FEP WORKING PAPERS
FEP WORKING PAPERS

RESEARCH WORK IN PROGRESS

N. 237, FEB. 2007

MONETARY POLICY AND THE POLITICAL SUPPORT FOR A LABOR MARKET REFORM

ÁLVARO AGUIAR

ANA PAULA RIBEIRO

CEMPRE, FACULDADE DE ECONOMIA

U.PORTO

FEP FACULDADE DE ECONOMIA
UNIVERSIDADE DO PORTO

Monetary Policy and the Political Support for a Labor Market Reform

Alvaro Aguiar and Ana Paula Ribeiro*
CEMPRE, Faculdade de Economia, Universidade do Porto†

February 4, 2007

Abstract

Lagged benefits relative to costs can politically block an efficiency-enhancing labor market reform, lending support to the two-handed approach. An accommodating monetary policy, conducted alongside the reform, could help bringing the positive effects of the reform to the fore.

In order to identify the mechanisms through which monetary policy may affect the political sustainability of a reform, we add stylized features of the labor market to a standard New-Keynesian model for monetary policy analysis. A labor market reform is modeled as a structural change inducing a permanent shift in the flexible-price unemployment and output levels. In addition to the permanent gains, the impact of the timing and magnitude of the reform-induced adjustments on the welfare of workers - employed and unemployed - is crucial to the political feasibility of the reform. Since the adjustments depend, on one hand, on the macroeconomic structure and, on the other hand, can be influenced by monetary policy, we simulate various degrees of output persistence across different policy rules.

We find that, if inertias are present, monetary policy, even when conducted by an independent central bank, affects the political support for the reform. In general, the more expansionary (or the less contractionary) the policy is, the faster is the recovery to the new steady-state equilibrium and, thus, the stronger is the political support.

Keywords: Monetary policy rules; Labor market reforms; Unemployment benefit; Political economy; New-Keynesian models.

JEL Classification Codes: E24; E37; E52; E61.

*We thank Bennett T. McCallum for invaluable help in setting up the model.

†CEMPRE - Centro de Estudos Macroeconómicos e Previsão - is supported by the Fundação para a Ciência e a Tecnologia, Portugal.

1 Introduction

Labor market reforms, as other structural reforms, bring about short-run transition costs while longer-run permanent effects are expected to be positive, namely permanent improvements in real wage flexibility and in potential output. Despite these expected gains, the lack of political support is often blamed for the failure to reform labor markets.

Opposition to reform is usually related either with uncertainty about its effects, with the distribution of losses and gains across different political interest groups, or with the time-lag before net benefits appear. Typically, reforms in the labor market try to improve wage flexibility through increasing competitiveness of the unemployed relative to the employed; this often involves immediate losses in real wages, which are quickly perceived by the employed. Saint-Paul (2006), strongly influenced by the seminal arguments of Fernandez and Rodrick (1991), refers that a *status quo* bias, blocking reform implementation, is likely to arise and depends on (i) the effects that increased competition in the labor market has on the wage rents of the employed over the unemployed's; (ii) the political weight of the unemployed; and (iii) the intensity of job creation. Eventually, the reform ends up improving the profitability of firms, allowing for a gradual recovery with higher real wages and lower unemployment levels which, in turn, induce a lower tax burden (for unemployment benefits) on firms and workers. However, these benefits often arise with a long delay relative to costs (Bean, 1998 and Elmeskov, 2000), which, together with uncertainty, can indeed make a reform politically difficult to sustain.

In the sequence of steady increases in the European unemployment rates – explained, to a great extent, by the presence of rigid labor market institutions interacting with shocks that have hit the European economies –, the need for labor market reforms became an important issue in the economic policy agenda (*e.g.*, OECD, 1999, and Poeck and Borghijs, 2001, among many others). The issue of political support for reforms has led to the development (firstly by Blanchard *et al*, 1986) of the two-handed approach, according to which expansionary demand-side policies, conducted alongside reforms, could help in bringing its positive effects to the fore. Demand-side policies can speed up the adjustment process towards the new long-run equilibrium making the benefits of the reform more visible in the short run. The more sluggishly the economy adjusts, the larger is the scope for the "helping hand" of demand-side policies (Lindbeck and Snower, 1990, Bean, 1998, and Saint-Paul, 2006). A related argument is that macroeconomic outcomes, in the sequence of shocks hitting the economy, are significantly affected by the interplay of policy responses and labor market institutions (LMI). In general, more flexible LMI imply lower employment adjustment costs (*e.g.*, Gordon, 1996).

The two-handed approach is also endorsed at the institutional level: demand-side policies are explicitly included as policy recommendations in the OECD Jobs Strategy in 1994; and data on the evaluation of the Jobs Strategy show that countries that shifted towards stabilization-oriented macroeconomic policies exhibited the highest follow-through rates in implementing labor market reforms and scored significant improvements in labor market indicators (OECD, 1999).

Theoretically, the two-handed approach requires a model capable of capturing the interactions between demand-side policies and structural reforms, a framework that is

largely lacking in macroeconomics. In this paper, by focusing on the inertias that determine the time-lag before net benefits emerge, we assess the political support for a reform, and inquire how demand-side policies – in particular, monetary policy – can affect the dynamics of the economic adjustment to the structural reform and, thus, its political sustainability. This requires the choice of a suitable macroeconomic model as well as the definition of criteria for the measurement of political support.

As for the macro model, we propose a New-Keynesian rational-expectations framework with habit formation in consumption, modified with specific institutional features characterizing the labor market. In particular, we assume that nominal gross wages are established in a right-to-manage process of collective bargaining, preventing labor market clearing. This inefficiency, resulting from institutional features of the labor market, adds to the ones arising in the goods markets. Once LMI are included in the model, it is possible to identify, in a stylized manner, instruments of labor market reform. In particular, we consider the reduction of the unemployment-benefit replacement ratio.

As for the political support evaluation, we compute the changes in the welfare of the employed and the unemployed workers, during the adjustment process after reform implementation. Welfare effects of the reform respect both the (immediate) reduction of the insurance income and of real wages, and the positive (possibly lagged) effects arising from the fall in unemployment and in the related tax bill. Assuming net positive permanent effects on the welfare of the workers, the sooner net benefits show up, the higher is the political support for the reform.

After this introductory section, the paper proceeds as follows. Section 2 develops the macroeconomic model, including the definition of monetary policy rules. Section 3 argues that a reduction in unemployment benefits is a meaningful stylized reform and defines alternative processes of its implementation. After discussing the criteria for political support measurement, section 4 applies the defined measure to simulations with different inertias and monetary policy rules. Section 5 presents some concluding remarks.

2 A Macroeconomic Model with Labor Market Institutions

In this section we proceed with the description of a model designed to capture the interaction between labor market reform and monetary policy. We follow the New-Keynesian type of models used by Galí (2003; 2006) and McCallum and Nelson (1999) for monetary policy analysis. However, differently from the usual models for monetary policy analysis, ours is modified to include non labor-market clearing features. The latter affect the non-efficient flexible-price output level and generate unemployment. We start by characterizing the behavior of the decentralized agents in the economy – firms and households.

2.1 Households

Consider an infinitely-lived individual (*i.e.*, household), representative of the consumers' behavior in the economy. The individual is risk-averse and enjoys utility from consumption and leisure, according to the following instant utility function.

$$U_t = Log\left[C_t(i) - hC_{t-1}(i)\right]\exp(g_t) - \frac{N_t^{(1+\varphi)}}{1+\varphi}, \qquad h \leq 1, \tag{1}$$

where C stands for *per capita* consumption of a composite final good, N for the hours worked by the individual, g defines a shock to preferences and β $(0 < \beta < 1)$ is a discount factor.

The utility function, based on Christiano *et al*'s (2005), captures the consumers' wish to smooth both the level and the change in consumption, slowly changing habits, as considered in Fuhrer (2000). When h (index of habit persistence) > 0, the utility function produces a gradual hump-shaped response of consumption to shocks, an appealing form for fitting the data (see, for instance, Christiano *et al*, 2005 and Smets and Wouters, 2003) as it avoids some counter-intuitive dynamics of consumption in response to changes in the expected real interest rate (Estrella and Fuhrer, 2002).

Regarding leisure in the utility function, the individual, either employed or unemployed, is assumed to supply a fixed amount of labor, $\overline{N^s}$. Besides enabling to focus on the demand-side labor market frictions, this assumption captures the empirical regularity that labor supply is relatively inelastic in the short run.[1] As a result, effective *per capita* hours of work, N, are taken as given by the individual, as they are determined by the demand for labor. Assuming $N \leq \overline{N^s}$, the unemployment rate is $u = \frac{\overline{N^s} - N}{\overline{N^s}}$.

The representative agent is "homogenized" as if he were partially employed and partially unemployed.[2] Thus, the unemployment rate u implies that the representative agent receives the nominal wage rate, W, over $(1-u)\overline{N^s}$, and the unemployment benefit rate, bW, over $u\overline{N^s}$.

The budget constraint limits real consumption per period to the real income raised during current production activity plus the changes in holdings of real risk-free government bonds (GB). Production output is distributed either under the form of labor-related incomes or as profit earnings, Π. Henceforth, labor-related incomes refer to all incomes raised through the employment relationship, including wages as well as other incomes substituting for wages during the out-of-work situations, namely the unemployment benefit. In particular, the budget constraint results from a weighted average of the constraints

[1] See, for instance, Burda and Wyplosz, 1997. Short-run wage inelasticity can be due to, among other causes, the existence of labor market legislation establishing a fixed number of weekly working hours. In addition, given our definition, below, of the unemployment benefit rate, a variable N^s would lead to the awkward result that the amount of unemployment benefit received would increase with the amount of labor supplied.

[2] This is a technically convenient way of keeping compatibility between the representative agent and the need to consider (below, in section 4) that the aggregate dynamics of the unemployment rate and, consequentely, of the political support for the reform, may depend on the distinction between being employed and being unemployed.

facing the employed and the unemployed:

$$C_t = (1-u_t)\overbrace{\left[\frac{\Pi_t}{P_t}+\frac{W_t}{P_t}(1-\tau_t)\overline{N^s}-GB_{t+1}(1+rr_t)^{-1}+GB_t\right]}^{employed}+$$
$$+u_t\overbrace{\left[\frac{\Pi_t}{P_t}+\frac{bW_t}{P_t}\overline{N^s}-GB_{t+1}(1+rr_t)^{-1}+GB_t\right]}^{unemployed}, \quad (2)$$

where rr stands for the real interest rate, P for the aggregate price level, τ for the tax rate on labor income; $(1-u)$ and u are used as proxies for the probability an individual has of being employed or unemployed, respectively. We are assuming that the constraints facing the employed and the unemployed differ only in labor-related incomes.

It is also assumed that unemployment benefits are fully tax-financed (a pure Bismarckian system) by the employed, so as to keep the government budget permanently balanced:

$$\begin{aligned}\frac{W_t}{P_t}\tau_t N_t &= \frac{bW_t}{P_t}(\overline{N^s}-N_t) \Leftrightarrow \\ \tau_t &= \frac{bu_t}{1-u_t}. \end{aligned} \quad (3)$$

Using equations (1), (2), (3) and normalizing $\overline{N^s}$ to 1, the optimizing problem of the representative household is defined as:

$$\begin{aligned}&\underset{C_{t+j},GB_{i+j+1}}{Max} \quad E_t\sum_{j=0}^{\infty}\beta^{t+j}\left(Log\left[C_t(i)-hC_{t-1}(i)\right]\exp(g_t)-\frac{N}{1+\varphi}\right) \\ &s.t. \qquad C_{t+j}=\frac{\Pi_{t+j}}{P_{t+j}}+\frac{W_{t+j}}{P_{t+j}}(1-u_{t+j})-GB_{t+j+1}\frac{1}{(1+rr_{t+j})}+GB_{t+j}. \end{aligned} \quad (4)$$

Solving problem (4) we get the following Euler equation for consumption (*i.e.*, the IS function), mimicking the economy's aggregate demand dynamics.

$$\begin{aligned}(1+\beta h^2)E_t\Delta y_{t+1} = \; & h\Delta y_t+\beta hE_t\Delta y_{t+2}+ \\ & +(1-\beta h)(1-h)(r_t-E_t\pi_{t+1}-\rho)- \\ & -(1-h)(v_t-\beta hE_tv_{t+1}). \end{aligned} \quad (5)$$

Where Δy_t is the change in the (log) of output, defined as (y_t-y_{t-1}) and $v_t=-E_t\Delta g_{t+1}$ is a demand-side disturbance, with g_t defined above, in (1). The constant $\rho=-\log\beta$ is the time discount rate and corresponds to the steady-state equilibrium real interest rate in the absence of secular growth (see, below, equation 35, in 4.3).

2.2 Firms

In what concerns the production side, we consider monopolistic competition in the production of intermediate goods and perfect competition in the production of the composite final good.

There is a continuum of intermediate goods producers indexed by $i \in [0,1]$, each of which producing a differentiated good, Y_{it}. If a firm sets its prices optimally (in order to maximize profits) at any period, the problem faced by the i^{th} firm can be represented by:

$$\begin{aligned} & Max_{Y_{it}} \, \Pi_{it} = P_{it} Y_{it} - W_t N_{it} \\ & s.t. \\ & Y_{it} = A_t \left(N_{it}\right)^{\alpha}, \quad \alpha < 1 \\ & Y_{it} = \left[\frac{P_{it}}{P_t}\right]^{-\varepsilon} Y_t, \quad \varepsilon > 1. \end{aligned} \tag{6}$$

The first restriction represents the production function, where A is a technology index common to all firms and N_i refers to the hours of labor in use by the firm producing intermediate good i. The second restriction represents the relative demand for each intermediate good i, Y_i, conditioned by the final good producers' optimal choice of inputs.

We also consider the existence of many producers of the composite final good, Y, producing through a Dixit and Stiglitz (1977) CES-type aggregation of intermediate goods. The resulting general price index, P, arises in a perfectly competitive market and can also be defined as a CES-type aggregation of intermediate goods prices (see, for example, Ireland, 2001).

The solution to (6), above, yields a constant mark-up, μ, of prices over nominal marginal costs. Assuming symmetry across firms, $P_i = P$ and $Y_i = Y$, the aggregate price resulting from the flexible-price (FP) decision of firms is given by:

$$P_t = \mu \left[\frac{1}{\alpha} W_t Y_t^{\frac{1-\alpha}{\alpha}} A_t^{-\frac{1}{\alpha}}\right], \quad \mu = \frac{\varepsilon}{\varepsilon - 1}, \quad \alpha < 1, \quad \varepsilon > 1. \tag{7}$$

However, the assumption that firms can optimally reset prices at any period is not compatible with real effects of the demand-side policies, because full price adjustment crowds out, instantaneously, any demand pressure. In fact, some price rigidity in general equilibrium models is a *sine qua non* assumption for the model to produce real effects from monetary policy conducting. In our model we follow a discrete version of Calvo's (1983) price adjustment mechanism as proposed in Galí (2003). Firms, whenever possible, adjust prices to an optimal value, P^*, conditioned upon the expected average duration of price stickiness. Each firm has a given probability of adjusting prices in each period, independent of when prices were last adjusted. Assuming this probability constant across firms and equal to $(1-\theta)$, we can define the (log of) aggregate price level (p) as weighted average of the lagged general price index and the currently set optimal price (King, 2000):

$$p_t = \theta p_{t-1} + (1-\theta)\, p_t^*. \tag{8}$$

This establishes the sticky price dynamics. As expected, the optimal price to be set at t must drive the best profit results conditional on the possibility that the firm's price may not be changed for some periods ahead. Taking $E_t\Pi_{t+j,j}$ as the profits expected for period $t+j$ conditional on the information available at time t and with prices frozen since t, P_t^* must satisfy:

$$Max_{P_t^*} E_t \sum_{j=0}^{\infty} (\theta\beta)^j \, \Pi_{t+j,j}. \tag{9}$$

Following, among others, Goodfriend and King (1997) and Galí *et al* (2001) on the above problem, and under low inflation, the optimal price to be set at t can be expressed in the approximate log form:

$$p_t^* - p_t = \log\mu + (1-\theta\beta)\frac{\alpha}{\alpha + \varepsilon\,(1-\alpha)} \sum_{j=0}^{\infty} (\theta\beta)^j \, E_t mc_{t+j} + \sum_{j=1}^{\infty} (\theta\beta)^j \, E_t\pi_{t+j}, \tag{10}$$

with $E_t mc_{t+j}$ and $E_t\pi_{t+j}$ standing, respectively, for the log of expected real marginal costs and the expected inflation rate for period $t+j$, conditional on the information available at time t.

2.3 Labor Market - Collective Bargaining

Standard models for monetary policy analysis usually assume labor market clearing. For our purposes, this needs to be changed into a model where the flexible-price (FP) equilibrium output is inefficient not only due to the existence of monopolistic competition among producers, but also because labor market institutional functioning leads to unemployment. Also, the model must capture the effects of labor market reform both on the adjustment mechanism to shocks hitting the economy, as reform improves real wage flexibility, and on equilibrium unemployment.

Involuntary unemployment arises because there is job rationing in the economy. Firms could set lower wages and get more workers into jobs but mechanisms of wage formation may prevent this. The insider-outsider theory provides explanation on how the market wage is set above the market clearing level and also why the unemployed (outsiders) are unable to underbid the wages that are currently paid to incumbents (insiders). Lindbeck and Snower (1988) argue that the existence of Labor Turnover Costs (LTCs) associated with insider-outsider turnover might explain why firms do not substitute outsiders for insiders at lower wages.[3] Thus, under LTCs, insiders have bargaining power, which explains why wages are set through bargaining between firms and their current workers, leaving the unemployed out.

In particular, we consider that workers of a given firm form a labor union to negotiate over wages alone.[4] In each period, following the bargaining outcome, the firm chooses the

[3]The existence of LTCs underlying the insider-outsider theory provides a foundation for insiders' market power, instead of its *ad hoc* definition as imperfect competition in wage setting (as, for instance, in Galí, 2003).

[4]We simplify the functional form of the union's utility by assuming risk neutrality. This does not

employment level, taking wages as given. In other words, we follow the right-to-manage approach to wage formation laid out, for example, by Layard *et al*, 1991.[5]

Our assumptions lead to a Nash bargaining problem, which turns out to be the following combination of the objective functions of the firm and of the union, weighted by the respective bargaining power (Γ represents the union's bargaining power):

$$\begin{aligned} &\underset{W_{it}}{Max} \quad [P_{it}Y_{it} - W_{it}N_{it}]^{(1-\Gamma)}\,[W_{it} - Wout_t]^{\Gamma}[S_{it}(W_{it})]^{\Gamma} \\ &s.t. \\ &Y_{it} = A(N_{it})^{\alpha}, \quad \alpha < 1 \\ &Wout_t = F_{it}W_t + (1 - F_{it})bW_t = (1 - u_t + u_t b)W_t. \end{aligned} \tag{11}$$

The utility of each bargaining party is derived from the rent of effective income over the respective "fallback" (*i.e.*, the income each party gets if agreement fails). The first term within square brackets captures the instantaneous utility for the firm, while the remaining terms in the maximand refer to the union's instantaneous utility.[6] Additionally, the following features should be stressed:

(i) Bargaining is over wages alone and not over hours of work . Often, labor contracts are subject to legal constraints on the amount of working hours, making labor supply relatively inelastic and leaving little room for working-time negotiations at the firm level.

(ii) In highly decentralized bargaining (at the firm level), tax and profits externalities arise. The union does not internalize the fact that higher wages increase unemployment and, thus, taxes to finance larger unemployment benefits (Calmfors and Driffill, 1988) - hence, bargaining is over gross wages. In addition, the employed workers do not take into account the effect of their bargaining decisions on their income as stockholders. These negative externalities match the evidence that centralized and coordinated collective bargaining, characterized by more moderate wage claims, tend to yield lower unemployment and inflation (see, for instance, evidence in Carneiro *et al*, 2002, for the OECD countries).

(iii) In contrast, the union takes into account that wage claims may have adverse effects on the firm's competitiveness and, thus, on the probability of insiders' survival in the firm, $S_i(W_i)$ (Calmfors and Driffill, 1988).

(iv) The union's "fallback", $Wout_i$, represents the insiders' outside-option earnings, which is an average of the wage and the unemployment benefit average rates (W_t, bW_t), weighted, respectively, by the probability of finding a job outside the i^{th} firm (F_i) and the probability of not finding a job elsewhere ($1 - F_{it}$). Although ($1 - F_{it}$) is often specified as a function of several factors that affect competition faced by job searchers (see Layard *et al*, 1991), we assume, as in Bovenberg *et al* (2000), that the unemployment rate is a good *proxy* for the probability of not finding a job.

Assuming symmetry across firms, by making $P_i = P$, $N_i = N$ and $W_i = W$, the

conflict with the household's risk aversion, since the essential feature is that both the union's and the household's utility increase with wages.

[5] We assume that bargaining occurs in every period, so that nominal wage stickiness is absent.

[6] For a detailed exposition of the derivation of the Nash bargaining, see Belot and van Ours (2004).

optimal solution to problem (11) is

$$(1-b)(1-\Gamma)u_t\frac{W_t}{P_t}(-N_t)+\left[A\left(N_t\right)^{\alpha}-\frac{W_t}{P_t}N_t\right]\left[1-(1-b)u_t\varepsilon_{SN}\varepsilon_{NW}\right]\Gamma=0, \qquad (12)$$

where ε_{SN} stands for the elasticity of the survival probability with respect to employment and ε_{NW} stands for the nominal-wage elasticity of labor demand. Equation (12) is obtained by using the simplifying assumption of a constant absolute elasticity of the survival probability relative to wage, $\varepsilon_{SW}=\varepsilon_{SN}\varepsilon_{NW}$, at the (flexible price) steady-state level. According to Layard *et al* (1991), ε_{SN} is typically less than 0.5 while the (flexible price) steady-state level of ε_{NW} is given by:

$$\varepsilon_{NW}=\left|\frac{\frac{\partial N}{N}}{\frac{\partial W}{W}}\right|=(1-\frac{\alpha}{\mu})^{-1}>0. \qquad (13)$$

Using both equations, (12) and (13), we get the following wage offer curve, relating real wage to the employment level:

$$\frac{W_t}{P_t}=\left[1+\frac{1}{\frac{\Gamma}{(1-\Gamma)}\left[\frac{1}{(1-b)u_t}-\varepsilon_{SN}(1-\frac{\alpha}{\mu})^{-1}\right]}\right]^{-1}A_t\left(N_t\right)^{(\alpha-1)}. \qquad (14)$$

Therefore, real wages resulting from Nash bargaining increase with:

(i) the union's relative bargaining power, $\Gamma/(1-\Gamma)$;

(ii) the union's "fallback", which, in turn, increases with b and with a lower u_t;

(iii) the survival probability, which, in turn, increases with μ, and with a lower ε_{SN} and a lower α;

(iv) the marginal productivity of labor, that is, with a lower N.

2.4 Flexible-Price Equilibrium

The flexible price (FP) equilibrium output is defined as the long-run steady-state level of output. It refers to the output level achieved under the flexible-price adjustments, given a set of institutional arrangements characterizing the labor market.

Satisfying the right-to-manage model for wage formation, we start by combining the wage offer curve and the labor demand under the flexible price hypothesis to get the FP equilibrium output level. On the one hand, log-linearization of the pricing decision under FP (equation 7, above) yields the labor demand function,

$$(w_t-p_t)=-\log\mu+\log\alpha+(\alpha-1)\overline{n}_t+a_t, \qquad (15)$$

reacting negatively to the real wage rate.

On the other hand, log-linearizing the wage offer curve – equation (14) – around the

FP equilibrium, together with the assumption of labor supply inelasticity, we get:

$$(w_t - p_t) = \bar{d}_0 + \bar{d}_1(\Delta\Gamma_t) + \left[\bar{d}_{21} + (\alpha - 1)\right](n_t - \bar{n}_t) + \bar{d}_3(\Delta b_t), \quad \bar{d}_{21} > (\alpha - 1), \tag{16}$$

$$\begin{aligned} \textit{where} \qquad & \bar{d}_0 \equiv -\log\left(1 + \frac{1}{\overline{q}}\right) + a_t + (\alpha - 1)\bar{n}_t; \quad \bar{d}_1 \equiv \left[\frac{1}{(\overline{q}+1)}\frac{1}{(1-\bar{\Gamma})\bar{\Gamma}}\right]; \\ & \bar{d}_{21} \equiv \left[\frac{1}{(\overline{q}^2+\overline{q})}\frac{\bar{\Gamma}}{(1-\bar{\Gamma})}\frac{1}{(1-\overline{b})\bar{u}^2}\right]; \quad \bar{d}_3 \equiv \left[\frac{1}{(\overline{q}^2+\overline{q})}\frac{\bar{\Gamma}}{(1-\bar{\Gamma})}\frac{1}{(1-\overline{b})^2\bar{u}}\right]; \\ & \Delta\Gamma_t = \Gamma_t - \overline{\Gamma}_t; \quad \Delta b_t = b_t - \overline{b}_t; \quad \bar{q} = q(\bar{\Gamma}, \bar{b}, \bar{u}). \end{aligned}$$

The dashed variables refer to values at the respective FP equilibrium levels. Usually, $\Delta b = \Delta\Gamma = 0$, unless an unexpected reform affecting either of the parameters occurs. Under no reform or if it is pre-announced, $b = \overline{b}$ and $\Gamma = \overline{\Gamma}$. As expected, real wages increase with pressure from labor demand. Under flexible prices, with $n = \bar{n}$ and $\Delta b = \Delta\Gamma = 0$, putting together the labor demand function and the wage offer curve at the FP levels, we get the following results for $\bar{u}_t$, $\bar{n}_t$ and $\bar{y}_t$, respectively:

$$\bar{u}_t = \frac{(\mu - \alpha)\bar{\Gamma}}{\left[\alpha(1-\bar{\Gamma}) + \bar{\Gamma}\epsilon_{SN}\mu\right](1-\bar{b})} = \overline{u}; \tag{17}$$

$$\bar{n}_t = n_t^s - \bar{u} = -\bar{u} = \overline{n}; \tag{18}$$

$$\bar{y}_t = -\alpha\bar{u} + a_t. \tag{19}$$

The FP equilibrium is affected by the inefficiencies (both in the labor and in the goods and services markets) present in the economy.[7] The FP unemployment rate (which coincides with the steady-state unemployment rate) determines the FP output level, $\bar{y}_t$, and increases with the unemployment-benefit replacement ratio (b), the relative power of the union in wage bargaining (Γ), and the degree of monopolistic competition in the market for intermediate goods, μ. Unless a supply-side policy - namely, a labor market reform - is enforced, so as to push the FP closer to its efficient level $y_t^e = a_t$, the long-run output level will not be higher than $\bar{y}_t < y_t^e$.

The FP output dynamics just derived enables us to recover the firm's pricing behavior, equation (10) in 2.2, above, to get the economy's aggregate supply (AS) function. Using (the log-linearized) equation (7), in 2.2, together with the dynamics of the log of the real wage (equation 16, above), allows us to define the log of the real marginal costs, mc, as

$$mc_t = -\log\mu + \frac{\overline{d}_{21}}{\alpha}y_t - \frac{\overline{d}_{21}}{\alpha}a_t + \overline{d}_{21}\overline{u} + \overline{d}_1\Delta\Gamma_t + \overline{d}_3\Delta b_t. \tag{20}$$

Putting together equation (10), the aggregate price level definition in (8) and the real marginal cost deviations from its FP level ($\widehat{mc}_t = mc_t - \overline{mc}_t$) using equation (20), the

[7] Hereafter, dashed variables with time subscript refer to FP equilibrium levels, while dashed variables without time subscript stand for their respective steady-state levels.

inflation dynamics (AS) equation follows:[8]

$$\pi_t = \beta E_t \pi_{t+1} + k\widetilde{y}_t + \mathtt{u}_t, \tag{21}$$
$$with\ k = \lambda\frac{\overline{d}_{21}}{\alpha};\ \mathtt{u}_t = \lambda(\overline{d}_1\Delta\Gamma_t + \overline{d}_3\Delta b_t);\ and\ \lambda = \frac{(1-\theta)(1-\beta\theta)\alpha}{\theta\left[\alpha+\varepsilon(1-\alpha)\right]}.$$

Inflation is thus determined by future expected inflation, by the output gap and by an unexpected reform processes. The inflation rate is related to the output gap through the features characterizing both the goods and labor markets. As to the former, the higher the price elasticity of demand (ε) and the stronger the nominal inertia in prices (θ), the less strongly inflation will react to the output gap. Concerning the ways through which the institutions of the labor market determine the reaction of inflation to the output gap, in general, features that improve the outside option or the wage bargaining power of the unions, make nominal wage growth, and thus inflation, less responsive to the cycle fluctuations. Also according to equation (21), unexpected changes in the unemployment benefit ratio or in the relative wage bargaining power of the parties affect inflation in the same way a cost-push shock does.[9]

We can now sum up the model in regard to the structure describing the economy: (i) the aggregate demand function derived from the households' behavior (equation 5, in 2.1); (ii) the aggregate supply function reflecting firms' optimal price-setting decisions (equation 21); and (iii) the flexible-price output dynamics (equation 19).

To close the model we still need to account for the behavior of policy authorities in charge of monetary policy and of the implementation of the labor market reform. This enables the use of the model to analyze the interaction between a demand-side stabilization policy and a structural, supply-side, policy. The rest of this section describes the monetary policy rules while a stylized labor market reform is presented in section 3.

2.5 Monetary Policy

We assume that monetary policy is the only demand-side management policy available and that the policy maker is an independent central bank (CB).[10]

Theoretically, the policy maker would behave optimally in a way to maximize the utility of the representative agent. However, the literature on monetary policy conducting shows a widespread consensus that central banks follow simple rules instead (see, for instance, Taylor, 1999). Nonetheless, optimal policy rules perform a useful role in benchmarking simple rules. For instance (and for our purposes), optimal policy rules provide results on welfare costs that are useful for the evaluation of simple rules.

[8] The presence of habit persistence ($h > 0$) usually affects the aggregate-supply function as Amato and Laubach (2004) show. However, this does not apply to our case due to the assumption of constant labor supply.

[9] More generaly, unexpected components of structural reforms provide aditional theoretical foundation for the presence of cost-push shocks in the New Keynesian Phillips curve.

[10] The government is assumed to be neutral, with a passive role exclusively related with income distribution: it collects taxes to pay for the unemployment benefits, constrained to keeping a balanced budget.

Following a standard procedure in the relevant literature, we define the optimal monetary policy (OMP) as maximizing the welfare of the representative agent. Here, we follow a version of Woodford's (2002) methodology, as presented by Galí (2006), to derive the objective function of the monetary authority according to the specificities of our model (Appendix A). Using some simplifying assumptions, we are able to derive the relevant decision problem of the monetary authority as the minimization of a standard Loss function:[11]

$$\begin{aligned} &\underset{\pi_{t+j},\widetilde{y}_{t+j}}{Min} \qquad E_t\sum_{j=0}^{\infty}\beta^j(\pi_{t+j}^2+\omega_{\widetilde{y}}\widetilde{y}_{t+j}^2), \qquad \omega_{\widetilde{y}}=\frac{\lambda_L(1+\varphi)}{\varepsilon\alpha} \\ &s.t. \\ &\pi_t=\beta E_t\pi_{t+1}+k\widetilde{y}_t+\mathtt{u}_t, \qquad k>0, \end{aligned} \tag{22}$$

where the constraint refers to the AS function derived in 2.4, above; it captures the inflation - output-gap stabilization trade-off faced by the central banks when responding to cost-push shocks.

Following Clarida *et al* (1999), Galí (2003) and McCallum and Nelson (2004), we can describe two sets of solutions for the optimal policy: discretion and commitment.

Optimal policy under discretionary behavior (OMP-D) Occurs whenever the optimizing monetary authority cannot commit to any future policy actions. Because the central bank can not influence current expectations on output and inflation, it takes private sector expectations as given when solving the optimization problem (22). The resulting optimal target rule is

$$\pi_t=-\frac{\omega_{\widetilde{y}}}{k}\widetilde{y}_t, \forall t. \tag{23}$$

Optimal policy under commitment (OMP-C) Another form of OMP may emerge when the monetary authority has enough credibility to stick to an announced plan of action defined at a certain time and to be applied from then on. The central bank recognizes that its policy choice effectively influences private sector expectations regarding inflation and output. In this case, the optimal solution is given by

$$\pi_1 = -\frac{\omega_{\widetilde{y}}}{k}\widetilde{y}_1, \quad t=1 \tag{24}$$

$$\pi_t = -\frac{\omega_{\widetilde{y}}}{k}\left(\widetilde{y}_t-\widetilde{y}_{t-1}\right), \quad t=2,3,4,... \tag{25}$$

Optimally, the monetary authority behaves differently in the first period and in the following periods. This solution involves, however, a "time-inconsistency", because in the first period the central bank behaves just like in the discretionary case. For instance, if

[11] It should be noted that although the implications of habit formation for welfare evaluation have been avoided (by using simplifying assumptions in the Loss function), we keep using the habit-formation IS function (5), above.

a cost-push shock occurs in period 1, in period 2 both the inflation and output gap are stabilized and thus the optimal choice would be the discretionary solution once again. To avoid time inconsistency, we consider, instead, Woodford's "timeless perspective" in the equilibrium under commitment: to implement a "systematic" control regime, the central bank would behave identically in all periods, such that (25) would apply for all t (see McCallum and Nelson, 2004).

Taylor Rules It is usually argued in the literature that, in practice, central banks fail to design and implement optimal policy rules (Taylor, 1999 and Galí, 2003, among others).[12] To account for this, several authors have proposed a variety of simple rules as a guideline for monetary policy conducting and for assessing its performance across different models. These simple rules can, in general, be summarized in the following instrument rule (*e.g.*, McCallum, 2001):

$$r_t = (1-\rho_r)\left[\rho + \phi_\pi \pi_t + \phi_y (y_t - \overline{y}_t)\right] + \rho_r r_{t-1} \qquad \phi_\pi, \phi_y > 0, \quad \rho_r \in (0,1)\,, \tag{26}$$

where r_t stands for the nominal interest rate, π_t for the inflation rate (assuming a zero-inflation target), ρ is the constant steady-state real interest rate, and ρ_r stands for the nominal interest rate smoothing parameter.

This rule combines the interest-rate feedback Taylor rule with interest rate smoothing. On the one hand, the Taylor rule is successful in mimicking central banks' behavior especially for closed economies (such as the U.S. or the EMU area) and it exhibits good properties relative to the optimal policy (see the studies in Taylor, 1999). On the other hand, interest rate smoothing draws strong empirical support from the practice of central banks, even if it still lacks a robust theoretical formalization.[13]

3 A Stylized Labor Market Reform - The Case of Unemployment Benefits

Labor market reforms have two major positive macroeconomic effects: by increasing real wage flexibility, (i) reforms improve stabilization of cost-push shocks and (ii) reduce equilibrium unemployment, thus, increasing the flexible-price output. Saint-Paul and Bentolila (2001) refer to these as the "increasing the economy's adjustment potential" and the "increasing the economy's average performance" effects, respectively.

Labor market reforms often refer to a comprehensive set of measures aimed at changing labor market institutions - see, for example, OECD (2006), which describes labor market policies under monitoring since 2005. However, in order to be compatible with our broad macroeconomic model, the mechanism of reform should be modeled as simply

[12] In addition to the reasons for deviating from OMP, presented in the studies compiled by Taylor (1999), there is the case of the European Monetary Union where the monetary policy by the ECB is not optimal for each economy. Thus, for each of the EMU countries, monetary policy is like a non-optimal rule, enforced by a supra-national institution.

[13] For exhaustive reviews on interest rate smoothing see, for example, Sack and Wieland (2000).

as possible provided that it captures the two major macroeconomic effects mentioned above. We start this section by briefly arguing that a reduction in unemployment benefits is a relevant stylized labor market reform: apart from the role of the benefits as a state-provided insurance device, its reduction improves competition in the labor market, thereby increasing real wage flexibility which, in turn, is key to the macroeconomic effects.

The Insider Wage Bargaining Model in Layard *et al* (1991) and the Job Search Model (Mortensen and Pissarides 1999) predict that, in contrast with other LMI reforms, a reduction in the unemployment benefit unambiguously reduces equilibrium unemployment. Among other dimensions of the unemployment benefits (such as the duration of entitlement, the coverage and the strictness of the benefit system), the level of the benefits is often empirically assessed as having an important impact on the equilibrium unemployment level. Nickell *et al* (2003), providing a review of empirical studies, conclude that the average results collected in the literature point to a rise of 1.11 percentage points in equilibrium unemployment induced by a 10 percentage point rise in the unemployment-benefit replacement ratio. Moreover, Nickell *et al*'s (2003) own results show that, for the OECD countries, both the level and the duration of entitlement of the unemployment benefit have a positive impact on unemployment, while only the former has a positive significant direct effect on real wages. Table 1 illustrates the replacement ratio and the duration index of the unemployment benefits for the selected OECD countries.[14]

Analitically, unemployment benefits are a mechanism that works both as a state-provided insurance device and as a lower bound for wage setting.

As an insurance device to risk-averse workers, unemployment benefits are mainly redistributive. Unemployment benefits clearly redistribute welfare from the employed to the unemployed (Saint-Paul, 2000): while the unemployed benefit from the insurance, its financing is a tax burden to the employed (insurance effects).

However, through wage formation, unemployment benefits also affect real wage flexibility and, thus, equilibrium unemployment. On one hand, a rise in unemployment benefits immediately improves the outside option for the employed, thus raising the bargained wage (immediate wage effect). But, on the other hand, firms gradually adjust to higher bargained wages by lowering demand for labor, thus raising unemployment and attenuating the initial rise in wages (labor demand wage effect); higher unemployment, in turn, increases exposure as well as the induced tax burden (employment effects).

Hence, the wage effect provides incentives to high benefits claims by the employed while the insurance and employment effects provide incentives to the opposite. If the former effect is strong enough, a reduction in the unemployment benefit is expected to increase real wage flexibility, reduce equilibrium unemployment and improve adjustments to shocks.

We now model the reform process consisting of a reduction in the unemployment benefit ratio (b), under three alternative implementation processes: a reform process consisting of a one-shot, pre-announced reform; a reform gradually implemented; and an unexpected reform process.

[14] The measure of benefit duration is the level of benefit in the later years of the spell of unemployment normalised on the benefit in the first year of the spell (Nickell *et al*, 2003).

	1988-95 Unemployment Benefit	
	Replacement Ratio	Duration Index
Europe		
Austria	0.34	0.74
Belgium	0.48	0.77
Denmark	0.64	0.84
Finland	0.53	0.53
France	0.58	0.49
Germany (w)	0.37	0.61
Ireland	0.40	0.39
Italy	0.26	0.13
Netherlands	0.70	0.57
Norway	0.62	0.50
Portugal	0.65	0.35
Spain	0.68	0.27
Sweden	0.72	0.04
Switzerland	0.61	0.18
United Kingdom	0.22	0.70
Average	**0.52**	**0.47**
Other OECD countries		
Australia	0.26	1.02
Canada	0.58	0.22
Japan	0.30	0.00
New Zealand	0.29	1.04
United States	0.26	0.18
Average	**0.34**	**0.49**

Source: Nickell et al (2003)

Table 1: Unemployment Benefit Replacement Ratio and Duration Index in OECD countries

Pre-announced reform: one-shot *vs* gradual implementation The pre-announced reform process is modelled under the assumptions that (i) the reform is announced previously to implementation, so that decentralized agents can adjust their expectations accordingly; and (ii) rational agents perceive the permanent effects of reform on FP output and also on the parameters of the model. In particular, we assume that b takes a new permanent value, 10 percentage points (pp) lower, inducing a permanent positive change in $\overline{y}$.

We start by generally defining a gradual reform process since it also embeds the case of a reform operating instantaneously (one-shot reform). We can think of a gradual reform path either as a gradual decline in b affecting all the unemployed or as a gradual application of the lower level of b to the newcomers into unemployment.

To capture the gradual path of the reform, we proceed in analogy with a permanent, but gradual, technological change. This is appropriate, since permanent technology shocks have, like reforms, long-lasting gradual effects over FP output. Following the literature on modelling permanent technological shocks (as, for instance, in Blanchard and Quah, 1989, and in Galí *et al*, 2003), the gradual reform path yields, in our case, the following path for FP equilibrium-output, $\overline{y}$:

$$\Delta\overline{y}_t = \rho_{\overline{y}}\Delta\overline{y}_{t-1} + \frac{\partial\overline{y}}{\partial b}\Delta b_t, 0 \leq \rho_{\overline{y}} < 1, \Delta b_t = \begin{cases} -0.1(1-\rho_{\overline{y}}) \text{ if } t = t_0 \text{ } (1^{st} \text{ implementation period}) \\ 0 \text{ otherwise} \end{cases} . \tag{27}$$

where Δb_t stands for a shock term that differs from zero only in the period when the reform starts being implemented. Equation (27) translates the gradual path for b (the reform process) in terms of $\overline{y}_t$ through the structural relationship between the two variables (see equations 17 and 19). This gradual reform produces diminishing effects as time goes by; and a larger correlation parameter, $\rho_{\overline{y}}$, corresponds to a longer implementation period and to a smaller first impact of the reform, while the one-shot reform corresponds to the case of $\rho_{\overline{y}} = 0$.[15]

Unexpected reform An unexpected reform could apply to the case where a reform is discussed (with an uncertain outcome) between the government and the social parties, previously to being effectively implemented. Economic agents are not fully informed to what extent their suggestions will be taken into account by the policy authority and the reform will be, at least, partially unexpected. We simplify by considering a completely unexpected one-shot reform.

Without the announcement of the reform, economic agents can not perceive its impacts immediately at t_0. A non-announced reform works as a cost-push shock in period t_0, the effects being then fully perceived after implementation, that is, the new $\overline{y}$ is fully perceived in $t_0 + 1$. In order to capture these effects, it is assumed a temporary shock in b, while $\overline{y}_{t_0}$ remains at its pre-reform level. From $t_0 + 1$ onwards, adjustments combine the temporary shock effects with those of a permanent change in $\overline{y}$.[16]

The proposed scenarios for the economic structure and reform processes, as well as the corresponding calibration (exhaustively described in Appendix B), will be used below to measure reform transition costs and long-term effects. But first, we need to identify more precisely the potential costs and benefits associated with reform, and to define the measurement methodology.

4 Evaluating Reform Effects and Political Support

In this section we first propose a metric to evaluate the effects of the labor market reform, both the permanent welfare effects and the ones associated with the political sustainability of the reform implementation. Using this metric, we then evaluate the political support for reform, accounting for both permanent and transition effects, under different scenarios for the macroeconomic structure, different monetary policy rules and different reform processes.

Evaluating the political support for a reform requires the identification of what is at stake for each political interest group as well as measuring the time it takes for positive effects to emerge. As for the latter, the upfront of costs relative to benefits of reform

[15] As economic agents are immediately aware of the full effects of the reform on the parameters of the model, we assume that, in either case, the parameters depending on the reform shift to their final FP values immediately, *i.e*, in the first period of reform implementation.

[16] For simplification, the parameters are set at their new FP levels when evaluating the path of the adjustments to reform. Effects of this assumption are negligible because there is only one period during which decentralized agents are not aware of the reform.

results from the fact that the positive impact on the supply side does not automatically lead to a full response from the demand side (see, among others Gordon, 1996; Bean, 1998; and Saint-Paul, 2006). This, in turn, results mainly from the presence of either nominal (Bean, 1998) or real persistence phenomena (*e.g.*, habit formation, unemployment hysteresis effects) that delay employment and/or real wage gains (Alogoskoufis *et al*, 1995).

In the context of our stylized aggregate labor market, we consider that the potential interest groups are the employed and the unemployed workers. A sustainable reform requires that, at least, the most influential interest group is better off in the long run. However, transition may bring costs and permanent benefits may take time to surface. This balance, that may jeopardize reform, can be illustrated with the effects of a reduction in unemployment benefits, as identified above in 3. Table 2 summarizes the qualitative impacts (and timings) of these effects on the welfare of the employed and the unemployed. As will become clear below, the welfare of each group results from the sum of current incomes with actualized weighted averages of expected incomes while employed or unemployed.

Immediate Effects		**Employed workers' welfare**	**Unemployed workers' welfare**
Insurance Effect:	Δ^- unemployment protection	-	-
Insurance Tax Effect:	$\Delta^- \tau \Rightarrow \Delta^+$ net real wage	+	
Wage Effect:	Δ^- outside option $\Rightarrow$ $\Rightarrow \Delta^-$ bargained wage $\Rightarrow \Delta^-$ real wage	-	-
Non Immediate Effects **(Δ^+ wage flexibility $\Rightarrow \Delta^+ y \Rightarrow \Delta^+ n^d \Rightarrow \Delta^- u$)**		**Employed workers' welfare**	**Unemployed workers' welfare**
Labor Demand Wage Effect:	$\Delta^+ n^d \Rightarrow \Delta^+$ real wage	+	+
Employment Effect:	$\Delta^- u \Rightarrow \Delta^-$ exposure	+	+
Employment Tax Effect:	$\Delta^- u \Rightarrow \Delta^- \tau \Rightarrow \Delta^+$ net real wage	+	

Table 2: Effects of a Reduction in Unemployment Benefits

As the table shows, all the non-immediate effects are welfare improving while some of the immediate ones are not. Thus, it is useful to derive a corresponding welfare measure to capture

- the quantitative impacts on welfare, and
- how long it takes for the positive non-immediate effects to outweigh the negative immediate ones.

In addition, given the qualitative differences between employed and unemployed depicted in the table, a conflict of interests may arise. In this case the relevant welfare measure should take into account the relative political relevance of each group. Following

a simplified version of Saint-Paul's (1996) arguments, we assume that, in case of conflicting balances, the employed (insiders) are the only influential interest group in voting for/against reforms (decisive voter) - *i.e.*, while the employed can obstruct an adverse reform, the unemployed can not. In addition to constituting the majority of the labor force, insiders are endowed with bargaining power by the existence of labor turnover costs and are, thus, less exposed to unemployment. In contrast, the unemployed (outsiders) are fewer, not so well organized in unions and are likely to be much less homogeneous (Saint-Paul, 2006).[17]

4.1 A labor-related welfare measure

In order to define a welfare measure to evaluate the political support of reform, we must "de-homogenize" the representative agent defined in 2.1, above, splitting it into the representative employed and the representative unemployed.

To start with, we consider only labor-related incomes, since the main source of income to the representative labor force agent comes from the labor relationship.[18] In our stylized case, this labor-related income comprises only the direct wage and the unemployment benefit.

Following Saint-Paul (2000) we consider, as before, that each representative labor force agent lives for several periods and that his utility (V_t), in real terms, is defined by the present discounted value of his expected labor-related income.

$$V_t = \sum_{s=t}^{T} U_s \frac{1}{(1+\rho)^{s-t}}, \quad U_s = U\left[p_s(W/P)_s(1-\tau_s) + (1-p_s)(bW/P)_s\right] \tag{28}$$

where ρ is the steady-state real interest rate; U_s is the expected utility at s given the information available at t, p_s is the probability of being employed in period s conditional on the information available at t; $(W/P)_s$ stands for the real wage an individual is expected to earn if employed at time s, while $(bW/P)_s$ is the real unemployment benefit an individual is expected to receive if unemployed at date s. Nominal wages and the price level are determined in the model as presented in section 2, above. In equation (28) employed workers' income is net after taxes, with the tax rate (τ) respecting the assumptions outlined above in 2.1, equation (3). V_t stands for the present value, at t, of the welfare of each representative labor force agent between t and T.

Rewriting equation (28) recursively, we get

$$V_t = U_t + \beta E_t V_{t+1}, \quad \beta = \frac{1}{1+\rho}. \tag{29}$$

[17] According to Saint-Paul (1996) the decisive voter is an employed, unskilled or semi-skilled, as these groups represent more than 70% of the European labor force. If, in addition, skill differences among the employed were accounted for, an internal source of conflict between different skills could emerge.

[18] This is a simplification relative to what has been assumed for the representative agent in 2.1, where firms' profits and interest from savings are also part of income. In the political support framework, we consider that profit-earning employed and unemployed, are, as such, neither politically relevant nor a target for the reform.

Using equation (29) we can distinguish between the welfare of the employed and that of the unemployed. Assuming that the individual knows if he is employed or unemployed in period t, the following equations are, respectively, the employed worker's (Ve) and the unemployed worker's (Vu) welfare functions:

$$Ve_t = U_t[(W/P)_t(1-\tau_t)] + \beta E_t[(1-S_t)Ve_{t+1} + S_t Vu_{t+1}]. \tag{30}$$

$$Vu_t = U_t[(bW/P)_t] + \beta E_t[F_t Ve_{t+1} + (1-F_t)Vu_{t+1}]. \tag{31}$$

S_t denotes the probability an employed worker has of loosing his job between t and $t+1$ and F_t stands for the probability an unemployed worker has of finding a job between t and $t+1$. U is defined as the log of consumption (in this case fully financed with labor-related incomes), as described for the representative agent in 2.1 (equation 1), above.

We allow all variables to be time dependent in order to capture changes during the transition period after the implementation of the reform. In steady-state equilibrium, before reform implementation or after full adjustment having occurred to the new potential output in response to reform, both incomes and labor-force flows (into and out of employment) are constant.

The model also verifies $(1-F) = S = \overline{u}$ in steady state, in order to make equilibrium-unemployment determination compatible with the one arising from job matching models. Consider the following flow equilibrium:

$$\begin{aligned} \mathtt{U}_t - \mathtt{U}_{t-1} &= S_t N_{t-1} - F_t \mathtt{U}_{t-1} \\ u_t - u_{t-1} &= S_t(1-u_{t-1}) - (1-u_t)u_{t-1} \\ S_t &= u_t, \quad N_t^s = 1, \quad \forall t, \end{aligned} \tag{32}$$

where $\mathtt{U}$ stands for the unemployment level. Because of the use of the unemployment rate as a proxy for the probability an unemployed worker has of not finding a job and given the constant labor supply, the job-separating and job-finding rates are complements, $\forall t$. Note, however, that under a variable labor supply, complementarity between the two rates would occur only in the steady state.

For $T \to \infty$, Ve and Vu can be solved forward to yield the following steady-state expressions:

$$Ve_{(SS)} = \frac{(1-\beta\overline{u})}{1-\beta} U[(W/P)(1-\tau)] + \frac{\beta\overline{u}}{1-\beta} U[bW/P]. \tag{33}$$

$$Vu_{(SS)} = \frac{\beta(1-\overline{u})}{1-\beta} U[(W/P)(1-\tau)] + \frac{[1-\beta(1-\overline{u})]}{1-\beta} U[bW/P]. \tag{34}$$

Inspection of (33) and (34), shows that $Ve_{(SS)}$ and $Vu_{(SS)}$ differ only in the utility from first period incomes, *i.e.*,

$$Ve_{(SS)} - Vu_{(SS)} = U[(W/P)(1-\tau)] - U[bW/P],$$

confirming that the unemployment benefit favors the currently unemployed workers at the expense of the net real wage of the employed ones, that must finance the benefit (recall the effects in Table 2, above).

As for transition, plugging in equations (30) and (31) the complementarity between F and S, also implies that differences in welfare evaluated at time t arise only from the different utilities in that period. Therefore, if the reform is to be implemented in $t+1$, it will affect in the same way the welfare of either a current (at time t) employed or a current unemployed worker. In this case, and in spite of different permanent (steady-state) welfare gains, transition effects are common to both labor-force groups and, thus, will not be a source of conflict.

4.2 Evaluation of Permanent Effects

As has just been explained, the impact of a reduction in the unemployment benefit ratio may affect differently the steady-state welfare of the representative employed and unemployed. A positive impact to both is sufficient to ensure political sustainability of the reform in the long run.

Given the variety of effects at play, even in steady state, political support by each representative member of the labor force depends both on the starting level of the benefit and on its change. Figure 1 plots the steady-state labor-related welfare values for the employed and the unemployed workers against the plausible range of b (unemployment-benefit replacement ratio) values. Given the model calibration, there exists optimal b levels (*i.e.*, steady-state welfare maximizing) for the employed and the unemployed. The employed workers' optimal b level is lower (0.3) than that of the unemployed (0.4), a result qualitatively in line with Holmlund's (1998), where preferred unemployment benefit rates are computed using a search-matching framework. The reason for the unemployed to require a higher b is that the unemployment-benefit insurance effects are larger while the tax effects are smaller relative to the employed workers'. If the unemployment benefit is either too generous (above 0.4) or too small (below 0.3), it harms both the employed and the unemployed. Unemployment-benefit reduction improves labor market matching (positive employment effect) and net real wages (positive wage effect), while reducing income for the unemployed (negative insurance effect); when b is high, the first two effects appear to dominate the insurance effect, while the opposite happens for low values of b. Also, when a reduction in b improves (diminishes) welfare, the employed experience higher gains (lower losses) than the unemployed resulting, in line with the conclusions of Holmlund (1998), from differentiated insurance effects: the unemployed are currently affected while the employed will only be affected in the future, if they become unemployed.

Using the simulations from Figure 1, we can also determine the unemployment benefit replacement ratio for which the unemployment benefit compensation ruins incentives to work; under our baseline calibration, if the replacement ratio is higher than 0.85, being unemployed is more appealing than being employed ($Vu > Ve$).

In the reform example we have been simulating, a reduction in the unemployment benefit replacement ratio from 0.7 to 0.6, both pre and post-reform unemployment benefit ratios are above the optimal level for the unemployed. As a consequence, positive

permanent effects on welfare result higher for the employed relative to the unemployed. The reasons for the unemployment benefit ratio to be, arguably, higher than optimal in many countries (compare, for example, our optimal value between 0.3 and 0.4 with the actual values for the countries in Table 1, above) may result from historical maladjustment: the optimal level may have changed without the corresponding adaptation of labor market legislation, which may not change as frequently.[19]

Breakdown of permanent reform effects Table 3, using the calibration described in Appendix B, illustrates the breakdown of steady-state effects on the labor-related welfare of the employed and the unemployed, of a reduction from 0.7 to 0.6 in the unemployment benefit ratio. It confirms the positive effects on the steady-state welfare of both employed (1.679) and unemployed (1.51).

	Employed	**Unemployed**
Insurance Total	**-0.274**	**-0.425**
Insurance	-1.104	-1.247
Tax	0.831	0.822
Employment	**2.148**	**2.130**
Flows	0.571	0.571
Tax	1.576	1.559
Real Wage	**-0.195**	**-0.195**
Total	**1.679**	**1.510**

Table 3: Breakdown of Permanent Effects of the Reform on the Welfare of the Labor Force

Three additional conclusions can be drawn from Table 3.

First, insurance and real wage effects hit negatively both the unemployed and the employed. While real wage effects are the same whatever the worker situation, the insurance effects are stronger for the unemployed. Real wage effects reflect the specific form of the workers' utility function: if workers were risk neutral, with a linear utility function on labor-related incomes, this effect would be stronger for the employed. In respect to the insurance effect, the asymmetry reflects the fact that the unemployed are the ones who are currently dependent on unemployment benefit compensation, while the employed only face the risk of unemployment in the future.

Second, employment effects are stronger on the employed than on the unemployed. Given our assumption that the probability of keeping a job equals the probability of finding a job if unemployed, the flow effects are the same for both group of workers because their expected future employment situation is equally weighted by considering the expected unemployment rate. However, the effects of tax rate reduction, due to the

[19] According to our model, the balance of tax, wage, employment, and insurance effects, and, thus, the optimal level of b, is mainly determined by the same variables that determine unemployment, for example, the firms' market power, labor intensity and the trade unions' bargain power (see equation 17, above).

positive indirect effects of the reform on the unemployment rate, are slightly higher for the employed: they currently affect the employed while actual unemployed see these effects postponed for future dates. The same reasoning applies to the insurance tax effects, capturing the direct effect of the change in b on the tax rate.

Third, the amount of the tax effects provides an illustrative example of how the model assumptions may change the steady-state effects of reform. If, instead of being determined by the need to finance the unemployment-related expenditure (recall equation 3, in 2.1, above), the tax rate were constant (zero tax effects), there would be no political support for the reform because, as Table 3 shows, the positive flow effects are not large enough to compensate for the insurance and real wage negative effects. Another example would be if entry/separating rates from unemployment were not fully indexed to the level of unemployment, in which case, flow and tax effects would be smaller. Generalization of these conclusions should, thus, be taken carefully. In particular, the results are sensitive to the starting level of the unemployment-benefit replacement ratio and to the model calibration.

4.3 Evaluation of Transition Costs

Analysis of steady-state welfare is useful to assess the sustainability of the reform in the long run. However, if we take this as given – otherwise reform would not make sense at all – the main issue to the political support for the reform concerns the costly adjustments to the new FP equilibrium. We analyze, below, how these adjustments vary with the inertias in the economy, the processes of reform implementation and the monetary policy rules. Policy choice combined with different environments may reduce the likelihood of reform because it may conduct economic variables along a slower path towards the new steady-state equilibrium (see, among others, Blanchard *et al*, 1986, Gordon, 1996, and Bean, 1998) and so, postpone the gains from reform.

In the analysis of the short-run costs, attention is turned to the time horizon for reform to yield net positive effects, when voters decide whether or not to support a reform. According to Bean (1998), political feasibility of reforms is often jeopardized because when losses precede gains, voters do not look sufficiently ahead.[20] In any case, even with infinite horizons, the longer it takes for positive effects of the reform to emerge, *ceteris paribus,* the lower is its political support.

Accordingly, we assess the degree of political acceptance of reform implementation as a function of the time it takes to generate improvements to the voters' welfare. For different scenarios, different monetary policy conducting and different types of reform process, we compute the time it takes (*p-lim*) for the reform to deliver net positive welfare gains for the representative labor-force voter.

The *p-lim* period for the employed (and analogously for the unemployed) is computed as follows:

[20] In the context of the literature on political economy, Lächler (1984) argues that the vote outcome reflects the welfare maximization of the median generation, characterized by a finite time horizon and imperfectly altruistic in the choices regarding future generations' welfare.

– using equation (30), the welfare of the voter is compiled for the n-periods following the decision (taken at time t) to whether or not to support the reform;

– taking expectational welfare values as the true ones, we compute:

- the welfare without reform (Ve_0), using current steady-state values of incomes and flow probabilities, and

- the welfare with reform implementation (Ve), using the values of incomes and flow probabilities recovered from the impulse responses of the endogenous variables to a permanent shock in the unemployment benefit replacement ratio.

– *p-lim* is the shortest time horizon that verifies

$$Ve \geq Ve_0;$$

and, thus, can be defined as the shortest time horizon that agents have to wait until they enjoy net welfare gains from the reform.

We now proceed with the computation of *p-lim*, by exploring the adjustments to a reduction by 10 percentage points (from 0.7 to 0.6) in the unemployment benefit replacement ratio, for the three reform processes as defined in 3, above. Once we have identified, in a simplified manner, the political interest groups, the other relevant determinant of political support is the time it takes for reform to yield net benefits for each of the interest groups. Hence, the interesting scenarios are the ones where certain inertias induced by the economic structure, by the reform processes, or by the monetary policy rule, imply a delay in full adjustment following the reform. In these cases Ve remains below Ve_0 for sometime, *i.e.*, *p-lim* > 1. While focusing mainly on symmetric gains from the reform, we also explore, in a final note, the possibility of asymmetry between the employed and the unemployed

Table 4 shows the results of our evaluation of the political support for the reform, using, as before, the calibration described in Appendix B. It shows the gains (net of transition costs) accumulated in the 20 periods after reform implementation, and the breaking-time horizon for political support (*p-lim*), considering the alternative scenarios. The net gains represent the increase in welfare, to both the employed and the unemployed, attributable to the reform, *i.e.*, $Ve - Ve_0$.[21]

For comparative purposes, we start by characterizing the baseline scenario (row 1), where no inertias, and, thus, no political support costs, occur.

Baseline: immediate adjustment, no political support costs In our model, the source of inertia in the economic structure results from habit persistence in consumption, while inertias in reform arise from gradual or uncertain reform implementation. In accordance, the baseline scenario is characterized by a one-shot pre-announced (in the period preceding implementation) reform under no habit formation. As for monetary policy, any

[21] Recall that, due to complementarity between the job-separating and job-finding rates, the net accumulated gains accruing to the employed equal the ones obtained by the unemployed.

	Scenarios		Political Support							
			Breaking time horizon for political support p-lim				Net accumulated gains Ve-Ve$_0$ (t=20)			
			OMP		TR		OMP		TR	
			D	C	simple	smoothing	D	C	simple	smoothing
1	Baseline		1		1	1	0.2842		0.2842	0.2842
2	Low habit formation (*h=0.5*)		1		4	4	0.2842		0.2193	0.2334
3	High habit formation (*h=0.7*)		1		9	8	0.2842		0.1461	0.1767
4	Gradual reform ($\rho_y = 0.7$)		13		5	5	0.0945		0.1918	0.1745
5	Unexpected reform	$\omega_y = 0.01$	8	7	8	8	0.1699	0.1811	0.1580	0.1621
		$\omega_y = 1$	9	9			0.1536	0.1558		

OMP - C: Optimal Monetary Policy under Commitment

OMP - D: Optimal Monetary Policy under Discretion

TR: Taylor Rule

Table 4: Evaluation of Political Support

rule ensures full immediate adjustment in this scenario, since neither optimal (OMP) nor Taylor (TR) rules face the trade-off between inflation and output gap stabilization.

On the supply side, firms, perfectly aware of the reform design, expect demand to rise to the new FP output equilibrium level ($\overline{y}$). Higher real wages, due to employment pressure, fully crowd out the effects of a lower unemployment benefit on firms' paid wages, and thus on marginal costs; as current and expected marginal costs are constant, there is no incentive for price changes in the reform implementation period nor in the subsequent periods, thus $\pi_t = 0$.

As for the demand-side, combining the IS function (recall equation 5, above in 2.1), under no habit persistence ($h = 0$), with the real interest rate (rr_t) definition, the FP equilibrium real interest rate ($\overline{rr}_t$) yields

$$\overline{rr}_t = \rho + E_t \Delta \overline{y}_{t+1} + v_t = \rho + E_t \Delta a_{t+1} + v_t. \tag{35}$$

After reform, current demand is immediately driven to the new FP output equilibrium level as current and expected inflation remains at zero because optimal monetary policy ensures both price and output-gap stabilization; with the expectations of future output gap and inflation at zero, the long-run real interest rate ($\overline{rr}_t$) remains constant at ρ because the reform is one-shot, leaving no expectations of future changes in the FP equilibrium-unemployment rate – see equation (35), above. Even under the Taylor rule, which does not allow the nominal interest rate to optimally fluctuate with the FP real interest rate, there is full adjustment to the new FP equilibrium. The reason, again, as noted above, is that the real interest rate does not change, as reform is fully implemented in period t.

Figure 2 shows these responses of output, nominal interest and inflation rates and output-gap, to a permanent change in the FP output level induced by the decrease in b. Because of the immediate adjustment to the new FP equilibrium, under this scenario there are no political costs and permanent positive effects of the reform show up immediately.

In contrast, next we turn to adjustments that imply political support costs. Such

non-immediate adjustments to reform can be caused by (i) non-optimal monetary policy response with inertia in the economic structure (rows 2 and 3, Table 4); or (ii) by gradual or unexpected reform implementation (rows 4 and 5, respectively).

Figure 3 illustrates, for the case of high habit persistence under the TR, the relationship between the timing of political support and the net accumulated gains along the way. In general, with inertias resulting from the economic structure or from the reform process, net gains from the reform may take some time to emerge. This occurs because, in spite of some immediate reduction of the employed's tax burden, the immediate net effects are negative for the workers' welfare: insurance diminishes and the reduction in the outside option depresses the bargained wage (recall the effects in Table 2). Then, lower real labor costs boost the demand for labor, and, thus, employment, gradually driving the economy towards a higher level of potential output, enhanced by improved real wage flexibility. As employment rises, reducing exposure, the tax burden relief is further reinforced (recall the employment effects quantified in Table 3). At a certain point in time (illustrated by *p-lim = 9* in Figure 3), these positive effects of the reform outweight the earlier negative ones, steadily improving net welfare.

Political support costs: adjustments with inertia in the economic structure
In this scenario we allow for consumption smoothing due to habit persistence ($h > 0$ in equation 5). In particular, Figure 4 shows adjustment responses to the one-shot pre-announced reform under the optimal rules and under the simple Taylor rule with h set at 0.5 (corresponding to row 2, Table 4). The depicted short-run adjustments are similar to those implied by a negative demand-side shock – this view of reform as a recession has been noted by Saint-Paul (2006). The announced reduction in b directs expectations to a higher FP output level, thus increasing the output gap, and leads to price reduction due to a fall in nominal bargained wages caused by the unemployment benefit reduction.

The main implication of this scenario is that the private demand impulse is no longer sufficient to immediately attain the new $\overline{y}$. As the FP unemployment rate falls, the long-run real interest rate now decreases in the period of reform implementation, as can be checked in the expression below, which results from adapting the equilibrium real interest-rate equation (35), above, to the case of habit persistence.

$$\begin{aligned} \overline{rr}_t &= \rho + h_1 E_t \Delta\overline{y}_{t+1} + h_2 E_t \Delta\overline{y}_{t+2} + \\ &\quad + h_3 \Delta\overline{y}_t + \frac{1}{(1-\beta h)}(v_t - \beta h E_t v_{t+1}), \qquad (36) \\ with \quad h_1 &\equiv \frac{(1+\beta h^2)}{(1-\beta h)(1-h)}; h_2 \equiv -\frac{\beta h}{(1-\beta h)(1-h)}; h_3 \equiv -\frac{h}{(1-\beta h)(1-h)} \\ and \quad & h_1 + h_2 + h_3 = 1. \end{aligned}$$

In the reform implementation period, $\Delta\overline{y}_t > 0$, while in the subsequent periods, $E_t\Delta\overline{y}_{t+1} = E_t\Delta\overline{y}_{t+2} = 0$. The change in $\overline{rr}_t$ keeps the current real interest rate above the FP equilibrium level, refraining consumption and causing a negative output gap. When compared

to the baseline scenario, OMP works exactly in the same way to influence demand and supply behavior, but now private demand inertia requires active expansionary monetary policy alongside with the reform: the only way to promote a zero output gap consistent with price stabilization is to lower the nominal interest rate. OMP pushes the desired demand to the new $\overline{y}$ and keeps, as in the baseline scenario, firms from changing prices, ensuring immediate adjustment to $\pi = \widetilde{y} = 0$. In other words, OMP eliminates the effects of inertia in private demand and so nominal interest rate recovers, in $t + 1$, to the pre-reform level (Figure 4-C, solid line). This explains why, although through a different mechanism relative to the baseline, OMP ensures immediate political support.[22]

In contrast, political support costs arise with a non optimal policy. Under the TR, for instance (dashed lines in Figure 4), adjustment to the new FP output level is slower, thereby originating stabilization costs. With the change in the FP real interest rate, immediate adjustment would require a sufficiently expansionary monetary policy, which is not accomplished with the TR: the TR nominal interest-rate reaction can only be triggered by inflation or output pressures which, given the inertia in private demand, occur only gradually. Since this is understood by the agents, firms, not expecting policy to fully push demand to the new $\overline{y}$, are sluggish in increasing labor demand. Real wages remain temporarily lower than the new FP level because labor demand pressure is only gradual, whereas the reduction in unemployment benefits is immediate. Therefore, both current and expected marginal costs fall below the new FP level and prices follow, as Figure 4-B shows.

Under TR, the higher the demand-side inertia, the slower is the adjustment to the new FP equilibrium and, thus, the later will the positive effects of the reform outweigh its negative impacts. With moderate habit persistence ($h = 0.5$, row 2 in Table 4), it takes four periods for workers to start enjoying the positive effects of the reform; while with higher persistence ($h = 0.7$, row 3), it is necessary to wait five additional periods. We have also concluded (results not reported in Table 4) that the larger the feedback parameters in the TR, the higher is the political support for the reform; this is not surprising, as larger feedback parameters drive the TR closer to OMP (see McCallum and Nelson, 2004), although at the expense of higher interest-rate variability (compare the dashed to the solid lines in Table Figure 4-C). Table 4 also shows that with interest rate smoothing reform becomes politically more appealing (higher $Ve - Ve_0$) and may even reduce the *p-lim*.

Clearly, we can interpret the political-support results under demand-side inertia as supporting the two-handed approach: to achieve the new FP equilibrium, an expansionary monetary policy is required alongside the reform; the more expansionary the policy is, the lower are political costs.[23]

[22] Recall that active monetary policy is not necessary in the baseline case because, with exclusively forward-looking rational expectations, the existence of a perfectly known rule ensures that private agents' actions are sufficient to the adjustment.

[23] These results are robust if we add inflation inertia (considering an hybrid AS specification as in Galí and Gertler, 1999, and in Galí *et al*, 2001) to habit formation. In fact, inflation inertia affects the path of the real interest, making TR more expansionary in its effects and, thus, increases political support (results available upon request).

Political support costs: adjustments with inertia induced by a gradual reform Rows 1 and 4 of Table 4 compare the one-shot reform with the gradual one, assuming pre-announcement and an inertia-free economic structure in both cases. It is apparent that the political support is lower for the gradual reform. Lower political support certainly reflects the longer time it takes for reform to be implemented.[24] As it was shown in the breakdown of permanent reform effects, in Table 3, above, most of the reform gains are derived from employment flows and tax effects. Under a gradual reform, the benefit of having, for a while, a higher insurance level, carries the cost of delayed employment-related gains relatively to the one-shot reform.

Figure 5 depicts the adjustment paths to the gradual reform defined in equation (27), above, with $\rho_{\overline{y}} = 0.7$. OMP responds, as in the previous cases, fully to each step-change in FP output but, due to gradualism, output takes longer to reflect the full effects of the reform. Because of pre-announcement, each step-change in b during reform implementation is concomitant with the private agents' adjustment to the entire process. The economy fully adjusts to the successive changes in $\overline{y}$ and, in contrast with previous cases, nominal and real interest rates rise together. This restrictive monetary policy is required throughout the implementation process, because expectations of future increases in FP output drive expected future real interest rates up relative to current ones (equation 35, above) which incentives current consumption, putting upward pressure on prices.[25] The TR response to the rise in the FP real interest rate is not as restrictive, therefore accommodating some inflation with output temporarily above each FP equilibrium level, which yields higher political support. In the case considered in Table 4, OMP demands a longer time horizon (thirteen periods) for reform support than the TR (five periods). Additional results, not reported in Table 4, show that gradual reforms, contrary to the one-shot case, are easier to implement the smaller the feedback parameters are, *i.e.*, the farther the TR is from the costlier (in terms of political support) OMP.[26]

Exhibiting patterns of a negative cost-push shock adjustment, the gradual reform triggers a restrictive monetary policy response. Concerning the assessment of the two-handed approach, it remains the case that a less restrictive policy yields higher political support, thus facilitating the implementation of the reform.

Political support costs: adjustments with inertia induced by an unexpected reform Row 5 of Table 4 reports the political support outcome of an unexpected, one-shot, reform, which, as argued above in section 3, is an extreme case of uncertainty about the reform implementation. The underlying economic structure is, as in rows 1 and 4, inertia-free.

[24] This dominance, in terms of political support, of the one-shot reform is largely influenced by the focus of our model on the dynamics of the reform. If, instead, more modeling weight is given to redistributive aspects, or to uncertainty about the reform results, then the case for gradualism might be stronger.

[25] This effect is consistent with the permanent income hypothesis, which states that consumption rises with current as well as with expected future incomes.

[26] Other nonreported computations show that interest-rate smoothing may also improve the timing of political support, namely if reform does not take too long to be fully implemented. The details of all these additional, nonreported, results are available from the authors.

The reform works as a positive cost-push shock that reduces marginal costs in the implementation period: real wages fall with the reduction of the outside option, while labor demand pressure rises, but not as much as the new FP level. This combination leads a fraction of the firms to lower prices in period t. The more the average price falls, the closer is output to the new FP level. Firms that can only adjust prices in the following periods have no incentives to do so, because the effects of the reform are, by then, completely perceived. Clearly, if it were not for the impact of the first period surprise, adjustment would be the same as with the pre-announced reform.

In this case, differences in adjustment and, thus, in political support, occur not only between optimal and non-optimal monetary policy, but also between optimal discretionary (OMP-D) and optimal with commitment (OMP-C). Under OMP-D, the impact of the surprise vanishes after the first period, since private agents are aware that the monetary authority will respond fully to the shock in each current period. Under OMP-C, instead, the impact of the first period surprise extends to the following periods. In the face of the positive cost-push shock, the monetary authority generates a transitory expansion in the following periods, in order to change private expectations and achieve an improved inflation - output-gap trade off in the first period. Expected positive output gaps lead to weaker downward pressure in prices, and, thus, to a smaller increase in output in period t.

Figures 6 and 7 depict adjustments, respectively under OMP-C and OMP-D, compared with the TR. As long as the monetary authority maintains strong preferences over inflation stabilization, OMP yields higher political support than the TR. This case is illustrated by setting, as formerly (rows 1 through 4 of Table 4), $\omega_{\tilde{y}} = 0.01$ in the Loss function 22 (in 2.5, above), corresponding to a 3.8% annualized weight attached to output-gap stabilization. The reason for the higher political support delivered by this OMP stems precisely from its relatively more inflation-averse behavior: in reaction to a cost-push shock, the TR leads to higher inflation variability and lower output variability, thereby delaying the effects on employment, which, in turn, delays gains in taxes and wages. If, however, preferences underlying OMP are stronger in favor of output-gap control (illustrated by setting $\omega_{\tilde{y}} = 1$, *i.e.*, an annualized weight of 80% put on output-gap stabilization), TR yields higher political support: *p-lim* rises to 9 for OMP, while it remains at eight periods under TR. This is because the more reactive policy is to output-gap stabilization, the costlier is the adjustment in the first period, since, while unaware of the reform, monetary policy strongly pulls output to its no-reform FP level. Row 5 also shows that gains of commitment over discretion, related with the overshooting effects on output from the second period onwards, are reduced with the weight attached to output-gap control.

The analysis of the adjustments to either gradual or unexpected reforms show that OMP is no longer sufficient for immediate reform gains to occur. With uncertainty about reform implementation, higher political support may even be achieved under the non-optimal policy, TR. The two-handed approach still holds valid in this case, as the Taylor rule turns out to be more expansionary, assuring a faster transition to the new FP equilibrium.

The results (in Table 4) that we have examined so far exhibit the same welfare gains to the employed and the unemployed ($Ve - Ve_0 = Vu - Vu_0$). As explained above in

4.1, this is a consequence of (i) political-support evaluation not taking into account the current, pre-reform, period; and (ii), given the assumptions for S and F (respectively the job-separating and the job-finding probabilities), implying complementarity, *i.e.,* $S = (1 - F) = u$, the present discounted value of the welfare of the unemployed and the employed is the same, after the first period. Next, we will allow a more realistic assumption, considering that an unemployed worker has a lower probability of finding a new job than an employed worker has of keeping it, that is, $F < (1 - S)$.

Political costs with differentiated job-finding probabilities Let us re-define the indexation of the finding rate to the unemployment rate,

$$1 - F_t = Ou_t, \qquad O > 1, \tag{37}$$

and use the flow approach to changes in unemployment, as in (32), above in 4.1, to re-define

$$S_t = \frac{u_t(1 - Ou_{t-1})}{(1 - u_{t-1})}, \quad N_t^s = 1, \quad \forall t. \tag{38}$$

$F < (1 - S) \Leftrightarrow S < (1 - F)$, in steady-state, requires $O > 1$. Accordingly, real wage and the FP unemployment rate are now re-defined, respectively, as

$$\frac{W_t}{P_t} = \left[1 + \frac{1}{\frac{\Gamma}{(1-\Gamma)}\left[\frac{1}{(1-b)Ou_t} - \varepsilon_{SN}(1 - \frac{\alpha}{\mu})^{-1}\right]}\right]^{-1} A_t \left(N_t\right)^{(\alpha-1)}, \tag{39}$$

and

$$\bar{u}_t = \frac{(\mu - \alpha)\bar{\Gamma}}{\left[\alpha(1 - \bar{\Gamma}) + \bar{\Gamma}\epsilon_{SN}\mu\right](1 - \bar{b})O} = \overline{u}. \tag{40}$$

Interpretation of (39) and (40) reveals that the FP unemployment rate increases with the finding rate, while a higher finding rate weakens the response of real wages to current unemployment. As the value of the outside option decreases with a lower finding rate, the employed workers move towards more moderate wage claims within the firm and, hence, the FP unemployment rate falls.

Either in steady state or during transition, reform gains are expected to be higher for the employed workers than for the unemployed, since the former have higher probability of maintaining the job than the latter of finding one. To illustrate the effects on the welfare transition gains, Table 5 shows, for the baseline and for demand-side inertia cases, the *p-lim* periods for the employed (decisive voter) and the $Ve - Ve_0$ and $Vu - Vu_0$ values for a 20 periods horizon after the announcement of reform.

Besides the fact that higher gains occur for the currently (before reform implementation) employed, the results exhibit the same patterns as above, although with different magnitudes (compare with rows 1 through 3 of Table 4): OMP yields the best results and smoothing ensures better performance relative to the simple TR, but, under the non-optimal rules, political support takes longer to emerge. Lower political support by the

	Scenarios	Political Support							
		Breaking time horizon for political support (by the employed) p-lim				Net accumulated gains $Ve\text{-}Ve_0$ and $Vu\text{-}Vu_0$ (t=20)			
		OMP		TR		OMP		TR	
		D	C	simple	smoothing	D	C	simple	smoothing
1	**Baseline**	1		1	1	0.1375 and 0.1359		0.1375 and 0.1359	0.1375 and 0.1359
2	**Low habit formation *(h=0.5)***	1		7	6	0.1375 and 0.1359		0.085 and 0.0813	0.0967 and 0.0929
3	**High habit formation *(h=0.7)***	1		15	12	0.1375 and 0.1359		0.0273 and 0.0227	0.0531 and 0.0485

OMP - C: Optimal Monetary Policy under Commitment

OMP - D: Optimal Monetary Policy under Discretion

TR: Taylor Rule

Table 5: Evaluation of Political Support with Differentiated Job-Finding Probabilities

decisive voter results from (i) the real wage falling more strongly during the recovery to the new steady state, and (ii) smaller unemployment gains.

5 Final Remarks

Having included political support determinants in the macroeconomic analysis, we were able to assess to which extent monetary policy, without deviating from the usual behavior of independent central banks, can help to ensure the political sustainability of a labor market reform, a view in line with the two-handed approach. The basis for this assessment is a model – New-Keynesian style – which, on the one hand, is grounded on well-established literature about monetary policy analysis and, on the other hand, includes labor market institutional features based on the macro-labor literature. Motivated by the repeated calls for labor market reforms in Europe, including from central bankers, we have calibrated the model to match the EMU environment.

Simulating a reduction in the unemployment benefit replacement ratio as a stylized labor market reform, we find that, in spite of its positive permanent effects on the equilibrium unemployment rate and on real wage flexibility, reform implementation may lack political sustainability. Political support, both from the employed and the unemployed, weakens with the time it takes for the positive welfare effects of the reform to outweigh the immediate negative ones.

With rational expectations by economic agents, optimal monetary policy ensures political sustainability for a pre-announced one-shot reform, contrasting with the political support costs arising under non optimal policies. As for a gradual or an unexpected reform implementation, the optimal policy can not avoid resistance to reform implementation and the Taylor rule may even provide higher political support. Also, in general, interest-rate smoothing favors political support relative to the simple Taylor rule.

Our results are in agreement with the two-handed approach, according to which policy-driven cycles can decisively improve political support for the reform: the more expansionary (or the less contractionary) the policy is, the faster is the recovery to the new

steady-state equilibrium. Political support decreases with (i) the time it takes for reform implementation, (ii) the degree of uncertainty about reform implementation, and (iii) the inertias in the economic structure (in particular, habit persistence in consumption).

It is possible to draw two broader additional implications from our simulations. First, the two-handed approach results can be straightforwardly extrapolated to shock-driven cycles. In this context, the phase of the cycle where reform implementation drives stronger political support is, clearly, an expansion. And second, the framework that we have developed to account for the interactions between monetary policy and labor market reform, could prove useful to analyze interactions between other demand policies and other structural reforms.

We have also simulated situations in which political support by the employed may differ from the unemployed workers': the harder it is for an unemployed worker to find a new job, relative to keeping the job by a current employed worker, the lower are the reform gains in terms of the equilibrium unemployment rate, the lower is the political support by the decisive voter (the employed, in this case) and the larger are the relative gains for the employed. We have shown that, in this context, the two-handed approach still holds. These additional results indicate a promising way for future developments of this research: to further explore heterogeneities in the labor force, namely the ones giving rise to differences in political interests (different constituencies) between unemployed and employed and, within the latter, between more and less skilled.

A Optimal Monetary Policy

The objective to the monetary authorities is to maximize the deviations of instant utility from the correspondent FP level, $\overline{U}$,

$$U_t - \overline{U}_t = Log(C_t - hC_{t-1}) - \frac{N_t^{(\varphi+1)}}{(\varphi+1)} - \overline{U}_t. \tag{41}$$

Instant utility depends on N because the labor market fails to clear and, assuming costless job search, the hours of labor supplied by the unemployed are not welfare consuming.

Consider, first, the following first order Taylor approximation to the utility function, around the steady state:

$$\begin{aligned} Log(C_t - hC_{t-1}) &= Log(1-h) + LogC + \frac{1}{(1-h)}\left(LogC_t - LogC\right) - \\ &\quad - \frac{h}{(1-h)}\left(LogC_{t-1} - LogC\right) + o(||a||^2), \end{aligned} \tag{42}$$

where C stands for the steady-state level of consumption. The intertemporal utility (adding the leisure argument and neglecting shocks) is approximated by

$$E_0 \sum_0^\infty \beta^t \left\{ \left[Log(1-h) + \frac{1}{1-h}(c_{t+j} - hc_{t+j-1}) \right] - \frac{N_t^{(\varphi+1)}}{\varphi+1}, \right\}. \tag{43}$$

With β close to 1, and re-defining U_t as the utility derived from period t consumption (*i.e.,* including the contribution of period t consumption to the utility in the following period due to habit formation), the welfare function can be re-written, irrespective of the degree of habit persistence, as follows:

$$U_t = Log(1-h) + \frac{1-\beta h}{1-h}(c_t) - \frac{N_t^{(\varphi+1)}}{\varphi+1} \simeq Log(1-h) + c_t - \frac{N_t^{(\varphi+1)}}{\varphi+1}. \tag{44}$$

Re-writing (41) as

$$U_t - \overline{U}_t = \left[Log(1-h) + c_t - \frac{N_t^{(\varphi+1)}}{(\varphi+1)} \right] - \overline{U}_t, \tag{45}$$

and using a second order Taylor approximation to the utility function around the FP level, we get:

$$U_t - \overline{U}_t = \overline{U}_{c,t}\overline{C}_t\left(\widetilde{c}_t\right) + \overline{U}_{n,t}\overline{N}_t\left(\widetilde{n}_t + \frac{1+\varphi}{2}\left(\widetilde{n}_t\right)^2\right) + o(||a||^3), \tag{46}$$

where a second order approximation of relative deviations in terms of log deviations was also used.[27] Lower case variables represent variables in the log form, with $\widetilde{x}_t = \log\left(\frac{X_t}{\overline{X}_t}\right)$; $\widetilde{x}_t$ is assumed to be of order $o(||a||)$. Using the definition

$$\widetilde{n}_t = \frac{1}{\alpha}\left(\widetilde{y}_t + s_t\right), \quad s_t = \log\int_0^1 \left(\frac{P_{it}}{P_t}\right)^{-\varepsilon} di \tag{47}$$

and the goods market clearing condition $Y_t = C_t$, we have

$$U_t - \overline{U}_t = \overline{U}_{c,t}\overline{Y}_t\left(\widetilde{y}_t\right) + \overline{U}_{n,t}\overline{N}_t\left[\frac{1}{\alpha}\left(\widetilde{y}_t + s_t\right) + \frac{1+\varphi}{2\alpha^2}\widetilde{y}_t^2\right] + o(||a||^3), \tag{48}$$

where $\overline{U}_{n,t}\overline{N}_t = \left[-\overline{U}_{c,t}\overline{Y}_t\left(\overline{N}_t\right)^{(\varphi+1)}\alpha\right]/\alpha$.

Disregarding, for now, the s_t term, define:

$$[1-\Phi] = \frac{\left(\overline{N}_t\right)^{(\varphi+1)}}{\alpha} = \frac{(1-\overline{u})^{(\varphi+1)}}{\alpha}, \tag{49}$$

where Φ can be seen as a measure of the economy's inefficiency, that is, a measure of how far the FP equilibrium is from the efficient level, y_t^e (the FP output level observed under

[27] *I.e.,* $\left(\frac{C_t-\overline{C}_t}{\overline{C}_t}\right) = \widetilde{c}_t + \widetilde{c}_t^2 + o(||a||^3)$.

full resource utilization). A first order approximation to Φ yields:

$$\begin{aligned}\Phi &= (\varphi+1)\overline{u} + \log\alpha + o(||a||^2) \Leftrightarrow \\ \Phi &\simeq (\varphi+1)\frac{(y_t^e - \overline{y}_t)}{\alpha} + \log\alpha, \quad y_t^e - \overline{y}_t = \alpha\overline{u}. \end{aligned} \tag{50}$$

If the labor market clears in steady state ($\overline{u}=0$) then, for α close to one, Φ is close to zero.

Using (50) we can write the monetary authority's optimization problem as:

$$\begin{aligned}&\overline{U}_t - U_t = \frac{1}{2}\overline{U}_{c,t}\overline{Y}_t\left[2s_t + \frac{1+\varphi}{\alpha}\left(\widetilde{y}_t - z\right)^2\right] + t.i.p. + o(||a||^3), \\ &z = (y_t^e - \overline{y}_t) + \frac{\alpha\log\alpha}{(1+\varphi)}.\end{aligned} \tag{51}$$

Since z depends only on structural variables characterizing the economy – such as those characterizing labor market functioning, the degree of competition between firms and the features of the production function technology – it is quite straightforward to assume that it is not affected by monetary policy. In this context, z can be classified as terms independent of policy ($t.i.p$); in particular, the term $t.i.p$ in equation (51) is equal to $-z^2$.

Deriving a first order approximation to $\overline{U}_{c,t}\overline{Y}_t$ around the steady state (U_cY) and using

$$s_t = \frac{\varepsilon}{2}var_i\left\{p_{it}\right\} + o(||a||^3) \tag{52}$$

together with the following Lemma, as shown in Woodford (2002)[28],

$$\sum_{t=0}^{\infty}\beta^t\left(var_i\left\{p_{it}\right\}\right) = \frac{1}{\lambda_L}\sum_{0}^{\infty}\beta^t\pi_t^2 + t.i.p. + o(||a||^3),\ \lambda_L = \frac{(1-\beta\theta)(1-\theta)}{\theta}, \tag{53}$$

we can write a second order approximation to the consumer's welfare loss, expressed as a fraction of steady-state consumption (income):

$$L = \frac{1}{2}E_0\sum_{t=0}^{\infty}\beta^t\left[\pi_t^2 + \omega_{\widetilde{y}}\left(\widetilde{y}_t - z\right)^2\right], \quad \omega_{\widetilde{y}} = \frac{(1+\varphi)\lambda_L}{\alpha\varepsilon}. \tag{54}$$

Thus, central banks minimize a weighted sum of the square deviations of inflation and output gap from the respective targets, 0 and z. A final remark to (54) is worth mentioning. It relies on Clarida *et al* (1999)'s argument that monetary policy is unable to affect the natural level of output (here taken as the FP level of output). They prove that efforts to equalize $\widetilde{y}_t$ to z put pressure on the long-run inflation rate without affecting $\overline{y}_t$ (inflation bias problem). Taking this result into account, we assume that a rational central

[28] This identity is particular to the Calvo's (1983) price setting mechanism. If price setting differs from such specification, the definition of price variability will also change.

bank should never push output to values different from the flexible price level outcome, and so we set $z = 0$. This is equivalent to assuming that the monetary authority is perfectly aware of this constraint, or that there are more appropriate policies, other than the monetary policy, to overcome structural inefficiencies in the economy.[29] The relevant decision problem of the monetary authority is, then,

$$\begin{aligned} &\underset{\pi_{t+j},\widetilde{y}_{t+j}}{Min} \qquad E_t\sum_{j=0}^{\infty}\beta^j(\pi_{t+j}^2+\omega_{\widetilde{y}}\widetilde{y}_{t+j}^2), \qquad \omega_{\widetilde{y}}=\frac{\lambda_L(1+\varphi)}{\varepsilon\alpha} \\ &s.t. \\ &\pi_t=\beta E_t\pi_{t+1}+k\widetilde{y}_t+\mathtt{u}_t, \qquad k>0. \end{aligned} \tag{55}$$

B Model Calibration

The values for the set of parameters are chosen with a view to match the Euro area macroeconomic environment. We start by combining the calibration proposed in Moyen and Sahuc (2005) with Galí (2003), and then use other additional sources. Table 6 presents the values.

For the labor market specific parameters, we set an indicative European after-reform replacement ratio of 60% and also a value of 0.4 for the elasticity of survival with respect to the expected number of insiders (based on Layard *et al*, 1991). Labor intensity and the relative power of firms in the bargaining process are chosen in order to get a reasonable equilibrium unemployment rate ($\overline{u}$ in equation 17), around 6% - an equilibrium unemployment rate near that recently observed in the EMU area. The low value for Γ is supported by the low and decreasing degree of unionism in European countries (see, for instance, Blanchard, 2004).[30] As for α, we set it slightly below 1, since a decreasing marginal productivity of labor ensures the trade-off between real wage and employment levels.

For the gradual reform process, we consider a long implementation period with $\rho_{\overline{y}} = 0.7$ to compare with the one-shot pre-announced reform ($\rho_{\overline{y}} = 0$). As for the habit formation, the evidence in Christiano *et al* (2005) and in Fuhrer (2000) clearly points to a high degree of persistence. Our values have been chosen closer to Christiano *et al*'s (2005), given that we adopt their theoretical formulation.

In respect to monetary policy, we consider two types of central banks: an inflation-averse CB, that attaches a high value to price stabilization; and an inflation-prone CB, that mostly cares about output stabilization. These values are taken from McCallum and Nelson (2004). For the non-optimal interest rate rule we chose the original Taylor's feed-

[29] In this respect, Galí (2003) and Woodford (2003) assume that there is a government subsidy that pushes the flexible price level of output to the efficient level, so that the monetary authority needs not to worry about efficiency targets.

[30] Cahuc *et al* (2002) estimate a bargaining power of about 0.2 in France, a result consistent with others using Canadian and British data sets. Note, however, that the average unemployment rate was, during the estimation period, around 10% in France (see, for instance, Nickell and Layard, 1999), higher than our 6% fitted equilibrium unemployment rate.

Description	Parameter	Value
Price elasticity of demand	ε	11
Quarterly discount factor	β	0.99
Probability of firms not changing prices in a given period	θ	0.83
Unemployment benefit replacement ratio	b	0.6
Elasticity of the survival probability with respect to employment	ε_{SN}	0.4
Labor intensity	α	0.9
Technology index	A	1
Union's bargaining power	Γ	0.1
Gradual reform correlation parameter	ρ_y	0.7
Low/High habit formation	h	0.5 / 0.7
Low/High relative weight on output stabilization in the Loss function	ω_y	0.01 / 1
Inflation feedback parameter	ϕ_π	0.5
Output-gap feedback parameter	ϕ_y	0.125
Interest rate smoothing parameter	ρ_r	0.8

Table 6: Parameter Calibration

back parameters, while taking the interest-rate smoothing parameter also from McCallum and Nelson (1999; 2004).

References

Alogoskoufis, C. Bean, G. Bertola, D. Cohen, J. Dolado and G. Saint-Paul (1995), *Unemployment: Choices for Europe – Monitoring European Integration 5*, Chs. 6 and 7, CEPR

Amato, J. D. and T. Laubach (2004), "Implications of Habit Formation for Optimal Monetary Policy", *Journal of Monetary Economics*, Vol. 51, N^o 2, March, pp.305-325

Bean, C. (1998), "The Interaction of Aggregate Demand Policies and Labor Market Reform", *Swedish Review of Economic Policy*, X, pp. 1-36

Belot, M. and J. C. van Ours (2004), "Does the Recent Success of Some OECD Countries in Lowering Their Unemployment Rates Lie in the Clever Design of Their Labor Market Reforms?, *Oxford Economic Papers*, Vol. 56, N^o 4, October, pp. 621-642

Blanchard, O. J. (2004), "The Economic Future of Europe", *Journal of Economic Perspectives*, Vol. 18, N^o 4, Fall, pp. 3-26

Blanchard, O. J. and D. Quah (1989), "The Dynamic Effects of Aggregate Demand and Supply Disturbances", *The American Economic Review*, Vol. 79, N^o 4, September, pp. 655-673

Blanchard, O.J., R. Dornbush, J. Drèze, H. Giersch, R. Layard and M. Monti (1986), "Employment and Growth in Europe: A Two-handed Approach", in *Restoring Europe's Prosperity: macroeconomic papers*, O. J. Blanchard *et al* (eds.), pp. 95-124, Centre for European Policy Studies, MIT Press, Cambridge, MA

Bovenberg, A., Johan J. Graafland and Ruud A. Moij (2000), "Tax reform and the Dutch Labor Market: an Applied General Equilibrium Approach", *Journal of Public Economics*, Vol. 78, N^o 1-2, October, pp. 193-214

Burda M. and C. Wyplosz (1997), *Macroeconomics – A European Text*, 2nd edition, 613 p, Oxford University Press

Cahuc, P., C. Gianella, D. Goux and A. Zylberberg (2002), "Equalizing Wage Differences and Bargaining Power: Evidence From a Panel of French Firms", CEPR Discussion Papers, N^o 3510, CEPR

Calmfors L. and J. Driffil (1988), "Bargaining Structure, Corporatism and Macroeconomic Performance", *Economic Policy*, N^o 6, pp. 13-62

Calvo, G.A. (1983), "Staggered Prices in an Utility-Maximizing Framework", *Journal of Monetary Economics*, Vol. 12, N^o 3, pp. 383-398

Carneiro, Francisco, Amit Dar and Indermit S. Gill (2002), "A Survey on Labour Market Institutions, collective Bargaining and Macroeconomic Performance", Social Science Research Network Electronic Paper Collection, Jan 9, http://papers.ssrn.com/abstract=289664

Christiano, L., M. Eichenbaum and C. Evans (2005), "Nominal Rigidities and the Dynamic Effects of a Shock to Monetary Policy", *Journal of Political Economy*, February, Vol. 113, N^o 1, pp. 1-45

Clarida, R., J. Galí and M. Gertler (1999), "The Science of Monetary Policy: A New Keynesian Perspective", *Journal of Economic Literature*, Vol. XXXVII, December, pp. 1661-1707

Dixit A. K. and J. Stiglitz (1977), "Monopolistic Competition and Optimum Product Diversity", *American Economic Review*, Vol. 67, N^{o}3, June, pp. 297-308

Elmeskov, Jorgen (2000), "Implementing the OECD Jobs Strategy – Assessing Performance and Policy", Remarks at The Conference on Jobs, Helsinki 27 and 28 January

Estrella, A. and J. C. Fuhrer (2002), "Dynamic Inconsistencies: Counterfactual Implications of a Class of Rational-Expectations Models", *American Economic Review*, Vol. 92, N^o 4, pp. 1013-1028

Fernandez, Raquel and Dani Rodrick (1991), "Resistance to Reform: Status Quo bias in the Presence of Individual-Specific Uncertainty", *The American Economic Review*, Vol. 81, N^o 5, pp. 1146-1155

Fuhrer, J. (2000), "Habit Formation in Consumption and its Implications for Monetary-Policy Models", *The American Economic Review*, Vol. 90, N^o 3, pp. 367-390

Galí, J. (2003), "New Perspectives on Monetary Policy, Inflation, and the Business Cycle", in *Advances in Economic Theory*, L. Hansen and S. Turnovsky (eds.), Vol. III, pp. 151-197, Cambridge Uiversity Press

Galí, J. (2006), "Monetary Policy Design in the Basic New Keynesian Mode", Chapter 4 in Monetary Policy, Inflation and the Business Cycle - Monograph (work in progress, http://www.crei.cat/people/gali/monograph.html)

Galí, J., J. D. López-Salido and J. Vallés (2003), "Technology Shocks and Monetary Policy: Assessing the FED's Performance", *Journal of Monetary Economics*, Vol. 50, N^o 4, May, pp. 723-743

Galí, J. and M. Gertler (1999), "Inflation Dynamics: A Structural Econometric Analysis", *Journal of Monetary Economics*, Vol. 44, N^o 2, pp. 195-222

Galí, J., M. Gertler and J. D. López-Salido (2001), "European Inflation Dynamics", *European Economic Review*, Vol. 45, N^o 7, pp. 1237-1270

Goodfriend, M. and R. G. King (1997), "The New Neoclassical Synthesis and the Role of Monetary Policy" in *Macroeconomics Annual 1997*, Rotemberg and Woodford (eds.), pp. 231-295, NBER

Gordon, Robert J. (1996), "Macroeconomic Policy in the Presence of Structural Maladjustment" in *Macroeconomic Policy and Structural Reform* (Paris: OECD), pp. 173-204

Holmlund, Bertil (1998), "Unemployment Insurance in Theory and Practice", *Scandinavian Journal of Economics*, Vol. 100, N^o 1, March, pp. 113-141

Ireland, P. N. (2001), "Sticky-price Models of the Business Cycle: Specification and Stability", *Journal of Monetary Economics*, Vol. 47, N^o 1, February, pp. 3-18

King, R. G. (2000), "The New IS-LM Model: Language, Logic and Limits", Federal Reserve Bank of Richmond, *Economic Quarterly*, Vol. 86/3, Summer 2000, pp. 45-103

Lächler, U. (1984), "The Political Business Cycle under Rational Voter Behaviour", *Public Choice*, Vol. 44, N^o 3, pp. 411-430

Layard, R., S. Nickell and R. Jackman (1991), *Unemployment*, Oxford University Press, Oxford

Lindbeck and Snower (1988), "Cooperation, Harassment, and Involuntary Unemployment: an Insider-Outsider Approach", *American Economic Review*, Vol. 78, pp. 167-188

Lindbeck and Snower (1990), "Demand and Supply-side Policies and Unemployment: Policy implications of the Insider-Outsider Approach", *Scandinavian Journal of Economics*, Vol. 92, N^o 2, pp. 279-305

McCallum, B. (2001), "Should Monetary Policy Respond Strongly to Output Gaps?", *American Economic Review*, Vol. 91, N^o 2, May, pp. 258-262

McCallum, B. and E. Nelson (1999), "Performance of Operational Policy Rules in an Estimated Semiclassical Structural Model", in *Monetary Policy Rules*, J. B. Taylor (ed.), pp. 15-45, NBER

McCallum, B. and E. Nelson (2004), "Timeless Perspective vs. Discretionary Monetary Policy in Forward-Looking Models", *Federal Reserve Bank of St. Louis Review*, Vol. 86, N^o 2, March/April, pp. 43-56

Mortensen, D. and C. Pissarides (1999), "Job reallocation, employment fluctuations and unemployment" in *Handbook of Macroeconomics*, J. Taylor and M. Woodford (eds.), Ch. 18, Vol. 1B, Handbooks in Economics, Vol. 15, pp. 1171-1228, Amsterdam; New York and Oxford: Elsevier Science, North-Holland

Moyen, Stéphane and Jean-Guillaume Sahuc (2005), "Incorporating Labour Market Frictions into an Optimizing-Based Monetary Policy Model", *Economic Modelling*, Vol. 22, N^o 1, pp. 159-186

Nickell, S. and R. Layard (1999), "Labor Market Institutions and Economic Performance", in *Handbook of Labor Economics*, O. Ashenfelter and D. Card, Vol. 3C, pp.

3029-3084, Elsevier Science B.V.

Nickell, S., L. Nunziata, W. Ochel and G. Quintini (2003), "The Beveridge Curve, Unemployment and Wages in the OECD from the 1960s to the 1990s", in *Knowledge, information, and expectations in modern macroeconomics: in honor of Edmund S. Phelps*, Aghion *et al* (eds.), pp. 394-440, Princeton University Press

OECD (1999), "Labour Market Performance and the OECD Jobs Strategy", Ch. IV, *OECD Economic Outlook* 66

OECD (2006), *Economic Policy Reforms: Going for Growth*, Part I - Chapter 1, "Progress in Responding to the 2005 Policy Priorities: Overview"

Poeck, André Van and Alain Borghijs (2001), "EMU and Labour Market Reform: Needs, Incentives and Realisations", *World Economy*, Vol.4, N^o 10, November, pp.1327-1352

Sack, B. and V. Wieland (2000), "Interest Rate Smoothing and Optimal Monetary Policy: a Review of Recent Empirical Evidence", *Journal of Economics and Business*, Vol. 52, N^o 1-2, January-April, pp. 205-228

Saint-Paul, G. (1996), "Exploring the Political Economy of Labour Market Institutions", *Economic Policy: A European Forum*, N^o 23, October, pp. 265-315

Saint-Paul, G. (2000), *The Political Economy of Labor Market Institutions*, Oxford and New York, Oxford University Press, 280 p

Saint-Paul, G. (2006), "Macroeconomic fluctuations and the timing of labor market reform", in *Structural Reforms and Economic Growth in Europe*, S. Eijffinger *et al* (eds.), European Summer Institute and CEPR, September

Saint-Paul, G. and S. Bentolila (2001), "Will EMU increase Eurosclerosis?", in *The impact of EMU on Europe and the Developing Countries*, Charles Wyplosz (ed.), WIDER, Oxford U. Press, pp. 128-168

Smets, F. and R. Wouters (2003), "An Estimated Dynamic Stochastic General Equilibrium Model of the Euro Area", *Journal of the European Economic Association*, Vol. 1, N^o 5, September, pp. 1123-1175

Taylor, J.B (1999) (ed.), *Monetary Policy Rules*, University of Chicago Press and NBER, 442 p

Woodford, M. (2002), "Inflation Stabilization and Welfare", *Contributions to Macroeconomics*, Vol. 2, N^o 1, Article 1

Woodford, M. (2003), *Interest and Prices-Foundations of a Theory of Monetary Policy* (Chs. 3 and 6), Princeton University Press, 800 p

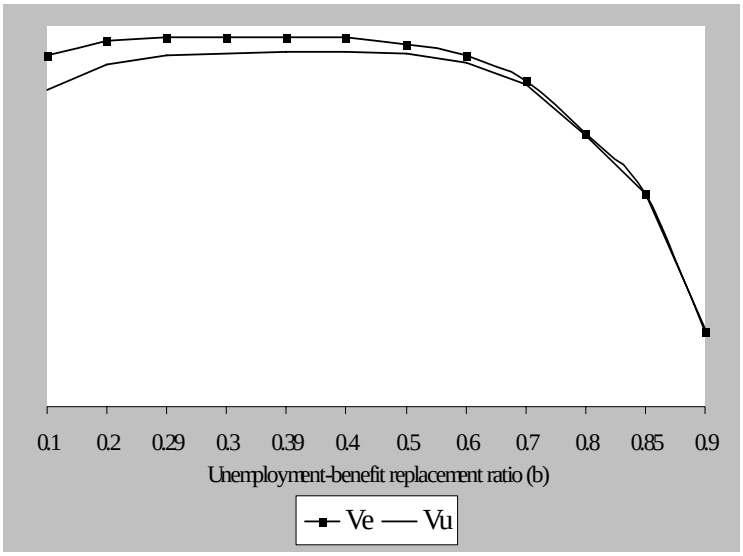

Figure 1: Steady-state welfare of employed (Ve) and unemployed (Vu) for different unemployment-benefit replacement ratios (b)

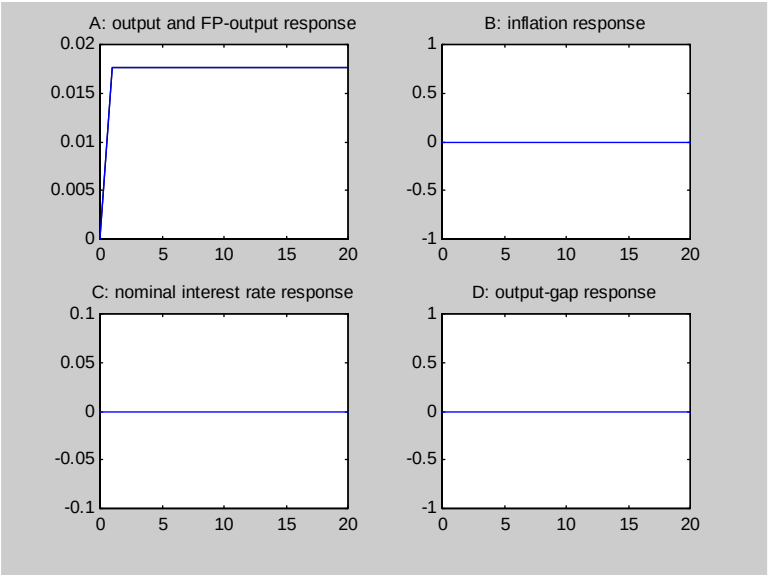

Figure 2: Adjustments to a one-shot pre-announced reform, baseline scenario

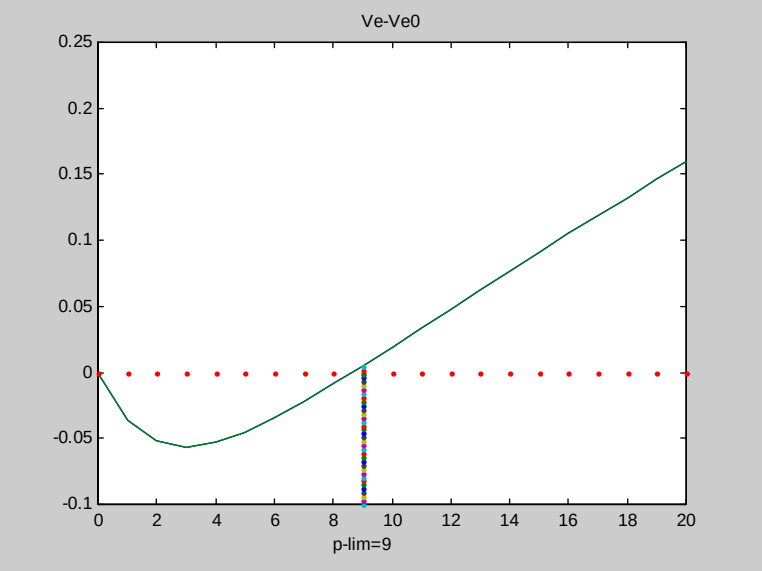

Figure 3: $p - lim$ period and net accumulated reform-gains under TR, habit formation ($h = 0.7$)

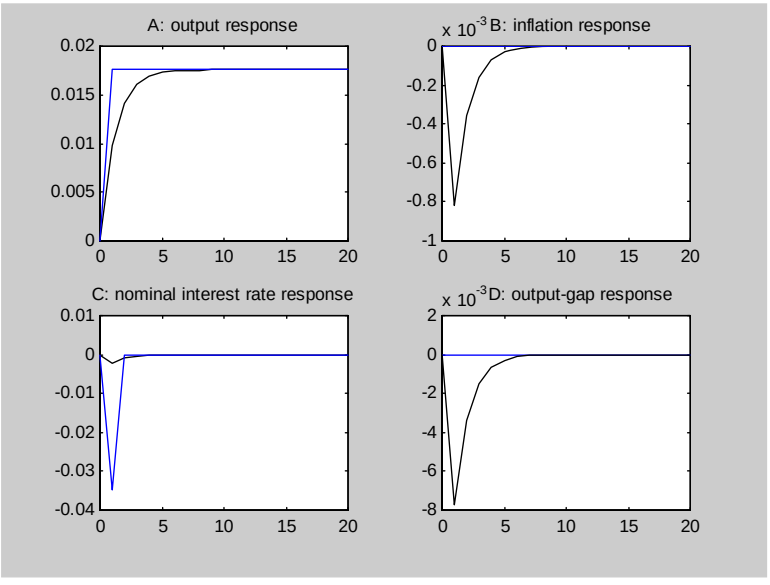

Figure 4: Adjustments to a one-shot pre-announced reform, habit formation ($h = 0.5$) - OMP (solid) *vs* TR (dashed)

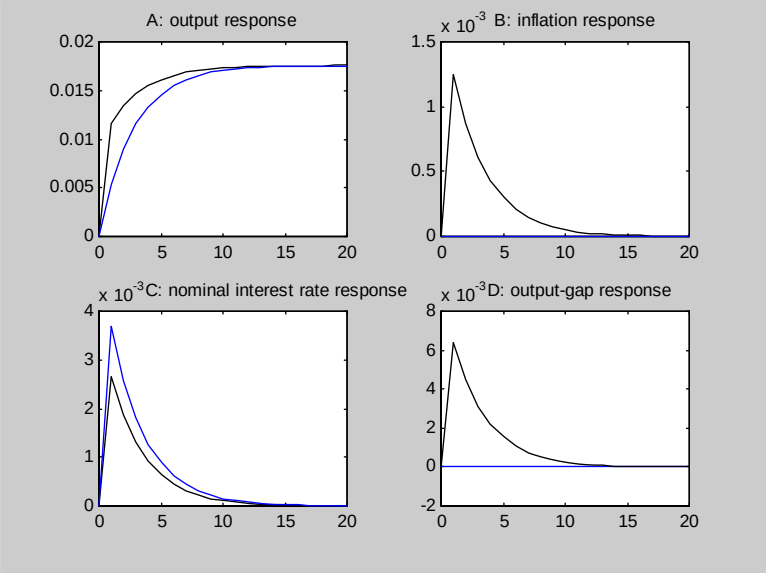

Figure 5: Adjustments to a gradual pre-announced reform ($\rho_{\overline{y}} = 0.7$) - OMP (solid) *vs* TR (dashed)

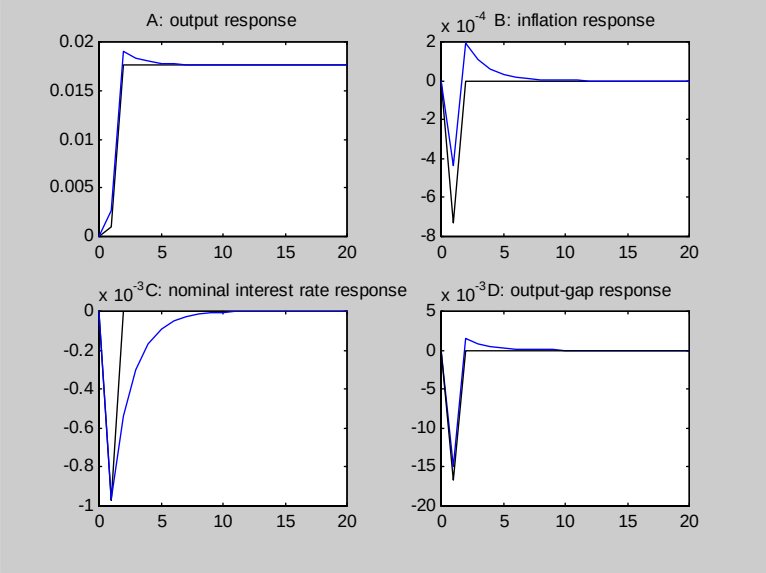

Figure 6: Adjustments to an unexpected reform - OMP-C, $w_{\widetilde{y}} = 0.01$, (solid) *vs* TR (dashed)

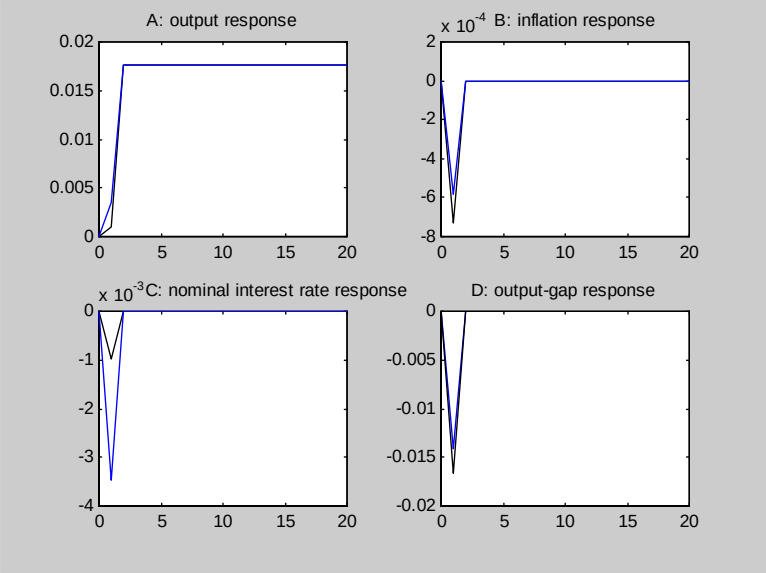

Figure 7: Adjustments to an unexpected reform - OMP-D, $w_{\tilde{y}} = 0.01$, (solid) *vs* TR (dashed)

Recent FEP Working Papers

Nº 236	Jorge M. S. Valente and Rui A. F. S. Alves, *"Heuristics for the single machine scheduling problem with quadratic earliness and tardiness penalties"*, February 2007
Nº 235	Manuela Magalhães and Ana Paula Africano, *"A Panel Analysis of the FDI Impact on International Trade"*, January 2007
Nº 234	Jorge M. S. Valente, *"Heuristics for the single machine scheduling problem with early and quadratic tardy penalties"*, December 2006
Nº 233	Pedro Cosme Vieira and Aurora A. C. Teixeira, *"Are Finance, Management, and Marketing Autonomous Fields of Scientific Research? An Analysis Based on Journal Citations"*, December 2006
Nº 232	Ester Gomes da Silva and Aurora A. C. Teixeira, *"Surveying structural change: seminal contributions and a bibliometric account"*, November 2006
Nº 231	Carlos Alves and Cristina Barbot, *"Do low cost carriers have different corporate governance models?"*, November 2006
Nº 230	Ana Paula Delgado and Isabel Maria Godinho, *"Long term evolution of the size distribution of Portuguese cities"*, September 2006
Nº 229	Sandra Tavares Silva and Aurora A. C. Teixeira, *"On the divergence of evolutionary research paths in the past fifty years: a comprehensive bibliometric account"*, September 2006
Nº 228	Argentino Pessoa, *"Public-Private Sector Partnerships in Developing Countries: Prospects and Drawbacks"*, September 2006
Nº 227	Sandra Tavares Silva and Aurora A. C. Teixeira, *"An evolutionary model of firms' institutional behavior focusing on labor decisions"*, August 2006
Nº 226	Aurora A. C. Teixeira and Natércia Fortuna, *"Human capital, trade and long-run productivity. Testing the technological absorption hypothesis for the Portuguese economy, 1960-2001"*, August 2006
Nº 225	Catarina Monteiro and Aurora A. C. Teixeira, *"Local sustainable mobility management. Are Portuguese municipalities aware?"*, August 2006
Nº 224	Filipe J. Sousa and Luís M. de Castro, *"Of the significance of business relationships"*, July 2006
Nº 223	Pedro Cosme da Costa Vieira, *"Nuclear high-radioactive residues: a new economic solution based on the emergence of a global competitive market"*, July 2006
Nº 222	Paulo Santos, Aurora A. C. Teixeira and Ana Oliveira-Brochado, *"The 'de-territorialisation of closeness' - a typology of international successful R&D projects involving cultural and geographic proximity"*, July 2006
Nº 221	Manuel M. F. Martins, *"Dilemas macroeconómicos e política monetária: o caso da Zona Euro"*, July 2006
Nº 220	Ana Oliveira-Brochado and F. Vitorino Martins, *"Examining the segment retention problem for the "Group Satellite" case"*, July 2006
Nº 219	Óscar Afonso Rui and Henrique Alves, *"To Deficit or Not to Deficit": Should European Fiscal Rules Differ Among Countries?"*, July 2006
Nº 218	Rui Henrique Alves and Óscar Afonso, *"The "New" Stability and Growth Pact: More Flexible, Less Stupid?"*, July 2006
Nº 217	J Maciej Cieślukowski and Rui Henrique Alves, *"Financial Autonomy of the European Union after Enlargement"*, July 2006
Nº 216	Joao Correia-da-Silva and Carlos Hervés-Beloso, *"Prudent Expectations Equilibrium in Economies with Uncertain Delivery"*, June 2006
Nº 215	Maria Rosário Moreira and Rui Alves, *"How far from Just-in-time are Portuguese firms? A survey of its progress and perception"*, June 2006
Nº 214	Maria Fátima Rocha and Aurora A.C. Teixeira, *"A cross-country evaluation of cheating in academia: is it related to 'real world' business ethics?"*, June 2006

Nº 213	Maria Rosário Moreira and Rui Alves, *"Does Order Negotiation Improve The Job-Shop Workload Control?",* June 2006
Nº 212	Pedro Cosme da Costa Vieira and Aurora A. C. Teixeira, *"Human capital and corruption: a microeconomic model of the bribes market with democratic contestability",* May 2006
Nº 211	Ana Teresa Tavares and Aurora A. C. Teixeira, *"Is human capital a significant determinant of Portugal's FDI attractiveness?"*, May 2006
Nº 210	Maria Rosário Moreira and Rui Alves, *A new input-output control order release mechanism: how workload control improves manufacturing operations in a job shop*, April 2006
Nº 209	Patrícia Teixeira Lopes and Lúcia Lima Rodrigues, *Accounting for Financial Instruments: An Analysis of the Determinants of Disclosure in the Portuguese Stock Exchange*, April 2006
Nº 208	Pedro Cosme Costa Vieira, *Energia nuclear: Uma solução para Portugal?*, April 2006
Nº 207	Aurora A.C. Teixeira and Joana Costa, *What type of firm forges closer innovation linkages with Portuguese Universities?*, March 2006
Nº 206	Joao Correia-da-Silva and Carlos Hervés-Beloso, *Rational Expectations Equilibrium in Economies with Uncertain Delivery*, March 2006
Nº 205	Luís Delfim Santos and José Varejão, *Employment, Pay and Discrimination in the Tourism Industry*, February 2006
Nº 204	Carlos F. Alves and Victor Mendes, *Mutual fund flows' performance reaction: does convexity apply to small markets?*, February 2006
Nº 203	Carlos F. Alves and Victor Mendes, *Are mutual fund investors in jail?*, February 2006
Nº 202	Óscar Afonso and Paulo B. Vasconcelos, *Numerical computation for initial value problems in economics*, February 2006
Nº 201	Manuel Portugal Ferreira, Ana Teresa Tavares, William Hesterly and Sungu Armagan, *Network and firm antecedents of spin-offs: Motherhooding spin-offs*, February 2006
Nº 200	Aurora A.C. Teixeira, *Vinte anos (1985-2005) de FEP Working Papers: um estudo sobre a respectiva probabilidade de publicação nacional e internacional*, January 2006
Nº 199	Samuel Cruz Alves Pereira, *Aggregation in activity-based costing and the short run activity cost function*, January 2006
Nº 198	Samuel Cruz Alves Pereira and Pedro Cosme Costa Vieira, *How to control market power of activity centres? A theoretical model showing the advantages of implementing competition within organizations*, January 2006
Nº 197	Maria de Fátima Rocha and Aurora A.C. Teixeira, *College cheating in Portugal: results from a large scale survey*, December 2005
Nº 196	Stephen G. Donald, Natércia Fortuna and Vladas Pipiras, *Local and global rank tests for multivariate varying-coefficient models*, December 2005

Editor: Sandra Silva (sandras@fep.up.pt)
Download available at:
http://www.fep.up.pt/investigacao/workingpapers/workingpapers.htm
also in http://ideas.repec.org/PaperSeries.html

www.fep.up.pt

Faculdade de Economia da Universidade do Porto
Rua Dr. Roberto Frias, 4200-464 Porto | Tel. 225 571 100
Tel. 225571100 | www.fep.up.pt