigidities may range between one and 3% of annual consumption, see Canzoneri et al. (2007). That is, a typical consumer would give up between one and 3% of his consumption to move from a world with nominal rigidities to a world without. A policy implication of these estimates is that, if, in a world with nominal rigidities, optimal monetary policy can approximately replicate the allocation that would prevail in a world without nominal rigidities, it can achieve substantial welfare gains.

Despite the widespread agreement, however, that nominal rigidities matter, there is little agreement among economists today on the most appropriate price and wage-setting mechanism that should be used to model them. The most widely used mechanism in the literature is the pricing rule proposed by Calvo (1983), which assumes that in each period some firms (workers) are randomly chosen and allowed to adjust their prices (wages) to current and expected future macroeconomic circumstances, while all others hold their prices fixed. This mechanism owes its popularity to its analytical convenience, but its drawbacks are by now well understood. With a fixed probability of price adjustment each period, some firms do

* Corresponding author at: Bank of England, Monetary Assessment and Strategy Division, Threadneedle Street, London EC2R 8AH, United Kingdom. Tel.: +44 (0)20 7601 5250.

E-mail addresses: matthias.paustian@bankofengland.co.uk (M. Paustian), vonhagen@uni-bonn.de (J. von Hagen).

not get to adjust their prices for arbitrarily long periods of time. This generates relative price distortions which make the welfare costs of nominal rigidities implausibly large; see [Kiley \(2002\)](#) and [Aszari \(2004\)](#). A variety of alternatives to the Calvo mechanism have been introduced in the recent macroeconomic literature and a number of empirical micro and macro studies on these mechanisms exist. Nevertheless, the evidence for or against a particular mechanism is far from being conclusive.¹ As a result, it is still largely up to the individual researcher to choose a mechanism generating price and wage rigidities as a basis of his analysis.

This situation is unsatisfactory. Not knowing how much the differences in the price and wage setting mechanisms matter, it is difficult to compare different studies of the welfare costs of nominal rigidities using different mechanisms. Furthermore, it is particularly awkward for monetary policy makers. If alternative monetary policy rules perform very differently when evaluated on the basis of models with different price and wage setting schemes, central bankers would need to know a lot about which of these schemes are empirically relevant and how robust the policy rules are under alternative price and wage setting mechanisms. In this regard, [Canzoneri et al. \(2007\)](#) note that there is a general consensus in the NKM literature that, in the presence of price rigidities alone, the optimal monetary policy rule aims at price stability alone regardless of the specific mechanism generating price inertia. They indicate, however, that things might get more complicated and that there is less agreement on optimal policy rules, when both price and wage rigidities prevail.

The goal of this paper is to explore how the choice of specific price and wage setting mechanisms affects the welfare costs of nominal rigidities in a dynamic general equilibrium model and the performance of alternative monetary policy rules. For this purpose, we present a standard NKM model with differentiated intermediate goods and labor based on [Erceg et al. \(2000\)](#). We calibrate and simulate this model assuming different pricing and wage setting mechanisms and obtain estimates of the welfare costs of nominal rigidities for a wide range of structural parameter values of the model.² Furthermore, we simulate the model under alternative monetary policy rules to explore how sensitive the performance of these rules is to changes in the price and wage setting mechanisms.

Together with a conventional Calvo scheme, we consider a truncated Calvo mechanism, which specifies a maximum length of time between any two price adjustments for all firms. Furthermore, we examine the mechanism proposed by [Wolman \(1999\)](#) which is characterized by price adjustment probabilities that increase as the lag since the last adjustment becomes longer, and [Taylor \(1980\)](#) contracts, which specify a fixed period of duration for each price set by a firm and each wage set by workers.³ In addition, we follow [Mankiw and Reis \(2002\)](#), who propose a price and wage setting scheme based on the assumption that firms (workers) are allowed to adjust their prices (wages) every period, but they do not receive new information relevant for doing so every period. Under this sticky-information mechanism, price and wage adjustment is sluggish because of the informational rigidities.

Our main findings can be summarized as follows. First, the welfare costs of nominal rigidities differ substantially across alternative price and wage-setting schemes. For a given average age of the price and wage contracts in an economy, schemes that place more mass on older contracts imply larger welfare costs of nominal rigidities. The intuition is that there are larger relative price and wage distortions when some agents have not updated their prices and wage contracts for a longer time. For example, nominal price and wage rigidities based on Calvo contracts generate welfare costs that are up to 2.5 times bigger than those implied by Taylor contracts with the same average age. Truncating the duration of Calvo contracts after ten quarters reduces the welfare costs under this scheme, but only slightly so. The Wolman pricing scheme leads to substantially lower welfare costs than Calvo pricing, but larger costs than Taylor contracts.

Second, while alternative monetary policy rules imply large differences in the welfare costs of nominal rigidities given a particular price and wage setting mechanism, the ranking of the welfare costs associated with alternative price and wage setting mechanisms is largely invariant to the monetary policy rule used. Thus, qualitative comparisons of the welfare costs of such mechanisms do not hinge on knowing which rule the central bank applies.

Third, similar results hold for different assumptions about updating the information sets in sticky information models. For a given average age of information sets, updating schemes that put less mass on older information involve smaller welfare costs. Quantitatively, the effect is more pronounced than with sticky prices and wages. For example, Calvo style updating rules can involve welfare costs that are up to five times larger than those of Taylor-type updating rules with the same average age.

Fourth, these results are robust to several sensible model variations. They are the same when we assume that the central bank measures the output gap as deviations from flexible price and wage output rather than from steady state output. They are confirmed when we assume that capital is fixed at the firm level rather than mobile due to the existence of an economy-wide rental market for capital. They are robust to variations of the critical parameters of the model across a wide range of values. They hold regardless of whether the economy is predominantly hit by technology shocks, monetary shocks, or preference shocks.

Finally, while alternative pricing and wage setting schemes are associated with different welfare costs, the welfare ranking of alternative monetary policy rules is very robust to changes in the mechanism generating nominal rigidities in the

¹ See the recent work by [Laforte \(2007\)](#) for the empirical macro evidence on alternative pricing schemes. The work of the European Central Bank's Inflation Persistence Network summarized in [Angeloni et al. \(2007\)](#) presents further empirical evidence on price stickiness. [Altissimo et al. \(2006\)](#) note that firms in the Euro area change prices infrequently, but revise prices more frequently.

² To make the different price and wage setting schemes comparable, we require that the average age of contracts is the same across alternative schemes.

³ See [Fischer \(1977\)](#) for a similar model using overlapping wage contracts.

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