Journal of Economic Dynamics & Control 34 (2010) 1305–1324

Contents lists available at ScienceDirect

Journal of Economic Dynamics & Control

journal homepage: www.elsevier.com/locate/jedc

Nominal vs real wage rigidities in New Keynesian models with hiring costs: A Bayesian evaluation

Marianna Riggi *, Massimiliano Tancioni *

Sapienza University of Rome, Italy

ARTICLE INFO

Article history:
Received 31 March 2008
Received in revised form
21 February 2010
Accepted 23 February 2010
Available online 10 March 2010

JEL classification:
E32
E52
C11

Keywords:
New-Keynesian model
Labor market frictions
Wage rigidities
Technology shocks
Bayesian inference

ABSTRACT

The inclusion of labor market frictions in the new Keynesian DSGE model overcomes the main drawbacks of the baseline framework. In this paper we show that this extended model, by assuming real wage rigidities, does not replicate the correct wage dynamics and the negative conditional correlation between technology shocks and employment observed in the data, known as the "productivity–employment puzzle" . We show also that these empirical limitations can be overcome by replacing real wage rigidities with nominal wage rigidities, without sacrificing other appealing features of the model. We adopt a Bayesian perspective to estimate the dynamic properties of the model with real wage rigidities and compare them with those of the model with nominal wage rigidities. We show that the evidence favors this latter construction.

0. Introduction

Two recent contributions by Blanchard and Galì (2007, 2009) recommend the introduction of labor market frictions and real wage rigidities in the baseline New Keynesian model. This extended model is receiving increased attention since it resolves two major limitations of the baseline New Keynesian model. First, the introduction of labor market frictions implies that the model is consistent with the presence of involuntary unemployment, which the baseline New Keynesian model does not allow for Blanchard and Galì (2007, 2009). Second, the introduction of real wage rigidities leads to the breakdown of the so-called "divine coincidence", i.e. the absence of a policy trade-off between stabilizing inflation and the welfare-relevant output gap (Blanchard and Galì, 2007, 2009). However, the ability of this extended framework to account for other salient features of business cycle dynamics remains questionable; the model still lacks substantial empirical testing and deeper insights into its dynamic properties.

In this paper we show that the performance of Blanchard and Galì's (2009) model relies heavily on how wage rigidities are specified. In particular, the hypothesis of real wage rigidity hampers the emergence of the highly debated "productivity–employment puzzle", or negative correlation between productivity improvements and employment conditional on technology shocks,[1] and generates excess real wage smoothness, leading to a counterfactual major drop in nominal wages following a technology improvement.

* Corresponding authors.
E-mail addresses: marianna.riggi@uniroma1.it (M. Riggi), massimiliano.tancioni@uniroma1.it (M. Tancioni).

[1] See Blanchard (1989), Blanchard and Quah (1989), Gamber and Joutz (1993), Blanchard et al. (1995), Galì (1999), Francis and Ramey (2005), Basu et al. (2006).

0165-1889/$ - see front matter © 2010 Elsevier B.V. All rights reserved.
doi:10.1016/j.jedc.2010.03.001

In considering the productivity–employment nexus, Galì (1999), Francis and Ramey (2005) and Basu et al. (2006) show that the weak or negative unconditional (sample) correlation between productivity and employment addressed by Hansen and Wright (1992) is due to the negative response of employment (hours worked) to productivity improvements,[2] a result that theoretically is consistent with a sticky price economy in which monetary policy is not fully accommodative (Dotsey, 2002; Galì and Rabanal, 2004).

In considering the wage dynamics, Basu et al. (2006) and Liu and Phaneuf (2007) provide evidence that a positive technology shock leads to a weak response in nominal wage inflation, while real wages rise modestly at impact and continue to rise until they reach a permanently higher steady state. Most of the adjustment in real wages takes place through a decline in the price level rather than through changes in nominal wages.

By focusing on the effects of productivity improvements, we analyze the dynamic properties of Blanchard and Galì (2009) model from a theoretical and empirical point of view. Theoretically we show first that the New Keynesian model with labor market frictions proposed by Blanchard and Galì (2009) can be consistent with the "productivity–employment puzzle" if we consider nominal wage rigidities rather than real wage rigidities, a hypothesis that is strongly supported by the empirical evidence (Taylor, 1999; Gottschalk, 2005). Second, we show that this modification allows the model to account better for the observed real and nominal wage fluctuations over the cycle, consistently with the findings in Liu and Phaneuf (2007). Third, we show that the model with nominal wage rigidities retains the appealing normative and positive properties of the real wage rigidities model proposed by Blanchard and Galì (2009): even under nominal wage rigidities the "divine coincidence" result does not hold (Erceg et al., 2000) and a hybrid New-Keynesian Phillips curve (NKPC) emerges.

Empirically, we evaluate which of the two model alternatives performs better. We compare the performance of Blanchard and Galì (2009) model with a substantially equivalent model structure that considers nominal wage rigidities. To conduct our empirical evaluation of these models, we implement a Bayesian Monte Carlo Markov Chain estimation procedure (MCMC) along the lines of Fernandez-Villaverde and Rubio-Ramirez (2004), Juillard et al. (2008) and Smets and Wouters (2003, 2007).

To improve the comparability of our results with those in the recent empirical DSGE literature (Smets and Wouters, 2007), we use unfiltered data and assume that technology is driven by a trend-stationary stochastic process. And in order to improve the fitness between the models and the data, we consider a larger set of rigidities than those in the benchmark Blanchard and Galì's (2009) model. In particular, we obtain reasonable estimates of price and wage optimization frequency (i.e. in line with the available microeconometric evidence) by assuming endogenous demand elasticity in goods and labor markets (Kimball, 1995; Dotsey and King, 2005; Eichenbaum and Fisher, 2007; Sbordone, 2007), and allow for autoregressive consumption behavior by assuming external habits persistence. The models are estimated using US quarterly data.

Bayesian Monte Carlo estimation and simulation are preceded by a stability mapping analysis from which we derive important indications for initializing the estimation within the parameter space that fulfills the stability requirements (Ratto, 2006). Model selection is based on the Bayes factor, which essentially summarizes the posterior evidence in favor of one model specification compared to the other. Our model selection analysis is similar to that proposed by Rabanal and Rubio-Ramirez (2005), who use a Bayesian approach to compare three extensions to the baseline New Keynesian model.

Analysis of the posterior impulse responses shows that the way that wage rigidities are specified is very important. The model with staggered nominal wage contracts replicates the dynamic effects of technology shocks, addressed in the empirical literature through the use of weakly identified model structures such as the VAR (Basu et al., 2006). A productivity shock leads to a fall in employment, a rise in real wages and a weak response in the nominal wage. The real wage rigidities model estimates, on the other hand, highlight the existence of a trade-off between the degree of real rigidity and the emergence of a negative correlation between productivity and employment. To account for this, the estimates favor a parameterization in which the degree of real wage stickiness is virtually zero. Finally, Bayesian model comparison indicates that the model with nominal wage rigidities has to be preferred over the benchmark Blanchard and Galì (2009) model.

The paper is organized as follows. Section 1 provides the analytical derivation of the models under real and nominal wage rigidities. Section 2 presents an analysis of models' dynamic properties. First, by means of stochastic simulations, we focus on the economic mechanisms responsible for the different dynamic properties in terms of employment and wage responses to positive technology shocks. We then draw some implications from the introduction of nominal wage rigidities in the Blanchard and Galì (2009) model with respect to the "divine coincidence" result and the emergence of a hybrid NKPC. Section 3 introduces the Bayesian analysis, with a specific focus on Monte Carlo filtering techniques and on the Bayes factor as an approach to model comparison. Section 4 summarizes our results and Section 5 concludes.

1. The models

We consider four extensions to Blanchard and Galì's (2009) model, each needed given our strong empirical focus:

- We assume a trend component in technology, so that the data do not need to be detrended before estimation. Thus, the model is scaled and its dynamics is evaluated with respect to a balanced growth path.
- We allow for external habits formation in order to account for the slowly building effects in consumption and to check the robustness of our results for a larger set of rigidities.

[2] More specifically, once shocks in vector autoregressions are identified as "technological" according to broadly accepted theoretical indications, the employment (hours) response becomes negative in the short run.