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Macroeconomic Aspects of Structural Labor Market Reforms in Germany

by

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Abstract:

Using a newly constructed macroeconometric model for Germany and the rest of the Euro area, we investigate the macroeconomic effects of structural labor market reforms in Germany. We find that neither the fact that Germany can no longer pursue an independent monetary policy nor the possibility that other countries in the Euro area might react to reforms in Germany by implementing labor market reforms themselves constitute impediments to successful reforms. Reforms would relative quickly bring down unemployment and increase GDP significantly. Even former labor market "insiders" would gain as net wages increase due to falling unemployment insurance contributions.

Keywords: labor market reforms, macroeconometric model, Germany, Euro area

JEL classification: E24, J64

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1. Introduction

Mass-unemployment is one of the urgent problems of the German economy. Five million registered and a high number of non-registered unemployed do not contribute to the aggregate production process. The overwhelming majority receives transfer payments which have to be paid for by the employed via higher taxes and social security contributions that lower their work incentives and are a burden on potential output growth. On the other hand, the unemployed constitute a major resource for a temporary acceleration of potential output growth.

After more than 30 years of experience with enduring mass-unemployment in Germany and other industrial countries, the causes of unemployment are no longer controversial among economists. The majority of economists is convinced that the incentives to work that are grounded in the institutional framework of the labor market are responsible for unemployment. This view is well founded, both theoretically and empirically. On the theoretical side, it is based on the new labor market theories, in particular the insider-/outsider theory and the efficiency wage theory (e. g. Layard et al. 1991). According to these theories, regulations that benefit workers such as high replacement rates or high employment protection laws will increase wage demands and actual wages of workers and lead to a wage level that is above the market clearing level. Combined with a neoclassical model of labor demand, this implies that unemployment increases as a result of these regulations. This unemployment will be "structural" as opposed to cyclical; it will not vanish in the long run. More detailed summaries of these theories can be found in Phelps (1997), Phelps and Zoega (1998), and Ljungqvist and Sargent (1998). On the empirical side, these theories are well grounded, too. Cross-country studies show that variables such as the replacement rate benefit duration the power of unions and the coverage of collective bargaining and the strictness of employment protection laws significantly help explaining the rate of unemployment (see e. g. Nickell et al. 2005) .

The key to returning to full employment, thus, lies with correcting the incentives that result from the institutional framework of the labor market and the social security system. Reforms of the institutional framework would cause the wage level to fall back to the market clearing level and this would stimulate labor demand. At the same time, work incentives would be strengthened. All in all, employment could increase strongly, depending on the reforms. A return to full employment is in principle possible.

Some opponents of structural labor market reforms in Germany accept the argumentation summarized above but argue that an actual implementation of reforms would lead to adverse macroeconomic consequences that are economically and socially too costly. They argue that

the wage restraint caused by structural labor market reforms would inevitably lead to a significant weakening of domestic demand and may thus destabilize the economy, possibly leading to low capacity utilization or even recession. In their view, this is true the more so as a centralized monetary policy conducted by the European Central Bank (ECB) on the basis of the economic stance of the entire Euro area may not be able to support labor market reforms in Germany in an adequate way. In addition, they argue that partner countries in the Euro area may respond to a fall in price competitiveness caused by wage restraint in Germany by initiating reforms themselves, thus reducing the functioning of the external competitiveness channel that could otherwise make up for the weakness of domestic demand.

The present study takes up these arguments and looks at the reform process from a macroeconomic perspective. We investigate what macroeconomic effects structural labor market reforms in Germany would have and what interactions of the main macroeconomic variables and the macroeconomic authorities will ensure a successful implementation of the reform process. While we do not deal with the precise reforms for labor market institutions – these have to be assessed in a microeconomic framework and are beyond the scope of the present paper –, we account for the fact that Germany can no longer pursue an independent monetary policy. We also account for the possibility that other countries in the Euro area might follow the German example and implement labor market reforms themselves.

To address these questions, we construct an empirical macroeconomic model for Germany. The model has two characteristics that distinguish it from other models of this kind for Germany. First, it has a consistently modeled supply framework, similar to recent work for France (Carnot 2002, Bhagli et al. 2004, Boissay and Villetelle 2005) and for the Euro area (Fagan et al. 2004, Beffy et al. 2003). Factor demand and price setting decisions of firms are derived from a production function and the assumption of profit maximization; the wage setting function is derived from insider-/outsider- and efficiency wage theories. As a result, the supply side may serve to explain how changes in labor market institutions affect wage setting and factor demand and, together with aggregate demand developments, lead to unemployment. Second, the model contains an extension for the—highly aggregative modeled—rest of the Euro area. This extension allows us to discuss questions with respect to monetary policy and with respect to the reaction of the partner countries in the Euro area. Simulations with the model show that it is well capable of replicating the macroeconomic developments in Germany and the Euro area since the early 1970s.

Our answer to the question whether the interaction of the main macroeconomic variables and authorities will ensure a relatively frictionless implementation of the reform process is an unrestricted yes. All simulations with the model come more or less to the same conclusion, that labor market reforms will relative quickly lead to a fall in unemployment and a significant increase in income. Even domestic demand will remain relatively robust. While the wage bill will be dampened in the first years of the reform, disposable income of private

households will not be depressed as lower labor costs also imply higher profit income. Still, in the long-run the functional income distribution is practically unchanged. Even the former "insiders" of the labor markets gain despite lower labor costs: net wages increase since contributions to unemployment insurance are cut with the fall in the unemployment rate. The results do not rely on stark assumptions regarding the support by macroeconomic policies. All that is required is that the monetary and fiscal authorities act according to their "normal" rules. That is, monetary policy follows a Taylor-rule and fiscal policy lets the automatic stabilizers work.

The remainder of the paper is structured as follows. In section 2 we establish the theoretical structure of the model. This includes the derivation of the supply side, highlighting of the key aspects that plays a role on the demand side of the model, and the description of links between the German economy and the EU11. Furthermore, we briefly analyze the dynamic properties of the stochastic equations of the model. In section 3 we present a battery of simulation results assessing the consequences of labor market reforms in Germany under different sets of assumptions. Section 4 concludes the paper.

2. The Model

We model the German economy by a neo-classical steady-state equilibrium that is derived from the supply side of the model and a Keynesian demand side, which determines the short-run output and dynamics. This approach is in line with the current consensus that the long-run equilibrium of a model should be consistent with a neoclassical steady-state growth path so that pure demand driven shocks can only have temporary effects (Goodfried and King 1998, Clarida et al. 1999)

The supply side block of the German economy is a set of estimated equations that are derived rigorously from the assumption of profit maximizing agents in a monopolistic competition environment, constant returns to scale with a Constant-Elasticity-of-Substitution (CES) production function, and labor market bargaining theory. It determines potential output in the long-run. The demand side of the German economy is modeled in a fairly standard New Keynesian way with persistent inflation. It determines output in the short-run. The EU11 is modeled in a somewhat less detailed way – though endogenously. Its supply side is implemented in a reduced form by simply approximating potential output by means of a Hodrick-Prescott filter. The demand side of the EU11 is summarized by the three components domestic demand, exports and imports.

2.1 The German Economy

2.1.1 Supply Side

Theoretical structure

The supply side of the model determines the level of potential output, demand for production factors and prices. It shows strong similarities to that presented by Carnot (2002) or Turner et al. (1996). One of the main characteristics of recent macroeconometric models is that they are consistently based on sound microeconomic foundations. We assume in this model that total production is determined by a Constant-Elasticity-of-Substitution (CES) function with two factors, namely capital K and labor L:

$$(1) \qquad Y = \left[\delta K^{\frac{\sigma-1}{\sigma}} + (1-\delta)\left(L e^{\bar{e}}\right)^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}},$$

where σ denotes the elasticity of substitution between the two factors, $\bar{e}$ is the level of technical progress, and δ a scaling parameter. Technical progress is assumed to be Harrod-neutral. This is consistent with the data on labor and capital productivity in Germany in the sample period, which show clearly upward trending labor productivity and stationary capital productivity. Besides, for a general CES production function a steady state growth path is only feasible under the assumption of labor augmenting technical progress (Gahlen 1973). Approximating the CES production function by a first order log-linear approximation yields the following expression for potential production:

$$(2) \qquad \bar{y} = \delta\left(\bar{l} + \bar{e}\right) + (1-\delta)k,$$

where k is the stock of capital and $\bar{l}$ (potential hours worked) is determined by the number of individuals in the labor force minus the number of workers who are unemployed for structural reasons times the average number of hours worked per capita.

We assume that all firms act according to profit maximization and face a constant price elasticity of demand for their products in a monopolistic competitive market. Under these assumption firms will produce a specific quantity such that the relation of prices to marginal costs is fixed and depends on the demand elasticity. If all firms act along these lines, the macroeconomic demands for the production factors are given by

$$(3a) \qquad l = c_1 + y - \sigma\left(w^p - p\right) - (1-\sigma)\bar{e}$$

(3b) $$k = c_2 + y - \sigma \frac{uc}{\exp(p)}.$$

Here, p is the price level, $w^p - p$ refers to the real unit labor cost, uc are the user cost of capital and c_1 and c_2 are parameters determined by the price elasticity of demand.

Profit maximization in the monopolistic competitive environment requires that the firms set their prices equal to marginal costs plus some mark-up. For the empirical implementation, we follow Turner et al. (1996) and Fagan et al. (2001) and presume that this mark-up is a function positively related to the output-gap $y - \overline{y}$, i.e. firm's power to raise prices increases with increasing factor utilization:

(4) $$p = \gamma(y - \overline{y}) + \delta(w^p - \overline{e}) + (1 - \delta)uc$$

The supply of labor and capital is determined by the households reflecting their preferences for income and leisure and their inter-temporal consumption preferences, respectively. However, instead of relying on an equation describing the supply of labor, we incorporate a wage-setting equation into the supply side of the model. As shown by Layard et al. (1991) and Manning (1994) such a function can be derived from labor market theories like for instance the insider-outsider theory or the efficiency wage theory. In this way the wage setting mechanism in our model is rigorously based on rational acting of firms and workers. Accordingly, workers' target wage depends on the labor productivity, the unemployment rate and a set of institutional factors of the labor market. Following Fagan et al. (2001), we do not model the latter factors explicitly. Rather we estimate the structural unemployment rate[1], which can be seen as the joint effect of all institutional aspects of the labor market. Consequently, the target wage can be written as a discount of the labor productivity that is larger the higher the unemployment rate rises above its structural level:

(5) $$w^b = p + \overline{e} - \alpha(U - \overline{U}),$$

where w^b denotes the pre-tax wage, U is the unemployment rate, and $\overline{U}$ its structural component. α captures the sensitivity of the target wage with respect to the unemployment gap and can be interpreted to be a measure of wage flexibility (see also Carnot 2002)

[1] For the estimation of the structural rate we suppose that all non-cyclical components of the unemployment rate are caused by institutional issues and are, hence, of structural nature. In this case the structural unemployment rate can be determined by means of a Hodrick-Prescott filter.

Parameter Estimates

The most crucial determinants of the supply side are the productivity growth rate $\Delta\bar{e}$ as well as the elasticity of substitution between labor and capital σ and the parameter capturing the sensitivity of the wages with respect to the unemployment rate α. In contrast to many other studies and macroeconomic models, we actually do not make the restrictive assumption that the Harrod-neutral technical progress follows a constant growth path given by a fixed parameter. In particular, estimating the trend growth path $\Delta\bar{e}_t$ as the non-cyclical component of the Solow-residuum by means of a Hodrick-Prescott filter shows a time variable growth rate, which exhibits a downward trend from 4% in the 1960s to about 1.5% in the recent years (Figure 1).[2]

As commonly done in the literature (Carnot 2002, Turner et al. 1996) we use the labor demand function (3a), which we augment to include terms capturing dynamic short-run effects, to estimate the elasticity of substitution between labor and capital. Under the assumption of time varying productivity growth the estimate for σ is 0.23. This is somewhat lower than the usual estimates found in other studies that imposes a constant trend growth path of productivity. Carnot (2002), for instance, finds a value of 0.38 for the French economy. And Berthold et al. (2003) report a far higher elasticity of substitution of 1.5 for Germany. Rowthorn (1998), however, shows in an international meta-study that in only three out of 52 analyzed studies the elasticity was found to be larger than 0.5.

Figure 1 - Time varying trend growth rate of labor productivity (percentage points) 1960–2004

[2] Kamps et al. (2004) do find a similar decline in labor productivity growth rates.

Estimating a dynamic version of the wage setting equation (5) we find an estimate for α of 1.7. This number is somewhat low compared to other estimates in the literature[3] and suggests a high degree of rigidity in the German labor market.

2.1.2 Demand Side

The demand side of the model determines actual output in the short-run. It consists of a set of equation, which model the different components of aggregate demand. In the following we summarize the most important points for understanding the design of the composition of total domestic demand:

- Household consumption depends on real disposable income, the real interest rate, the effective real exchange rate, and consumer price inflation. The exchange rate is included to capture terms-of-trade effects as, according to e.g. Kohli (2004), there exist a substantial connection between changes in the real exchange rate and consumption expenditure.
- Real disposable income itself consists of several separately modeled components. It is the sum of net wage payments (calculated from the labor supply and the net wages), pension payments and other monetary transfer payments, and firm profits.
- A distinct feature of our model is the endogenous determination of pension payments in dependence of real wages and the other monetary transfer payments in dependence of total production and the unemployment rate. The first determinant is included to take into account that the wealthier the society becomes the higher transfer payments are paid, whereas the inclusion of the unemployment rate reflects the fact that most of the payments are paid out as unemployment benefits.
- Investment is disaggregated into housing investment and firm investment. Housing investment depends in a standard way on real disposable income, the real interest rate and demographical factors. Firm investment depends on total output and the user cost of capital.
- Government expenditures are included in a very simplistic way. They are modeled in dependence of total production only.
- Import and export functions are defined in a fairly standard way. Imports are related to domestic demand plus exports and a price index measuring prices of imports others

[3] Carnot (2002) reports an overview about estimates that can be found in the literature. Among these, Turner et al. (1996) find a value of 4.2, L'Horty and Sobzack (1996) report values of 1.1-2.3, and Carnot himself finds a value of 4.2 in his MANEGE model.

than oil. Exports depend on total foreign demand and the real effective exchange rate based on producer prices. The point in which we deviate from the usual modeling approach is the separate treatment of trade with the EU11 in the sense that we estimate an import function for total aggregate imports and simultaneously a function describing the imports from EU11. Imports from ROW are in turn calculated for each period as the difference between the two. We treat exports analogously.

It is important to note that every demand component is related to its determining income variable (e.g. consumption to real disposable income or government expenditures to total output) by a homogeneity restriction to ensure that both grow by the same rate in steady-state in the long-run.

2.2 The Remaining Euro Area

The most important aspect in which our model differs to other EU country models is the way in which the EU11 are treated. So far, modeling involving the EMU has concentrated on the two extreme options. Either all national economies have been modeled separately (e.g. in the ESCB's Multi-Country-Model or NIGEM) or the EMU has been treated as one single economic entity (e.g. in the ESCB's AreaWideModel). For policy analysis or forecasting exercises primarily focused on one of the economies both approaches are clearly unsatisfactory. The total aggregation approach does not allow for inference about single economies while the other extreme introduces a huge amount of complexity into the model, which is not adequately rewarded in terms of better results for the main country of interest. We intend to bridge this gap by advancing an approach first proposed in Meier (2004).[4] It is essentially a 'three-layer' approach in the sense that one national economy of special interest (Germany in this case) is modeled very detailed and the EU11 are modeled also endogenous (though more rudimental) in an aggregated way whereas the rest of the world (ROW) is treated as exogenously determined.

2.2.1 Supply Side

The supply side of the EU11 is modeled in a very simplifying fashion. As commonly done in the design of theoretical models (Clarida et al. 1999, McCallum 2001) it is exclusively

[4] Pytlarczyk (2005) uses the same classification of areas for the construction of an estimated DSGE model of Germany within the euro area.

represented by a Phillips curve, which describes the development of the price level in dependence of the level of factor utilization in the economy. The potential production is approximated by the trend component of the aggregated GDP that is extracted by means of a Hodrick-Prescott filter. In addition the price level is affected by the price development in the EU11's trade partner's economies and a deterministic term that captures the disinflation process in the late 1980s and the run-up to the EMU during the 1990s (Coenen and Wieland 2005).

2.2.2 Demand Side

For modeling the demand side of the aggregated EU11 we essentially rely on the approach by Rae and Turner (2001), for which aggregate demand is subdivided into only three components, namely domestic demand, exports, and imports. For our purpose we add an equation determining the level of industrial production as this allows us to interlink the EU11 part of the model to the equations for the German economy. Together with the industrial production in ROW it serves as a proxy for foreign demand from the German perspective and enters as the main determinant in the German aggregated export function. This level of disaggregation allows for the analysis of all important channels of transmission between the German economy and the EU11 while keeping the model highly transparent at the same time. The three components of output in the EU11 are modeled along the following lines:

- Domestic demand is determined by aggregate total output and reacts to changes in the real interest rate. This last assumption is made to account for the elasticity of consumption expenditures and even more important of investment spending with respect to the real interest rate. In addition, it depends on the effective real exchange rate to capture any terms-of-trade effects.
- Total imports of the EU11 are given by the sum of imports from Germany plus imports from ROW. The former is identified by definition by German exports to the EU11 whereas we model the latter in dependence of domestic demand plus total exports of the EU11 and an index of import prices excluding oil items.
- Likewise, exports to Germany are determined by German imports from the EU11 in the model and EU11 exports to ROW are modeled by relating them to the industrial production in ROW and the effective real exchange rate between EU11 and ROW. Total exports are given by the sum of the two components.

It is worth mentioning that we again impose unity homogeneity restrictions also on these equations ensuring that the variables grow by the same rate in the steady-state.

2.3 Monetary Policy

Throughout this paper, we assume that monetary policy follows a Taylor rule. Taylor (1993, 1999) shows that this rule adequately describes the monetary policy in the US since the late 1980s. Clarida et al. (1998) argues that it is also plausible to model other central bank's reaction functions by means of this rule. The Taylor rule states that the central bank should determine its policy tool, the short term interest rate according to the following equation:

$$(5) \qquad i = i^{r*} + \Delta p + \beta_1(\Delta p - \Delta p^*) + \beta_2(y - \overline{y}),$$

where Δp^* denotes the target inflation rate and β_1 and β_2 are the weights attached to deviations from the target inflation rate and potential output, respectively. The central bank should, hence, raise the real interest rate above its equilibrium level if inflation lies above the target value and/or the output gap is positive. Note that for the ECB the reference value for its policy is not the German inflation rate but the change of the aggregated price level in the EMU.

2.4 Adjustment Mechanisms

The long-run potential growth of the economy is basically determined by a set of four variables that are exogenous to the model: The size of the labor force, average hours worked per capita, the structural unemployment rate, and the trend growth of productivity. In the short-run, however, the economy may deviate from this potential output path. The model includes several mechanisms that map the mechanisms, which force the economy back to its potential output level in the real world. Consider a positive shock to aggregate demand. By equation (3a), this will lead to an increased demand for labor. Due to the lower unemployment rate there will be upward pressure on the wage level. From equation (4) it can be seen that this in turn has spill-over effects on the price level. Furthermore, the increased factor utilization itself directly increases the price level because of the increased ability of firms to raise their prices. Eventually, the higher inflation leads to a moderation of aggregate demand via the private consumption expenditures. Moreover, there is a second main channel that triggers the adjustment process. Due to the relatively higher inflation, the economy looses

international competitiveness. That leads to higher imports and lower exports vis-à-vis both the EU11 and the rest of the world. In addition, the monetary policy is assumed to be non-neutral, e.g. following the Taylor principle, so that it would raise the real interest rate which would further reduce demand as all forms of investment expenditures would be depressed.

Not all of these mechanisms stand by to stabilize the economy of the EU11. As we do not model the wage setting process explicitly, the only channels that can work here after e.g. a demand shock are the increased ability of firms to set higher prices (which will eventually depress the domestic demand), the international competitiveness (which will decrease leading to higher imports and lower exports), and dampening effects of the monetary policy.

To ensure convergence to a new post-shock equilibrium at all (and preferably relatively rapidly), some conditions must be fulfilled. The semi-elasticity of wages with respect to unemployment (α) should be negative and the price level should react quickly to changes in factor costs, especially labor cost. Furthermore, it is important that price elasticity of imports and exports are sufficiently high.[5]

2.5 Single Equation Dynamics

When it comes to the empirical implementation of the theoretical framework, the macroeconomic model above translates into a macroeconometric model that is specified in form of error correction (EC) equations. We impose the long-run restrictions justified above (after testing them against the data) but estimate the coefficients on the error correction terms and the short run dynamics without any restriction. This is standard for modeling New-Keynesian macro models as theory tells little about the behavior of the short-term dynamics.

Due to price and wage stickiness the stabilizing mechanisms described in section 2.3 work only slowly. This allows for potentially sluggish response of variables to economic shocks. For stability reasons and the usefulness of the model for simulation exercises it is, however, necessary that the adjustment process is terminated within an adequate time period. That is the loading coefficients of the EC equations should be of reasonable size to ensure a relative fast movement towards a reestablished equilibrium. Table 1 summarizes the adjustment dynamics of the most important variables in the model after shocks to the indicated variables.

The multipliers are derived from single equation simulation and should, hence, be seen in a partial equilibrium sense. The results are obtained by simulating a permanent shock of 1% to

[5] More precisely: The sum of the absolute values of both elasticities should be at least larger than 1 (satisfying the so-called Marshall-Lerner condition) to ensure that a real depreciation leads to an improvement of the trade balance.

the indicated variables during the period 1974-2004. It is evident that the adjustment speed of the equations varies remarkably. Some variables reach the new equilibrium approximately after 5 years; namely private consumption, exports, consumer as well as producer prices[6], EU11 domestic demand and EU11 industrial production. Especially German exports almost immediately jump to the new equilibrium. For other variables the speed of adjustment is slower. Most strikingly it takes 3 years before we can observe any change in residential investment. Subsequently it takes more than 20 years until it reaches its new equilibrium. Investment spending reacts very rapidly. However, its increase is more than proportional and it takes more than 20 years in the model until it adjusts to the target level. Government spending reacts very sluggish. After 5 years only little more than one half of the adjustment is achieved. The overall price level reacts slowly to changes in factor costs. And most interestingly: The speed of adjustment is very different - depending on whether we simulate a shock to unit labor cost or to the user-cost of capital. Namely, we are able to confirm the finding of Carnot (2002) that the price level initially adjusts faster to higher labor cost than to higher user-cost of capital.

Table 1 - Single equation responses to a 1% shock from baseline scenario

	1 year	2 years	3 years	5 years	10 years	15 years	20 years	long run
Demand side								
Private consumption.. to real disposable income	0.80	0.88	0.93	0.98	1.00	1.00	1.00	1.00
Government spending to real GDP	0.30	0.51	0.49	0.58	0.85	0.94	0.98	1.00
Investment to real GDP	2.57	2.37	1.64	1.12	1.24	1.12	1.08	1.00
Residential investment to real GDP	0.00	0.00	0.78	0.26	2.20	2.47	1.60	1.00
Total exports to real foreign demand	0.58	0.83	0.93	0.99	1.00	1.00	1.00	1.00
Exports to EU11to dom. demand+exp. of EU11	1.03	1.01	1.01	1.00	1.00	1.00	1.00	1.00
Total imports to domestic demand plus exports	1.75	1.47	0.97	1.18	1.06	1.01	1.00	1.00
Imports from EU11 to dom. demand + exports	2.39	2.12	1.91	1.60	1.21	1.07	1.03	1.00
Supply side								
Labor demand to real GDP	0.87	0.96	0.98	0.90	1.03	1.00	1.00	1.00
Price level to user-cost of capital	0.00	0.05	0.11	0.19	0.27	0.29	0.30	0.30
Price level to labor cost	0.25	0.36	0.44	0.55	0.66	0.69	0.70	0.70
Producer price level to price level	1.25	0.41	0.91	0.91	0.91	0.91	0.91	0.91
Consumer price level to price level	0.37	0.73	0.87	0.74	0.71	0.70	0.70	0.70
Rest of the Euro Area								
EU11 domestic demand to EU11 real GDP	1.30	1.20	1.13	1.06	1.01	1.00	1.00	1.00
EU11 industrial production to EU11 real GDP	1.45	1.23	1.11	1.03	1.00	1.00	1.00	1.00

[6] Note that the two prices do not react one to one in the model to a change in the overall price level since we held constant the oil price as well as the import price index during the simulations.

3 Simulating the Macroeconomic Effects of Structural Labor Market Reforms

In the following we will use the model to simulate the effects of structural labor market reforms. We will not be specific about what precise measures constitute these reforms. Instead, we will implement these reforms as an exogenous reduction in the structural rate of unemployment. Specifically, we will simulate structural labor market reforms by a drop in the structural unemployment rate in Germany by of 5%.[7] This will cause an immediate fall in the structural unemployment rate to somewhat close to 5%, a figure which is reasonable given that the figures for countries with more flexible labor markets, such as the United States or the United Kingdom, show structural rates around 5% (IMF 1999). Initially, we assume that the full effect of the reforms takes place immediately. Consequently, the structural unemployment rate falls by 5% in the first year of the simulation.[8] All changes of other variables during the simulation period are triggered by this labor market shock.

3.1 Labor Market Reforms in Germany

In this first simulation we assume that labor market reforms take effect immediately and that no labor market reforms are undertaken in the EU11. We assume that fiscal policy acts according to the specified functions for government expenditure, pension payments, other social welfare payments, and contributions for unemployment insurance. Table A1 summarizes the effects of the labor market reforms. It shows deviations from the basis scenario in percentage points (unless otherwise indicated). Figure A1 gives a visual summary of the results. It shows the effects of reforms under the assumptions that the monetary policy follows a standard Taylor rule with β_1 and β_2 equal to 0.5 (blue line) and a modified Taylor rule that attaches more weight to deviations from potential output with β_2 equal to 1.5 (black line). It is clear that both policy assumption result in very similar outcomes. The modified version of the Taylor rule, however, leads to somewhat smoother adjustment process with less pronounced cyclical movements. Therefore, we work under the assumption of the modified Taylor rule in the remainder of this paper.

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[7] We are aware of the fact that in praxis it might be very hard – not to say impossible – to implement reforms that result exactly in the targeted reduction of the structural unemployment rate. For an appraisement of quantitative results of specific labor market reforms we refer to Nickell (2005) and the references therein.

[8] This construction of the simulation need not be regarded as unrealistic per se. A reduction of the unemployment benefits to its level during the 1960s (approx. 50% of the last net salary) could be implemented quite rapidly by the legislative bodies. And also other reforms like a relaxed dismissal protection could be implemented within a year or two. The assumption is relaxed in the last simulation.

The main result is that the reforms are effective without any major turbulence. It is clear, however, that the full effects are not achieved without delay. After five to ten years, however, much of the adjustment process is completed.[9] A precise termination of the full adjustment is difficult as the process is superposed by endogenously generated cyclical movements. Eventually, the unemployment rate is 5% lower and real GDP is 5% higher compared to the baseline. Important to note is that in the long-run, we cannot observe any distributional changes. The wage rate is as high as before the reforms. Only in the short-run it decreases since the reforms lead to a pronounced wage restraint while employment does not counterbalance this effect straight away due to the small wage elasticity of labor demand. In the short-run the price level falls short compared to the basis scenario. This is caused by lower wage cost and lower capacity utilization. The latter decreases because potential output increases by 3.5% given an elasticity of substitution of 0.7 of labor and a reduction of 5% of the structural unemployment rate.

In contrast to frequently articulated apprehensions the reforms have no negative impact on demand – not even in the short-run. The increased output relative to the basis scenario is mainly driven by investment and net exports which increase due to increased international compatibility of German firms. And even disposable income and private consumption are not negatively influenced. The initially decreasing wage rate is more than compensated for by increased firm profits. The EU11 are not negatively affected to a huge extend. The maximal drop in GDP compared to the basis scenario is 0.5% after two years. In the long-run there are no effects at all.

Recapitulating, we can say that the labor market reforms do not lead to any income losses in neither short- nor long-run. Admittedly, this scenario implies a nominal interest rate that is 2.2% lower in the third year compared to the basis scenario. Given the low level of interest rates that prevail in the EMU at the moment this is quite unrealistic. We treat this issue in the third simulation exercise where we model a gradual decline of the structural unemployment rate.

3.2 Labor Market Reforms in the Euro Area

A number of other European countries face similar labor market problems as Germany does. According to Laubach (2001), Richardson et al. (2000), and IMF (1999) those are predominately France, Spain, Italy, and Belgium. It is, hence, plausible to investigate what would happen should these countries undertake labor market reforms simultaneously to Germany. In fact, an announcement of reforms in Germany could increase pressure on those countries to follow. This is because a wage restraint in Germany would lead to increased

[9] The adjustment speed is considerably higher than under the assumption of a neutral monetary policy (results not presented in this paper).

competitiveness of Germany compared to the EU11. A possibility for the other EMU countries to circumvent the negative implications (although small as seen in the last section) would be to arrange for wage restraint in their economies to counteract the effects. By means of this simulation we want to analyze the implication of such behavior for the adjustment process in Germany.

A challenging technical point exists when it comes to implementation of this simulation as the supply side of the EU11 economy is captured only rudimentary in the model. A change of the structural unemployment rate for the EU11 can, hence, not be modeled directly. Instead, we change the potential output. To this end, it is assumed that the reforms in the EU11 are designed such that the potential output level is affected in the same magnitude and with the same dynamics as in Germany. The results are summarized in Table A2.

The most modified changes are naturally the ones of the variables regarding the EU11. Output in EU11 now converges to a level that lays 5% higher than the basis level whereas it was unaffected in the previous simulation. The high under-utilization in the EMU causes the price level to drop and the ECB to lower the interest rate by 4%.[10] The adjustment process in Germany is very similar to what we saw in the first simulation. Due to the lower interest rate the convergence speed is actually a little bit faster since especially interest rate elastic GDP components like residential investment and firm investments adjust very rapidly. Major changes can be observed with regard to the competitiveness. Germany looses competitiveness in the course of the simulation period against the EU11. Relevant for this result is the higher interest rate elasticity of demand in Germany.[11]

3.3 Instantaneous Versus Gradual Reform Implementation

So far we assumed that the effect of the labor market reforms takes place immediately in the first year. An alterative assumption could be that it requires a longer time span for them to come into effect. This might be due to technical implementation problems or because the entire reform basket cannot be agreed on due to political reasons. How long this process might take in practice shall not be discussed at this point. We assume in an ad-hoc way that

[10] Note again that such a drop of the interest rate is not practically achievable in the current macroeconomic environment in the EMU (it would presuppose unconventional measures like credit subsidies). Again a gradual implementation of the reforms as analyzed in the next simulation would be an appropriate responds to this finding.

[11] Initially German demand expands more rapidly than demand in the EU11. Thereby, the German price level decreases relatively less which causes German competitiveness to deteriorate.

the reduction of the structural unemployment rate by 5% is stretched linearly over 5 years. The results are presented in Table A3.

As expected, potential output now needs five years to increase by 3.5%. Analogously, the under-utilization of capacity is smaller in the first years. It decreases at most by 1% (compared to maximal decrease of approximately 3% in the other scenarios). The maximal wage restraint is reached not sooner than after six years and is somewhat smaller than in the other simulations.

Consequently, the price effects are also minor. In light of this, also the reaction of the ECB is less pronounced. The interest rate is lowed maximal 1% below the solution of the basis scenario. And, generally, we observe less fluctuation in the interest rate level in this scenario. It is also worth mentioning that the real interest rate as faced by German firms first stay constant and then decrease a little bit compared to the basis scenario. Demand does pick up slower. But as a consequence of the constant real interest rate, the delay is less than the five years over which we stretched the reform process. In sum, the results suggest that the loss of time due to gradual rather than instantaneous implementation of the reforms is not very high.

4. Conclusion

This study has looked at the macroeconomics of structural labor market reforms in Germany. The answer to the question, whether the interaction of the main macroeconomic variables and authorities will ensure a successful implementation of the reform process, is positive. All simulations implied that labor market reforms will relative quickly lead to a fall in unemployment and a significant increase in income. Even domestic demand will remain relatively robust. While the wage bill will be dampened in the first years of the reform, disposable income of private households will not be depressed as lower labor costs also imply higher profit income. Still, in the long-run the functional income distribution is practically unchanged. Even the former “insiders” of the labor markets gain despite lower labor costs: net wages increase since contributions to unemployment insurance are cut with the fall in the unemployment rate.

The results do not rely on stark assumptions regarding the support by macroeconomic policies. All that is required is that the monetary and fiscal authorities act according to their “normal” rules. That is, monetary policy follows a Taylor-rule and fiscal policy lets the automatic stabilizers work. If monetary policy supports the reform process with an early cut in interest rates, adjustment takes place somewhat faster.

Note that the policy scenarios calculated in this study do not see an independent role for wage policy. The labor market theories on which the analysis here is based do not regard wage policy as an exogenous policy instrument. Employees, unions and employer organizations and firms act rationally in the context of the economic incentives provided by the institutional framework of the labor market. Unemployment is the consequence of the interaction between institutions, macroeconomic shocks and rational behavior. It would not be a good advice to economic policy makers to hope for a change in the wage setting behavior without any sustained changes in the economic incentives.

The fact that Germany is part of the Euro area and that monetary policy is no longer under its control does not constitute a major obstacle to the success of the reform process. While the adjustment processes would probably work faster with monetary policy oriented only towards macroeconomic developments in Germany, the advantages would be small.

Possible reactions of the partner countries in the Euro area to labor market reforms in Germany are also no challenge to the success of the reforms. They are not very likely, as the negative effects of the reforms on EMU-partner countries that work via international price competitiveness effects are small. This is another reason why it is mistaken to call labor market reforms “beggar-thy-neighbor”-policies due to their international feedback effects. If the partner countries also decided to implement labor market reforms in their economies, this would not change the results for Germany. In this case, consumer prices in the Euro area would be dampened much more than under a scenario of isolated reforms in Germany. The European Central Bank (ECB) could, therefore, lower interest rates more aggressively.

The simulations indicate, in addition, that a gradual implementation of the reform process may be more feasible. If the labor market reforms are very decisive and are implemented all across the Euro area, an immediate implementation may require a very aggressive interest rate cut by the ECB which may not be possible technically given that interest rates are only about 2.5 percent at the moment. With a gradual implementation of labor market reforms, the interest rate cuts required to stabilize aggregate demand would be smaller.

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Table A1 - Labor market reforms in Germany

Year	1	2	3	4	5	10	15	20	30
Supply									
Potential Output	3.5	3.5	3.6	3.8	3.9	4.6	5.0	5.1	5.3
Capacity utilization	-3.3	-1.7	-1.4	0.5	0.8	0.3	0.8	0.2	0.2
Labor supply in hours	0.1	1.2	2.5	4.3	5.2	5.0	6.1	5.5	5.9
Unemployment rate	-0.1	-0.7	-2.1	-3.6	-4.4	-4.1	-5.1	-4.8	-4.8
Labor cost	0.0	-4.4	-4.4	-4.2	-3.1	-2.7	-1.0	-1.3	-1.1
GDP deflator	0.0	-3.7	-5.2	-5.0	-4.9	-3.0	-2.7	-2.8	-2.6
Capital stock of firms	0.0	0.3	0.6	1.2	1.8	3.1	4.3	4.5	5.1
Demand									
Real GDP	0.2	1.8	2.3	4.2	4.7	4.9	5.8	5.3	5.5
Private consumption	0.4	0.5	1.3	3.7	3.7	3.6	5.0	4.7	4.8
Residential investment	0.0	1.1	-0.7	-0.1	1.5	9.5	11.1	9.7	6.3
Firm investment	0.5	4.4	5.9	10.1	10.2	5.8	7.7	5.8	6.5
Exports	0.0	1.3	1.4	1.6	1.9	1.2	0.8	0.7	1.0
Imports	0.6	-2.8	-2.9	-0.1	-0.4	-0.9	0.5	0.7	-0.8
Trade balance (bio. €)	-0.1	0.6	0.7	0.2	0.3	0.3	-0.1	-0.1	0.3
Income Distribution									
Disposable income of households	0.2	1.0	1.0	3.8	3.8	4.4	5.5	5.2	5.2
Net wage bill	0.1	-3.1	-1.5	0.8	3.2	3.7	6.8	5.9	6.4
Profit income	0.6	15.3	13.3	16.7	12.8	13.5	8.1	8.1	7.5
Wage rate	-0.1	-2.9	-2.4	-2.3	-1.5	-1.5	-0.4	-0.5	-0.4
Fiscal policy									
Government spending	0.0	0.1	0.6	1.1	1.7	3.5	4.9	5.1	5.3
Contribution rate to unemployment insurance	0.0	-0.1	-0.2	-0.4	-0.6	-0.7	-0.9	-0.8	-0.8
Pension payments per head	0.0	0.0	-0.9	-1.5	-2.1	-1.4	-0.7	-0.3	-0.4
Unemployment benefits	-0.1	-0.9	-3.0	-4.6	-5.3	-5.7	-7.7	-9.9	-10.8
Competitiveness									
Total	0.0	4.6	3.3	3.6	4.5	2.6	1.5	1.6	2.0
Against EU11	0.0	4.7	3.1	3.5	4.4	1.9	0.5	0.5	1.5
Against RoW	0.0	4.6	3.5	3.7	4.5	3.3	2.5	2.5	2.4
Competitiveness of EU11									
Total	0.0	-0.5	-1.0	-1.3	-1.4	0.6	1.1	1.2	0.3
Against Germany	0.0	-1.4	-3.1	-4.1	-4.1	-0.8	-0.4	-0.2	-1.0
Against RoW	0.0	-0.1	0.2	0.3	0.2	1.3	2.0	2.0	1.0
Demand in EU11									
Real GDP	0.1	-0.5	-0.4	0.3	0.1	-0.1	0.1	0.3	0.0
Domestic demand	0.2	-0.5	-0.2	0.8	0.4	0.1	-0.1	0.1	-0.1
Exports	0.2	-0.9	-1.3	-0.8	-0.7	-0.3	0.6	0.6	-0.2
Imports	0.3	-1.3	-0.7	1.5	0.8	0.5	0.1	0.2	-0.5
Inflation									
Germany - CPI	0.0	-1.3	-2.0	-1.0	0.0	0.2	0.4	-0.2	0.1
Germany – GDP deflator	0.0	-3.7	-1.6	0.2	0.1	0.0	0.6	0.0	0.1
EU11 - CPI	0.0	0.1	-0.3	0.0	0.1	-0.2	0.0	0.0	0.1
EU12 - CPI	0.0	-0.3	-0.8	-0.3	0.1	-0.1	0.1	0.0	0.1
Monetary policy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nominal interest rate	-1.4	-1.8	-2.2	0.1	0.6	-0.1	0.7	0.3	0.3
Real interest rate in Germany	-1.4	1.9	-0.6	-0.1	0.4	0.0	0.1	0.4	0.2

Figure A1 - Effects of labor market reforms in Germany (standard and modified Taylor rule)

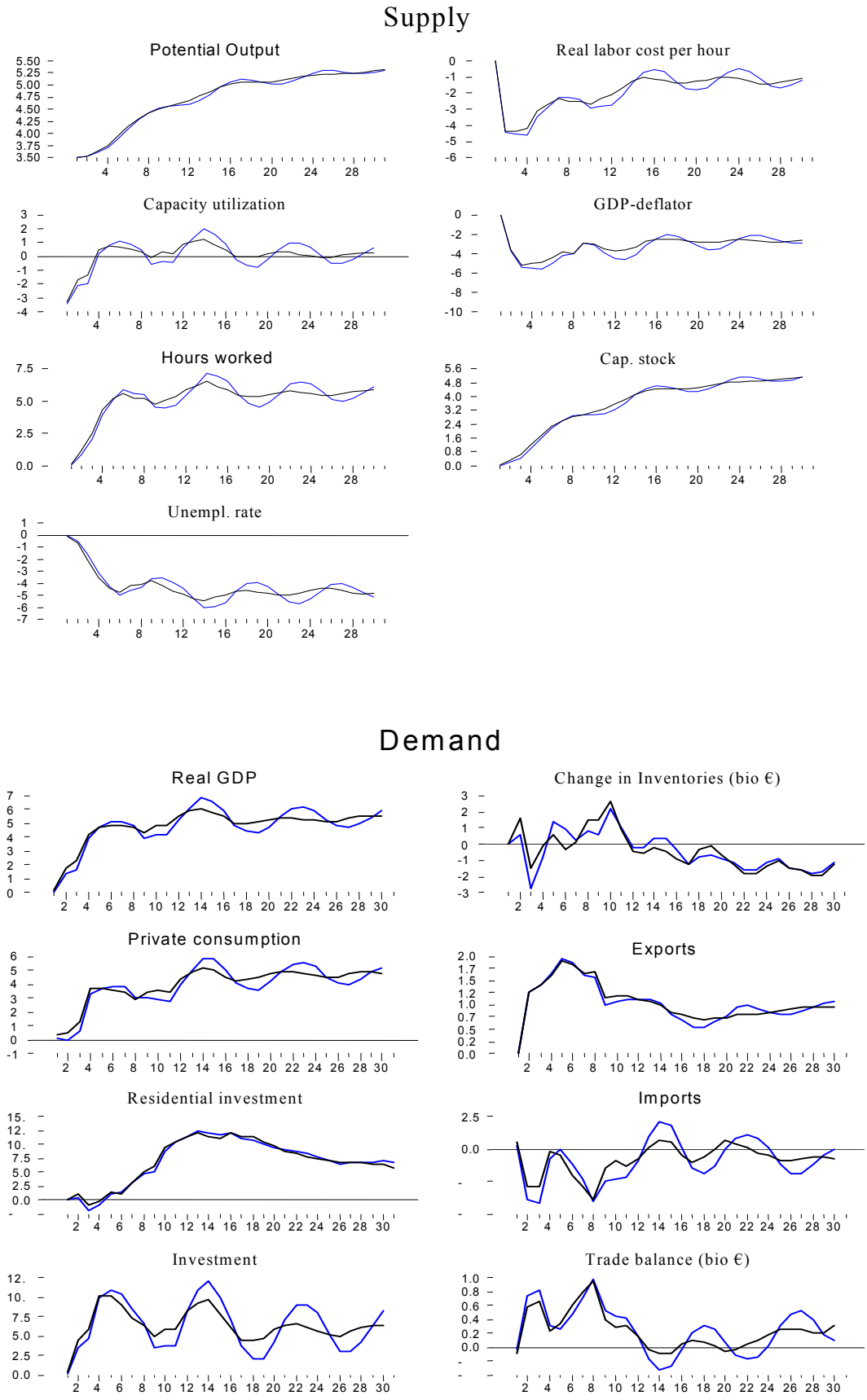

Figure A1 (continued)

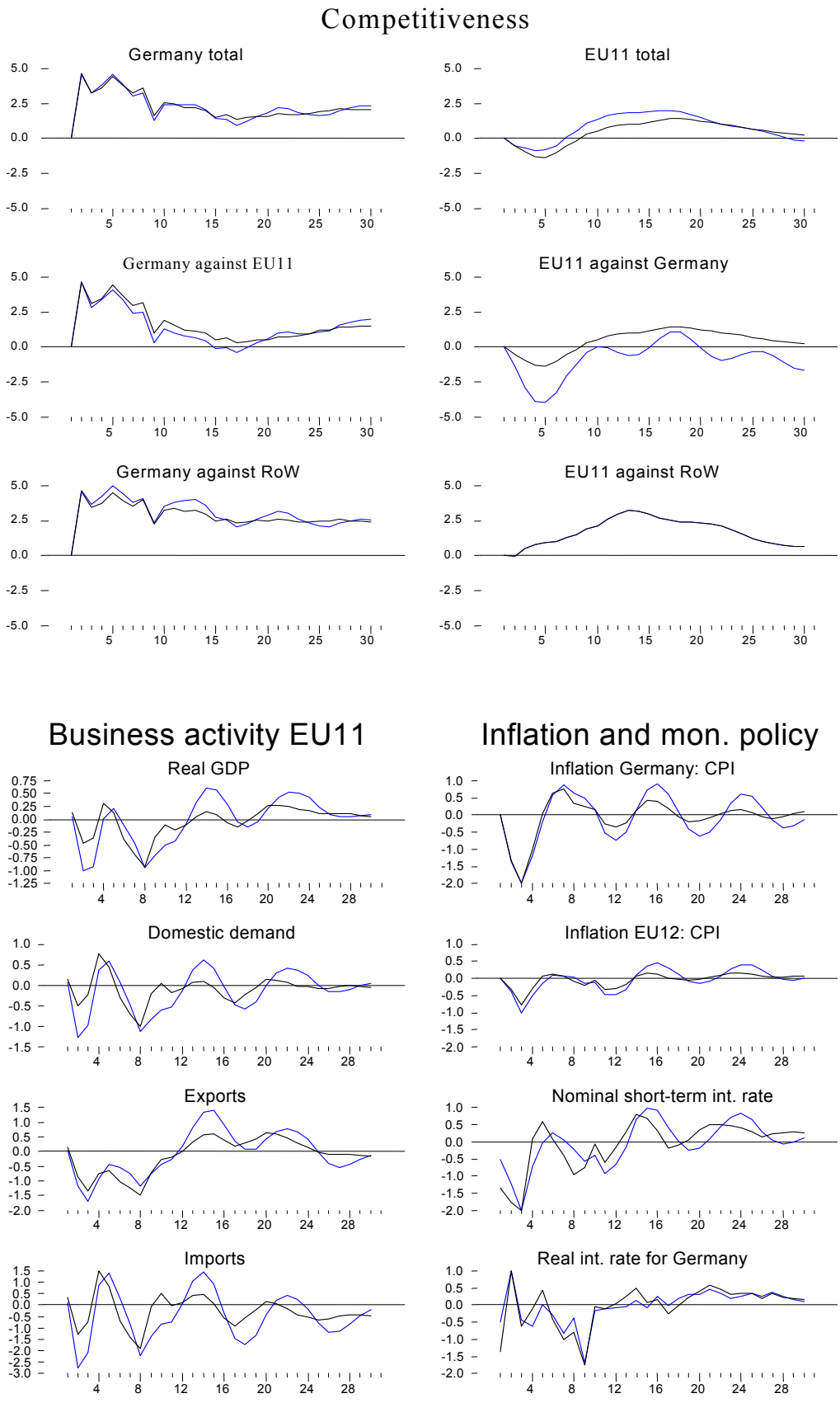

Table A2 - Labor market reforms in Germany and EU11

Year	1	2	3	4	5	10	15	20	30
Supply									
Potential Output	3.5	3.6	3.7	3.9	4.1	4.6	4.9	4.9	5.0
Capacity utilization	-2.8	-0.5	0.4	1.5	2.2	0.0	-0.1	-0.7	0.2
Labor supply in hours	0.4	2.1	4.0	5.5	6.6	4.6	5.3	4.7	5.4
Unemployment rate	-0.2	-1.3	-3.3	-4.6	-5.5	-3.9	-4.3	-4.1	-4.4
Labor cost	0.0	-4.2	-3.8	-3.0	-2.2	-2.5	-1.5	-2.2	-2.0
GDP deflator	0.0	-3.5	-4.7	-3.7	-3.2	-2.2	-2.9	-5.1	-6.6
Capital stock of firms	0.1	0.5	1.2	1.9	2.6	3.3	4.1	3.9	4.3
Demand									
Real GDP	0.7	3.1	4.2	5.4	6.3	4.6	4.8	4.2	4.9
Private consumption	1.3	2.3	3.4	6.3	6.5	6.0	6.3	5.4	4.3
Residential investment	0.0	3.5	3.1	3.0	6.4	14.6	12.2	8.2	1.1
Firm investment	1.6	7.3	10.4	12.6	12.8	4.5	5.2	4.5	6.4
Exports	0.0	0.9	0.9	0.5	0.5	-1.0	-1.0	-0.4	0.9
Imports	1.8	2.4	2.6	6.7	6.2	7.8	6.9	4.7	-1.0
Trade balance (bio. €)	-0.3	-0.3	-0.3	-1.0	-1.0	-1.6	-1.6	-1.1	0.4
Income Distribution									
Disposable income of households	0.7	2.5	2.9	5.6	6.1	5.4	5.4	4.7	4.5
Net wage bill	0.5	-1.9	0.8	3.5	5.7	3.4	5.3	3.9	4.9
Profit income	2.0	17.9	15.9	16.1	14.0	14.0	8.1	8.7	8.6
Wage rate	-0.2	-3.0	-2.3	-1.6	-1.1	-1.5	-0.6	-0.9	-0.8
Fiscal policy									
Government spending	0.0	0.2	1.1	1.9	2.4	3.8	4.7	4.3	4.4
Contribution rate to unemployment insurance	0.0	-0.1	-0.3	-0.5	-0.7	-0.7	-0.8	-0.7	-0.8
Pension payments per head	0.0	0.0	-0.8	-1.3	-1.7	-1.0	-0.7	-1.0	-1.2
Unemployment benefits	-0.3	-1.7	-4.4	-5.6	-6.4	-5.3	-6.5	-8.8	-10.6
Competitiveness									
Total	0.0	3.2	2.1	0.2	1.3	-2.1	-2.3	-0.6	2.0
Against EU11	0.0	2.0	1.4	-1.6	-0.4	-6.5	-7.6	-6.8	-4.1
Against RoW	0.0	4.4	3.0	2.4	3.2	2.4	2.6	4.5	6.1
Competitiveness of EU11									
Total	0.0	1.1	0.5	1.9	2.4	7.7	9.1	9.6	8.3
Against Germany	0.0	0.0	-1.6	-0.8	0.1	6.1	7.0	6.4	4.5
Against RoW	0.0	1.6	1.6	3.3	3.6	8.6	10.3	11.4	10.4
Demand in EU11									
Real GDP	0.4	1.9	1.7	2.7	2.7	4.0	4.5	4.9	5.1
Domestic demand	0.5	2.6	2.3	3.3	3.1	3.7	3.4	3.7	3.8
Exports	0.5	1.1	1.2	2.7	3.1	5.5	6.0	5.3	2.7
Imports	1.1	5.1	3.9	6.0	5.1	4.3	1.4	0.5	-1.1
Inflation									
Germany - CPI	0.0	-1.6	-1.7	-0.9	0.7	-0.4	0.3	-0.5	0.1
Germany – GDP deflator	0.0	-3.5	-1.2	1.0	0.5	-0.4	0.3	-0.3	0.1
EU11 - CPI	0.0	-1.6	0.0	-1.7	-0.3	-0.9	0.0	-0.1	0.1
EU12 - CPI	0.0	-1.6	-0.5	-1.5	0.0	-0.8	0.1	-0.2	0.1
Monetary policy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nominal interest rate	-4.4	-4.2	-2.3	-2.5	-0.1	-1.5	-0.2	-0.6	0.2
Real interest rate in Germany	-4.4	-0.7	-1.1	-3.5	-0.6	-1.2	-0.5	-0.2	0.1

Table A3 - Gradual labor market reforms in Germany

Year	1	2	3	4	5	10	15	20	30
Supply									
Potential Output	0.7	1.4	2.2	2.9	3.7	4.5	4.8	5.0	5.3
Capacity utilization	-0.7	-1.0	-1.3	-1.2	-1.1	0.3	0.8	0.2	0.2
Labor supply in hours	0.0	0.3	0.8	1.7	2.7	5.2	6.1	5.5	5.7
Unemployment rate	0.0	-0.2	-0.6	-1.4	-2.2	-4.2	-5.1	-4.7	-4.7
Labor cost	0.0	-0.9	-1.7	-2.5	-3.1	-2.4	-1.6	-1.2	-1.2
GDP deflator	0.0	-0.7	-1.8	-2.8	-3.7	-3.4	-3.3	-2.7	-2.5
Capital stock of firms	0.0	0.1	0.2	0.4	0.8	2.8	3.8	4.4	5.1
Demand									
Real GDP	0.0	0.4	0.9	1.7	2.7	4.8	5.6	5.2	5.4
Private consumption	0.1	0.2	0.4	1.2	1.9	3.5	4.5	4.5	4.7
Residential investment	0.0	0.2	0.1	0.0	0.3	5.3	11.1	9.9	7.2
Firm investment	0.1	1.0	2.3	4.3	6.2	6.8	8.0	5.4	5.9
Exports	0.0	0.3	0.5	0.8	1.2	1.4	1.0	0.8	0.9
Imports	0.1	-0.4	-1.0	-0.9	-1.2	-2.2	-0.1	0.1	-0.6
Trade balance (bio. €)	0.0	0.1	0.2	0.3	0.4	0.5	0.1	0.1	0.3
Income Distribution									
Disposable income of households	0.0	0.3	0.4	1.2	1.9	3.9	5.1	5.1	5.1
Net wage bill	0.0	-0.6	-0.8	-0.6	0.0	4.2	6.1	5.9	6.1
Profit income	0.1	3.5	6.1	9.1	11.1	11.7	9.2	8.1	7.6
Wage rate	0.0	-0.6	-1.1	-1.5	-1.8	-1.1	-0.7	-0.5	-0.5
Fiscal policy									
Government spending	0.0	0.0	0.1	0.4	0.7	3.0	4.4	5.0	5.3
Contribution rate to unemployment insurance	0.0	0.0	-0.1	-0.1	-0.3	-0.7	-0.9	-0.9	-0.8
Pension payments per head	0.0	0.0	-0.2	-0.5	-0.9	-1.7	-1.0	-0.3	-0.4
Unemployment benefits	0.0	-0.2	-0.9	-1.8	-2.8	-5.7	-7.9	-9.7	-10.5
Competitiveness									
Total	0.0	0.9	1.6	2.3	3.2	2.8	2.1	1.6	1.9
Against EU11	0.0	0.9	1.6	2.2	3.1	2.5	1.1	0.5	1.3
Against RoW	0.0	0.9	1.6	2.3	3.2	3.2	2.9	2.5	2.3
Competitiveness of EU11									
Total	0.0	-0.1	-0.3	-0.6	-0.9	-0.3	0.8	1.3	0.3
Against Germany	0.0	-0.3	-0.9	-1.7	-2.5	-1.8	-0.9	0.0	-0.9
Against RoW	0.0	0.0	0.0	0.1	0.1	0.6	1.8	2.0	1.0
Demand in EU11									
Real GDP	0.0	-0.1	-0.1	0.0	-0.1	-0.5	0.0	0.1	0.1
Domestic demand	0.0	-0.1	-0.1	0.1	0.1	-0.5	0.0	0.0	0.0
Exports	0.0	-0.1	-0.4	-0.5	-0.7	-0.9	0.2	0.4	-0.1
Imports	0.1	-0.1	-0.3	0.1	0.1	-0.9	0.2	-0.1	-0.5
Inflation									
Germany - CPI	0.0	-0.3	-0.7	-0.8	-0.8	0.5	-0.1	0.0	0.0
Germany – GDP deflator	0.0	-0.7	-1.1	-1.0	-1.0	0.4	0.1	0.0	0.1
EU11 - CPI	0.0	0.0	0.0	0.0	0.0	-0.2	-0.1	0.0	0.1
EU12 - CPI	0.0	-0.1	-0.2	-0.3	-0.2	0.0	-0.1	0.0	0.1
Monetary policy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nominal interest rate	-0.3	-0.6	-1.0	-1.0	-0.9	-0.4	0.2	0.1	0.3
Real interest rate in Germany	-0.3	0.1	0.0	0.0	0.1	-0.9	0.1	0.2	0.2
Structural unemployment rate	-1.0	-2.0	-3.0	-4.0	-5.0	-5.0	-5.0	-5.0	-5.0