



# Nominal and real wage rigidities. In theory and in Europe

Markus Knell\*

*Oesterreichische Nationalbank, Economic Studies Division, Austria*

## ARTICLE INFO

### Article history:

Received 2 March 2012  
Accepted 20 January 2013  
Available online 13 February 2013

### JEL classification:

E31  
E32  
E24  
J51

### Keywords:

Inflation persistence  
Real wage rigidity  
Nominal wage rigidity  
DSGE models  
Staggered contracts

## ABSTRACT

In this paper I study the relation between real wage rigidity (RWR) and nominal price and wage rigidity. I show that in a standard DSGE model RWR is mainly affected by the interaction of the two nominal rigidities and not by other structural parameters. The degree of RWR is, however, considerably influenced by the modelling assumption about the structure of wage contracts (Calvo vs. Taylor) and about other institutional characteristics of wage-setting (clustering of contracts, heterogeneous contract length, indexation). I use survey evidence on price- and wage-setting for 15 European countries to calculate the degrees of RWR implied by the theoretical model. The average level of RWR is broadly in line with empirical estimates based on macroeconomic data. In order to be able to also match the observed cross-country variation in RWR it is, however, essential to move beyond the country-specific durations of price and wages and to take more institutional details into account.

© 2013 Elsevier Inc. All rights reserved.

## 1. Introduction

The simplest explanation for the existence of real wage rigidities sees them as a consequence of two nominal rigidities: a nominal price rigidity and a nominal wage rigidity. Although this type of real wage rigidity is a crucial element of the current generation of DSGE models (cf. Christiano et al., 2005; Smets and Wouters, 2003) it is usually not in the focus of these papers and has so far not been analyzed in any detail.<sup>1</sup> In this paper I want to fill this gap. In particular, I am going to study how the two nominal rigidities interact to create real wage rigidity (RWR), how sensitive real wage rigidities react to changes in the nominal rigidities and to what extent the use of available information on price- and wage-setting is able to generate degrees of RWR that are in line with the empirical evidence.

Nominal and real wage rigidities have a long tradition in the explanation of business cycle fluctuations. While the concept of nominal wage rigidity is commonly related to the speed with which nominal wages can be changed in reaction to economic shocks, there exists less unanimity about the exact meaning of real wage rigidity. In this paper I define RWR as the speed with which the real wage approaches its equilibrium value after being hit by shocks to aggregate demand or aggregate supply. This formulation follows related definitions by Ball and Romer (1990) and Blanchard (2006).<sup>2</sup>

\* Address: OeNB, Economic Studies Division, Otto-Wagner-Platz 3, POB-61, A-1011 Vienna, Austria. Tel.: +43 1 40420 7218; fax: +43 1 40420 7299.

E-mail address: [Markus.Knell@oenb.at](mailto:Markus.Knell@oenb.at)

<sup>1</sup> Some discussions about this issue can be found in Woodford (2003), 231f and in Rabanal and Rubio-Ramírez (2005). The main exception is Riggi and Tancioni (2010) that will be discussed below.

<sup>2</sup> “Real wage rigidities” [capture] the speed at which real wages [adjust] to changes in warranted real wages” (Blanchard, 2006, p. 16). Ball and Romer (1990) refer to real rigidity in the context of price-setting: “We define a high degree of real rigidity as a [...] small responsiveness of an agent’s desired real price to changes in aggregate real spending” (Ball and Romer, 1990, p. 186).

The recent years have shown an increased interest in the issue of RWR. This has to do with the fact that the introduction of RWR improves the explanatory power of otherwise standard models (cf. Hall, 2005; Blanchard and Galí, 2007). As far as the reasons behind the rigidities of real wages are concerned, however, there does not exist much agreement. Blanchard and Katz (1999), in an early contribution, present a model in which unemployment benefits and wages react differently to changes in productivity growth. Hall (2005), on the other hand, uses a model where RWR follows from the existence of social norms while Hall and Milgrom (2008) present an argument based on sequential (real) wage bargaining. Blanchard and Galí (2007), finally, simply assume as a short-cut that the real wage  $\omega_t$  can be written as:  $\omega_t = \gamma\omega_{t-1} + (1 - \gamma)mrs_t$ , where  $\gamma$  is their measure of RWR and  $mrs_t$  stands for the marginal rate of substitution between consumption and leisure. In an appendix they motivate this short-cut formulation by referring to a model with “real wage staggering”. Interestingly, however, none of these papers deals explicitly with the possibility that RWR could simply be understood as the consequence of two nominal rigidities: a nominal price and a nominal wage rigidity. This parsimonious explanation is, however, a core element of New Keynesian (and also old Keynesian) models of the business cycle and it is the starting point of this paper. In particular, I will investigate whether the parsimonious model implies a RWR that is broadly in line with the empirical evidence.

In related work Riggi and Tancioni (2010) have compared the performance of the short-cut model by Blanchard and Galí (2007) to a model with two nominal rigidities. They show that the latter model is better able to replicate the observed wage and employment dynamics. In particular, the short-cut model fails to account for the negative correlation between productivity improvements and employment conditional on technology shocks (a phenomenon called the “productivity-employment puzzle”). While Riggi and Tancioni (2010) derive their results in a medium-scaled DSGE model (including a search-and-matching labor market) I focus on the smaller model by Erceg, Henderson and Levin [EHL] (2000). This is the benchmark model in the DSGE literature where both nominal price and nominal wage rigidities are introduced via Calvo contracts (Calvo, 1983). The EHL model leads to a solution of the form  $\omega_t = \delta\omega_{t-1} + f(\text{outputgap}, \text{productivity})$ , where  $f(\cdot)$  is a linear function of the stated measures of aggregate demand and aggregate supply. The parameter  $\delta$  measures RWR in the EHL model. I show that the two nominal rigidities are the main determinants of the degree of RWR and that  $\delta$  reacts rather insensitively to changes in the other structural parameters. The solutions of the forward-looking New Keynesian model can also be written in a form that is very similar to a backward-looking Phillips curve specification. I show that the derived expression is closely related to the traditional “triangle” model (cf. Gordon, 1998) and that the weight of past inflation in this expression is identical to the measure of RWR  $\delta$  (i.e.,  $\pi_t^p = \delta\pi_{t-1}^p + f(\dots)$ ).

In order to analyze how the degree of RWR implied by the EHL model corresponds to the empirical evidence, I use recent data on wage-setting practices in Europe. In particular, I take the survey evidence from the Wage Dynamics Network (WDN) of the ESCB that has collected a multitude of data on price- and wage-setting in 15 European countries (see Druant et al., 2012). A closer look at these data reveals that there exist at least four dimensions along which the assumptions about wage-setting in the basic EHL model are problematic. First, the majority of wage agreements seems to follow a predetermined pattern with given contract lengths. In other words, the ubiquitous assumption of Calvo wage contracts in which the hazard rate of wage changes is constant is contradicted for all countries. Second, while for most contracts ( $\approx 60\%$ ) this predetermined length is one year there exists also some heterogeneity in this context and a nonnegligible share of contracts has longer or shorter durations. Third, existing data suggest that in many countries new contracts are clustered in certain months (mostly in January). Fourth, wage indexation is a widespread practice in some countries. In order to account for these important institutional characteristics of actual wage-setting practices, I also solve the EHL model under the assumption of Taylor wage contracts, i.e. contracts with a fixed and predetermined length (cf. Taylor, 1980). In light of the additional characteristics of real-world wage-setting practices, I also allow for a certain percentage of flexible wages, for the fact that the sectors might be of different size and for partial wage indexation.

The solution to this model is somewhat more involved than the one for the model with Calvo wage contracts. It can, however, again be written in a way that contains an analogous measure of RWR. Comparing the different measures of RWR leads to two conclusions. First, the model with standard Taylor wage contracts involves a considerable smaller degree of RWR than the model with Calvo contracts. Second, the degree of RWR decreases in the share of flexible wages and the extent of asymmetric sector sizes and it increases in the prevalence of wage indexation. The largest impact can be observed for the share of flexible wages. Taking all of these elements into account gives a richer and less uniform picture than the model with Calvo contracts.

In the next step, I use the information from the WDN together with standard values for other structural parameters in order to calculate the measure for RWR that is implied by the theoretical model under different assumptions about the features of wage-setting. For the basic EHL model with Calvo wage contracts the average model-based estimate of annual RWR comes out as 0.35 while it is 0.17 for the standard Taylor model (i.e., with symmetric sector sizes and without taking flexible wages and indexation into account). These year-on-year (yoy) values correspond to quarter-on-quarter (qoq) values of 0.77 and 0.64, respectively. These figures are within the range of values for  $\gamma$  that are typically assumed in the models that are based on the short-cut formulation for RWR. Blanchard and Galí (2007), e.g., use illustrative values for  $\gamma$  between 0.5 and 0.9, Duval and Vogel (2007) employ values between 0.79 and 0.93, while Faia (2008) and Blanchard and Galí (2010) calibrate  $\gamma = 0.6$  and  $\gamma = 0.5$ , respectively.

In a further step, I use macroeconomic time series data (from 1995 to 2006) to provide estimates of RWR for a subsample of 8 European countries. The estimated qoq RWR depends on the specification and ranges from 0.7 to 0.85. The values of qoq RWR that are implied by the standard EHL models lie within this range. If one focuses not only on the average value of RWR but also on the variations across countries, then the agreement with the data is less convincing. While the empirical estima-

متن کامل مقاله

دریافت فوری ←

**ISI**Articles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات