

## Real wages and monetary policy transmission in the euro area

by  
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### Abstract

We use the Factor-Augmented Vector Autoregression (FAVAR) approach of Bernanke, Boivin and Elias (2005) to estimate the effects of monetary policy shocks on wages and employment in the euro area. The use of a large data set comprising country, sectoral and euro area-wide data allows us to better identify common monetary policy shocks in the euro area and their effects on labour market outcomes. At the same time the FAVAR approach gives us estimates of how relative wages and employment in the various countries and sectors respond to these common shocks.

JEL: E3, E4, J3, J6

Key words: VAR, factor models, wage rigidity, labour market

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## 1. Introduction

Over the past two decades, a large literature has developed on measuring the effects of monetary policy shocks on the economy using identified Vector Autoregressions.<sup>1</sup> As a result a set of stylized facts have emerged which can be used for model validation. Typically, following a tightening of monetary policy, real economic activity drops with a peak effect of about a year, while prices respond much slower. More recently, a number of studies have focused on the response of the labour market to a monetary policy tightening. Investigating the labour market response is useful to validate which features and frictions of modern labour-market matching models should be included in micro-founded New Keynesian DSGE models that can be used for policy analysis. However, typically the focus is on how the quantity of labour rather than the wage adjusts. Recent examples are Trigari (2005), Braun et al (2007) and Simonelli and Ravn (2006). The latter study uses structural VARs to analyze the dynamic labour market effects of four identified impulses to the US business cycle. Simonelli and Ravn (2006) find that in response to a monetary policy shock employment, hours per worker and vacancies drop in line with output, while unemployment shows a hump-shaped increase. In the short-run labour productivity falls. Employment responds by much more than hours per worker. In addition, Trigari (2005) and Braun et al (2007) examine the effects of a monetary policy shock on the job creation and destruction rate. However, neither of those three papers investigate the effect on wages.

In this paper, we analyse the effects of monetary policy shocks on labour market variables in the euro area and focus in particular on the response of prices and wages. As argued by Normandin (2006), the sign of the real wage response can give an indication of the relative importance of nominal wage versus nominal price rigidities. If nominal wage stickiness is relatively more important, then the real wage could fall following an expansionary monetary policy shock. In contrast, when price stickiness and limited participation restrictions are relatively more important, the real wage should rise in line with output. Finding the source of nominal stickiness is important for the design of optimal monetary policy. As argued by Erceg, Henderson and Levin (2002) and Onatski, Levin, Williams and Williams (2004), knowledge about the relative importance of nominal wage versus price stickiness will be important for determining how much weight to put on nominal wage inflation in the central bank's policy deliberations.

In this paper, we investigate the response of wages to a monetary policy tightening using the FAVAR approach of Bernanke et al (2005) for mainly two reasons. First, the large data-set approach allows us to concentrate on the more recent estimation period using quarterly data. As shown by Bernanke et al (2005) and Boivin and Giannone (2006) using large data sets helps pinning down the effects of monetary policy shocks, which becomes even more important if the time series dimension is relatively short. In contrast to Normandin (2006) who estimates separate VARs for different countries, we

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<sup>1</sup> See Christiano, Eichenbaum and Evans (1999) and Peersman and Smets (2003) for an overview on US and euro area evidence respectively.

analyse the impact of a common monetary policy shock on the various euro area countries.<sup>2</sup> A second advantage of the FAVAR approach is that it allows us to directly compare the labour market responses across countries and sectors, which we can then be related to differences in labour market institutions.

Overall, the literature has come to different conclusions regarding how real wages respond to changes in monetary policy. Christiano, Eichenbaum and Evans (1999) find that real wages rise following an expansionary monetary policy shock. However, the increase does not appear to be very significant. This result seems to be robust to economy-wide and sector-specific measures of real wages (Eichenbaum et al, 1997). Christiano et al (2005) conclude that a key finding of the analysis is that nominal wage rigidity is crucial for their model's performance. Stickiness in prices plays a relatively less important role. This finding is based on the fact that keeping all other parameters at their estimated baseline values, the response of prices jumps up following an expansionary policy shock, whereas the response of output is much smaller and much less persistent. However, Sims and Zha (1999) and Bernanke et al (2005) indirectly appear to find that the real wage rises following a tightening of policy. For the euro area, Peersman and Smets (2003) find that the nominal wages fall more slowly than prices, so that the real consumer wage actually rises following a contractionary policy shock. Also in this study, the confidence bands are, however, very wide. Their results are in contrast to Smets and Wouters (2003), which estimating a Bayesian DSGE model finds that real wages fall in a hump-shaped fashion very similar to output following a contractionary monetary policy shock. Christoffel, Küster and Linzert (2007) calibrate and estimate a DSGE model with nominal price stickiness and labour market frictions for the euro area over the period 1985-2005. When calibrating the model to euro area labour market features, they find that real wages do not respond very much to an easing of monetary policy. If anything, they fall. In the estimated model on the contrary with lower nominal wage stickiness, real wages temporarily rise by about 0.05 percent following a 25 basis point reduction in policy rates. In their model, there are two sorts of labour market frictions: first it is costly to hire; second; there are costs of adjusting the real wage. Finally, estimating separate VARs for each G7 country, Normandin (2006) finds that, among the three euro area countries over the sample 1983 till 2005, the real wage falls in France (indicating relatively more important nominal wage stickiness) and increases in Germany and Italy (indicating the reverse). The different findings across studies may not be surprising if both nominal price and wage rigidities are important. In fact, in his survey of the literature, Taylor (1999) concludes that there is evidence of nominal rigidities in both price and wage setting. He summarises the empirical literature by implying that on average a contract duration of one year in both goods and labour markets does not appear an unreasonable assumption.

In the rest of this paper, we first briefly lay out the FAVAR methodology of Bernanke et al (2005) in Section 2 and describe the data we use, which covers the period from 1987:Q1 to 2005:Q4. In Section 3, we then report the findings. We first show the effects on area-wide labour market variables. We find that, on average, a monetary policy tightening leads to a significant fall in the real wage per employee.

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<sup>2</sup> Another example of a study that uses large-data-set methods to estimate differential effects of a common monetary policy shock is Sala (2002).

Employment falls gradually, while hours per employee do not respond very much. We then proceed to discuss differences across countries and sectors. We find quite considerable heterogeneity over this sample. While real wages fall significantly in Finland, Spain and Italy following the monetary contraction, they rise, though in some cases not significantly so, in Belgium, France, Germany and the Netherlands. When we shorten the sample to start in the early 1990s, real wages fall by even more, while the cross-country differences become less outspoken, suggesting that recent labour market forms and monetary unification may have contributed to a more homogenous response of wages across the euro area. We also find significant differences in the response of wages in different sectors. While there is a strong and significant negative response in industry, the response is much more muted and gradual in most of the other sectors including services and construction. Section 4 concludes.

## **2. FAVAR methodology and data**

### **2.1. Framework**

In this section, we first review the FAVAR methodology of Bernanke et al (2005). Using a large-data set methodology has a number of advantages. First, it should help correctly identifying the monetary policy shocks and their effects. As emphasized by Bernanke et al (2005) and Giannone, Reichlin and Sala (2002), central banks typically use a lot of information when setting interest rates. Using a large-data-set methodology allows us to take all that data into account and summarise it into a limited number of factors. Moreover, as the key concepts that central banks try to extract such as measures of underlying inflation, the degree of overall capacity utilisation, etc. are not observable, it also avoids imprecision and possible biases in the estimates that come from the fact that any one observable may only be a poor measure of the relevant underlying concept.<sup>3</sup> The importance of using the cross section to improve the precision of the estimates is even greater given our constrained time dimension. Our sample starts in 1987, which is a compromise between using a time series that has enough cyclical variation to quantify the effects of policy while still preserving the number of series available in the cross section. It is also somewhat artificial to talk about a common monetary policy shock before the start of EMU in 1999 but limiting our sample to the strict period of a common policy would hamstring the entire analysis. In addition, by starting in the mid 1980s we hope to bypass any confounding break in macro-economic volatility that is argued to have occurred around the mid 1980s. Finally, we use quarterly data for lack of sufficient monthly labour market variables.

Second, the large-data-set methodology also allows us to analyse and compare the effects of a common policy shock on a number of area-wide, country-specific and sector-specific variables. This is particularly useful for our purposes as we would like to analyse differences in responses across countries and sectors of a number of key macro-economic variables.

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<sup>3</sup> One example highlighted by Bernanke et al (2005) is the appearance of a price puzzle in typical small-scale identified VAR estimates of monetary policy shocks.

Following Bernanke et al (2005), assume that the informational time series  $X_t$  are related to a number of unobservable factors  $F_t$  and the observed policy-controlled interest rate  $R_t$  by an observation equation of the following form:

$$(1) \quad X_t = \Lambda_f F_t + \Lambda_R R_t + e_t$$

where  $\Lambda_f$  is an  $N \times K$  matrix of factor loadings,  $\Lambda_R$  captures the effect of the short-term interest rate and  $e_t$  is a  $N \times 1$  vector of error terms with a mean equal to zero.<sup>4</sup>

The joint dynamics of the unobservable factors and the policy rate are given by the following transition equation:

$$(2) \quad \begin{bmatrix} F_t \\ R_t \end{bmatrix} = \Phi(L) \begin{bmatrix} F_{t-1} \\ R_{t-1} \end{bmatrix} + v_t$$

where  $\Phi(L)$  is a conformable lag polynomial of finite order  $d$  and  $v_t$  is a mean zero error term with covariance matrix  $Q$ .

In order to estimate system (1) and (2), we will follow the Bernanke et al (2005) two-step principal components approach. In the first step, we estimate the space spanned by the factors using the first  $K+1$  principal components of the vector of information variables. Obtaining an estimate of the unobservable factors involves determining the part of the space that is not spanned by the policy rate. In the second step, the FAVAR, equation (2), is estimated by standard methods, replacing  $F_t$  by its estimate from the first step. As the two-step approach implies the presence of “generated regressors” in the second step, we obtain accurate confidence intervals on the impulse response functions by implementing a bootstrap procedure that accounts for the uncertainty in the factor estimation.<sup>5</sup>

Also regarding the identification of the monetary policy shock in equation (2), we follow the approach taken by Bernanke et al (2005). We assume that the policy rate is ordered last in a standard recursive identification scheme. The idea is that unexpected policy changes do not contemporaneously (i.e. within the quarter) affect the unobserved fundamentals of the economy as captured by the estimated factors. While this obviously is only approximately true, it is reasonable to assume that the fundamentals only move slowly in response to such policy news. This identification scheme does not

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<sup>4</sup> The implication of equation (1) that the information variables depend only on the current and not lagged values of the factors is not restrictive in practice, as the factors can be interpreted as including arbitrary lags of the fundamental factors.

<sup>5</sup> See Bernanke et al (2005) for a detailed description of the two-step estimation procedure.

preclude that policy innovations do have a contemporaneous effect on each of the information variables.

## 2.2. Empirical implementation

In our application of the FAVAR methodology, the set of information variables consists of a balanced panel of 338 quarterly macro-economic time series. The data span the period from 1987:Q1 through 2005:Q4. The data set consists of 19 area-wide variables taken from the AWM data set of Fagan, Henry and Mestre (2001), a number of country-specific time series for Germany, France, Italy, Spain, the Netherlands, Belgium, Finland, Ireland, a number of US variables and sectoral goods and labour market data. Regarding the latter, data on real and nominal gross value-added and employment and total compensation for up to six sectors (agriculture, industry excluding construction, construction, trade, transport and communication, financial intermediation and real estate and other services) are included.

As is usual, the series are initially transformed to induce stationarity. Borderline cases are the nominal interest and inflation rate series. In a number of countries there is a clear trend in those variables over the sample period. To remain consistent with the literature and to have a common treatment across similar variables in the data set, we enter those variables in levels.<sup>6</sup> Table 1 in the appendix describes the data set, its sources and the transformations used. We use the euro area short-term interest rate as policy instrument.

In the first step, we need to determine the number of factors that characterize our data set. We select the number of factors using the criteria developed in Bai and Ng (2002). Table 1 reports the number of factors suggested by each of the three criteria assuming the data set contains a maximum number of 5, 8, or 10 factors. The criteria are asymptotically equivalent but  $IC_{p_2}(k)$  is better suited than  $IC_{p_1}(k)$  for finite samples and is less sensitive to the maximum number of factors than  $IC_{p_3}(k)$ . We therefore include five factors in the FAVAR framework. Eckmeier (2006) uses five factors to describe a similar sized data set for the euro area. Our results are not materially affected if we choose more or less factors.

Table 1  
Bai and Ng (2002) tests for the number of factors

	$kmax = 5$	$kmax = 8$	$kmax = 10$
$IC_{p_1}(k)$	5	5	5
$IC_{p_2}(k)$	5	5	5

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<sup>6</sup> We checked the robustness of our results by also differentiating all variables that do not pass a unit root test. The main results are not very much affected.

$IC_{p3}(k)$	5	7	10
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Usually, panel models should include as many series and as large a time dimension as possible. Boivin and Ng (2006), however, highlight the fact that more is not always better when computing factors via principle components. Due to cross-section correlation in the idiosyncratic errors, slightly different panels of macroeconomic data series may result in sets of factors that differ significantly. They propose weighting schemes and routines to eliminate series and show that factors extracted from as few as 40 series selected from 147 series can improve forecasts by at least as much, and sometimes more than, factors extracted from all 147 series. This is surely a consideration in our data set. Not wanting to impose an implicit zero weight or to discard a labour market variable of interest, we employ one of Boivin and Ng's (2006) weighing schemes instead of a series elimination routine. In their notation, we use "SWb" weights assuming 5 factors to pre-weight the data before continuing the analysis. Intuitively, these pre-weights emphasis variables that have large contributions to the common component while deemphasising those that do not.

### 3. The effects of monetary policy on the labour market in the euro area

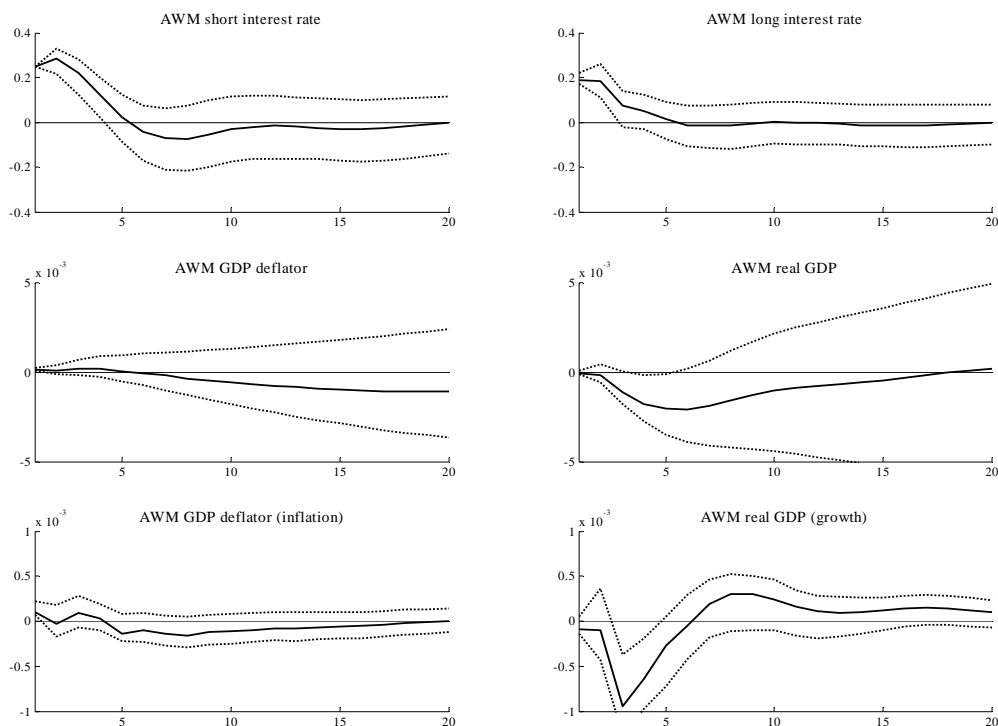
In this section, we present the main results. First, we discuss the effects of an identified monetary policy shock on area-wide variables and compare those to Peersman and Smets (2003), who use a different methodology and a different sample. Then we analyse cross-country and cross-sectoral differences in subsections 3.2. and 3.3. respectively. Finally, we investigate whether these effects are different in a shorter sample.

#### 3.1. Area-wide effects of changes in monetary policy

In this section we compare the area-wide effects of a monetary policy shock with those obtained by Peersman and Smets (2003). Peersman and Smets (2003) use a small-scale VAR in output, inflation, the nominal short-term interest rate and the exchange rate to estimate the effects of a monetary policy shock using a variety of identification schemes. They derive the impulse responses of a number of other variables such as the components of GDP, the labour market and asset prices by recursively adding those variables one-by-one to the identified VAR. Our study mainly differs in three respects. First, we use the complete data set to estimate the identified FAVAR as discussed above. Second, all variables are made stationary before estimation. Third, the sample period is different. Peersman and Smets (2003) cover the period 1980 till 1998, which precedes the establishment of EMU. Our data sample, instead, starts later (in 1987), but covers the first seven years of EMU. It is therefore interesting to see whether the estimated transmission process of monetary policy has changed.

Figure 1

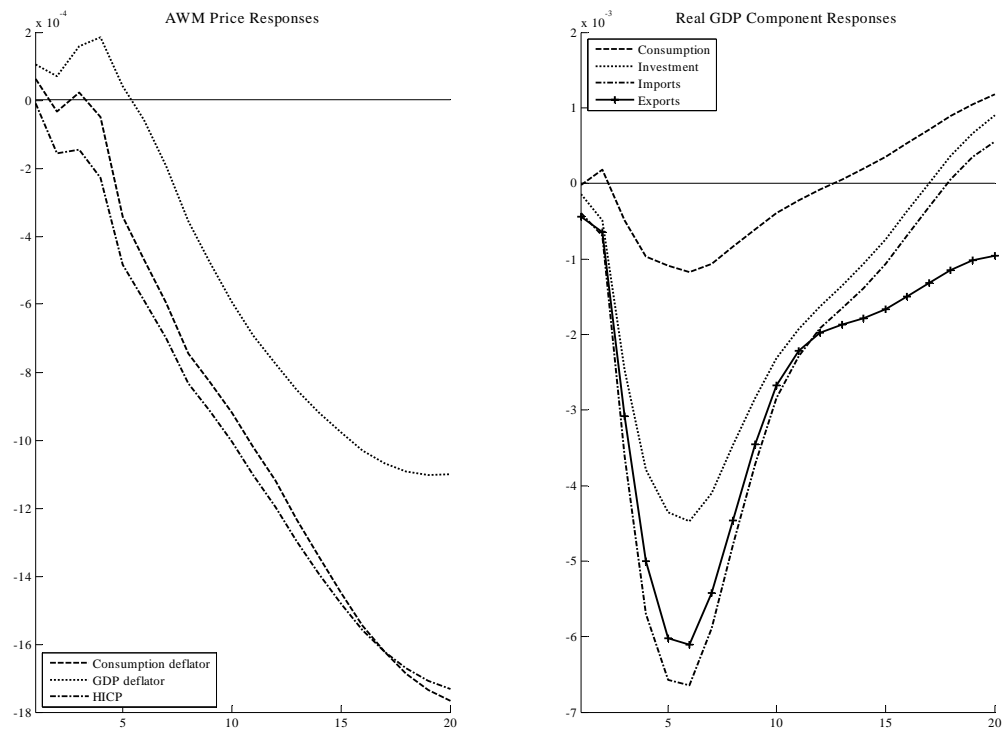
## Response of area-wide output and prices to a monetary policy shock



Given those differences in the sample and the methodology, it is quite striking how, overall, our results are very similar to those obtained by Peersman and Smets (2003). Figure 1 plots the response of the short-term interest rate, the long-term interest rate, real GDP and the GDP deflator to a standard deviation monetary policy shock. The typical interest rate impulse lasts for about a year and has a size of about 25 basis points. As a result, real GDP gradually falls with a cumulated peak effect of somewhat less than 0.2 percent after 7 quarters. These effects are a bit more persistent than those estimated in Peersman and Smets (2003). This higher persistence may be due to the higher persistence of the impulse to the short-term interest rate. This may also explain why the impact on the long-term rate is more pronounced in Figure 1. The most significant negative effects on growth take place two to three quarters after the monetary impulse. The price puzzle is limited: the GDP deflator does not respond very much during the first three quarters, but then gradually falls. Also in this case, the size of the cumulative effect on prices is about the same as in Smets and Peersman (2003).

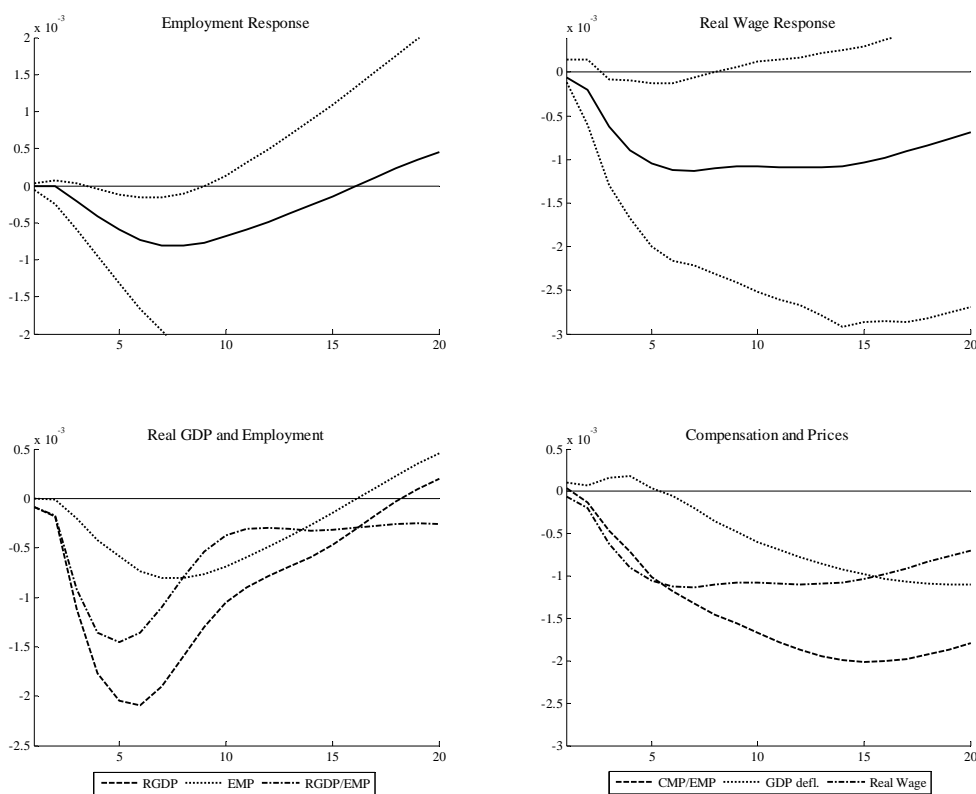
Figure 2

Response of prices and GDP components to monetary policy shock



Turning to the various components of GDP and the price indicators in Figure 2, it is clear that, as is well-known, investment is about 3 times more responsive than consumption. Imports and exports are a bit more sensitive to the policy shock than investment. The higher responsiveness of imports relative to consumption is partly due to the fact that investment has a high import content. Consumer prices and the consumption and GDP deflator all fall gradually following the policy shock and do not exhibit a price puzzle. This is consistent with the results of Bernanke et al (2005), which show that using a large data set helps resolving the price puzzle also in the United States. The cumulative effect is somewhat higher than in Peersman and Smets (2003).

Figure 3  
Response of employment and wages to a monetary policy shock

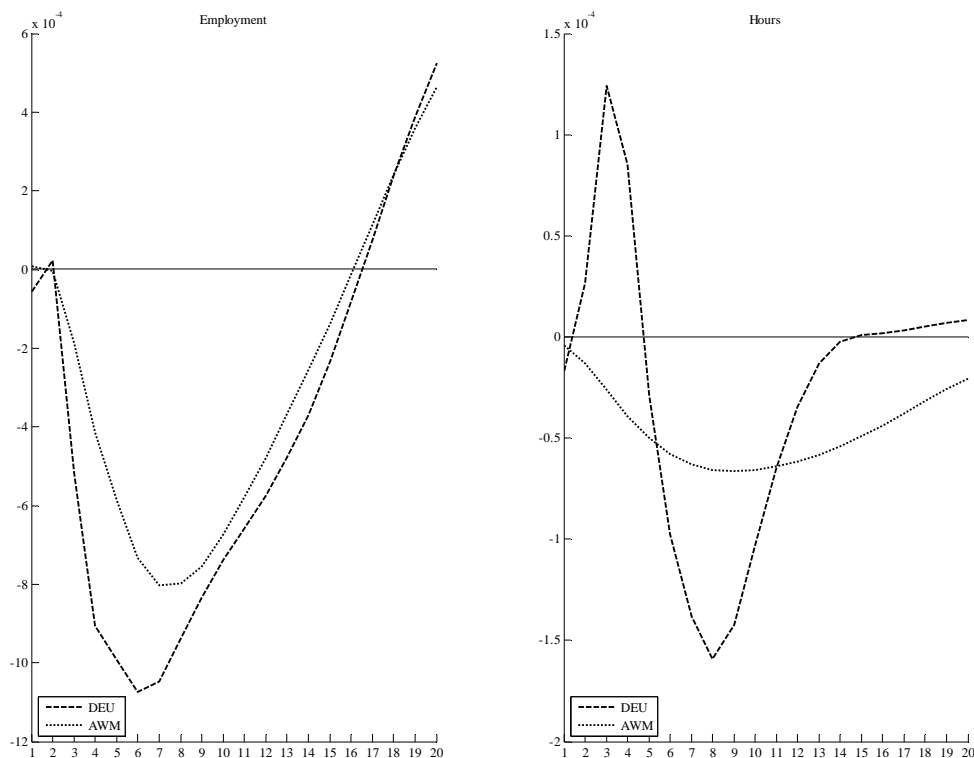


The focus in this paper is on the effects of monetary policy shocks on the labour market as depicted in Figure 3. The upper left panel shows that employment falls by much less and more sluggishly than real GDP, and as a result average labour productivity drops quite considerably in the short run. This is similar to the finding in Peersman and Smets (2003). As a result, labour productivity moves procyclically. In contrast to Peersman and Smets (2003), the real wage drops significantly. One possible explanation is that in the light of the labour market reforms and globalisation that took place over the past two decades, real wages have become more responsive to cyclical conditions. The magnitude of the real wage response is in line with the estimates of Christoffel, Küster and Linzert (2007). As indicated by Christoffel et al (2007) a lower degree of wage rigidity increases the response of wages and lowers the response of employment and output.

We can also use the FAVAR to analyse the effects on employment, vacancies and hours per employee in Germany and the euro area.<sup>7</sup> Figure 4 shows that most of the variation in total hours worked in response to a monetary policy shock is due to changes in employment. Hours per employee do not respond very much. Vacancies respond quite a bit more than the number of unemployed.

Figure 4  
The response of hours worked and vacancies in Germany and the euro area

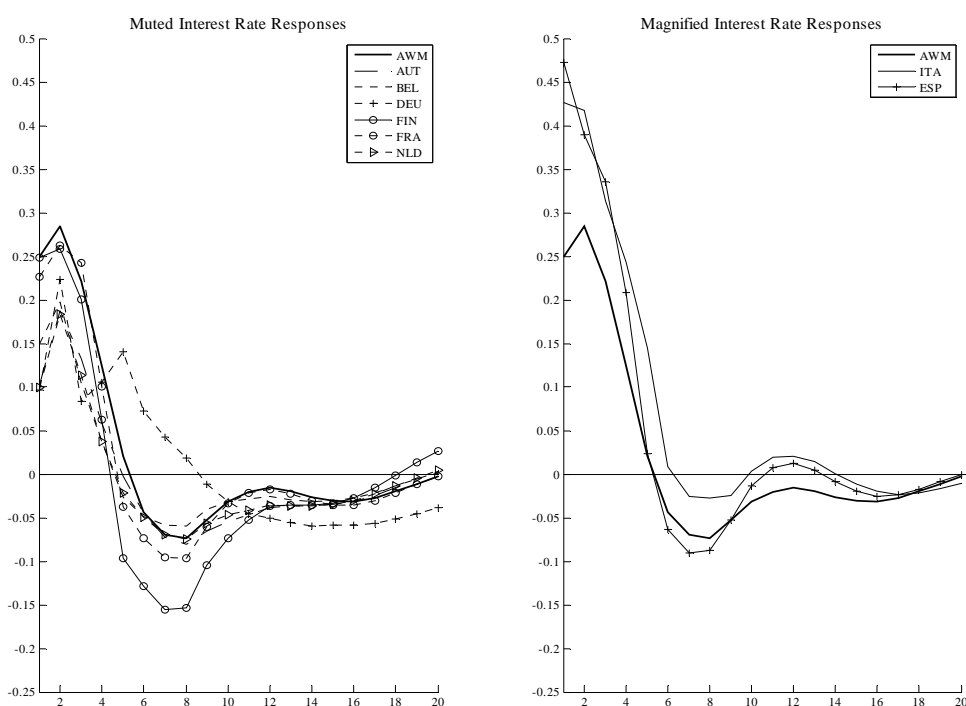
<sup>7</sup> Note that there is no aggregate vacancy data for the euro area that covers the full sample. Also the euro area hours worked data is incomplete and needs to be interpolated.



### 3.2. Cross-country differences in monetary transmission

Next, we turn to the country effects of the common monetary policy shock. First of all, it is important to re-emphasize that an important part of the sample takes place before the start of EMU. As a result, the identified monetary policy shock may not be completely homogenous across countries. This is illustrated in Figure 5, which plots the short-rate responses in each of the countries. The size of the interest rate response is less than 25 basis points in Germany, Austria, Belgium, France, the Netherlands and Finland. It is higher at almost 50 basis points in Italy and Spain. This is, of course, a reflection of the fact that an important part of the sample takes place before the start of EMU at which time there was no single monetary policy and the common shocks may have had different effects in the various countries.

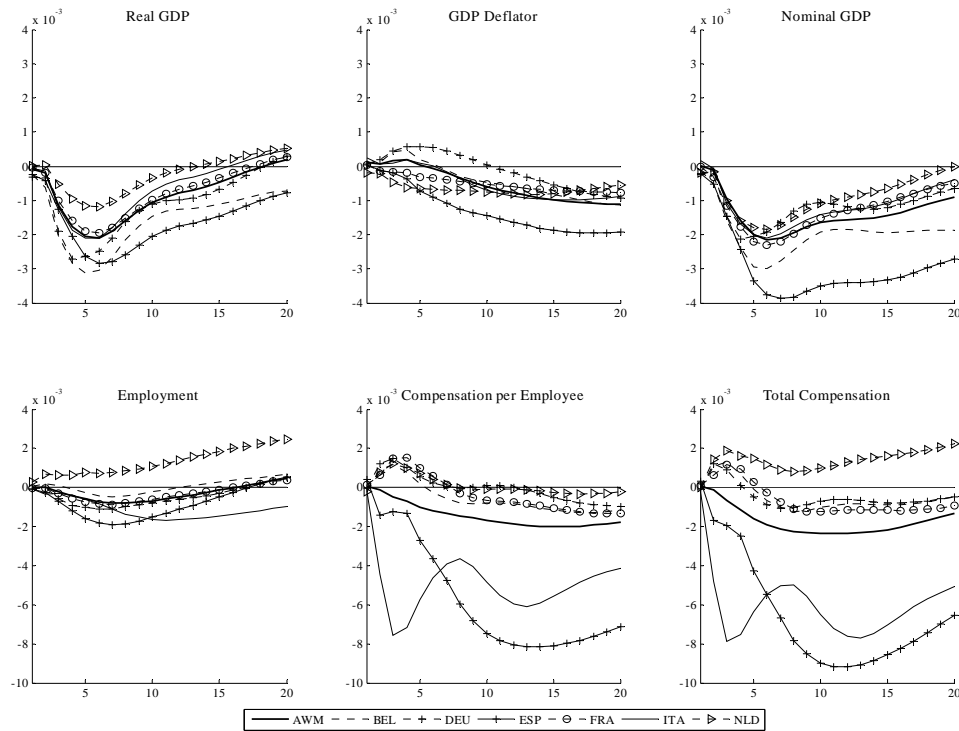
Figure 5  
 Cross-country short-term interest rate responses



It is important to see whether these differences have affected the size of the nominal response of the economy. This is shown in the top row of Figure 6. The largest adjustment of nominal GDP (last column) does take place in Spain, which also features the largest interest rate hike. However, the ranking of the other countries does not appear to be highly correlated with the size of the interest rate response. In order to see how much of the total nominal GDP response translates in real and price developments, the first row of Figure 6 also plots the response of real GDP and the GDP deflator. It is clear that while the overall nominal shock is smaller in Belgium and Germany than in the other countries, the cumulative loss in real GDP necessary to bring down prices is relatively larger in those countries. This is also reflected in the fact that prices take longer to respond to the monetary policy shock in Belgium and Germany.

Figure 6

Cross-country real and nominal GDP, employment and compensation responses



Similarly, one can plot the responses of employment and wages in each of the national labour markets (see lower row of Figure 6). Here the differences in nominal adjustment are much clearer. In both Italy and Spain the nominal wage responds much quicker and much more compared to other countries such as Germany, France and Belgium. In the latter countries there is somewhat of a wage puzzle. Nominal wages first rise before falling below baseline. These differences are also reflected in the response of total compensation because of the rather similar response of employment.

The difference in the relative labour market adjustment in these two groups of countries is most clear from Figure 7. It shows that in Belgium, France, Germany and the Netherlands, the real wage initially rises. On the other hand, real wages fall strongly in Finland, Italy and Spain. This may suggest that nominal wage stickiness is relatively more important than price stickiness in the former countries than in the latter. Moreover, Figure 8 shows that those differences are statistically significant. The upper left panel shows again the area-wide real wage response, while the other panels show the change in real wages in a particular country relative to the area-wide response.

Figure 7  
Cross-country real wage responses

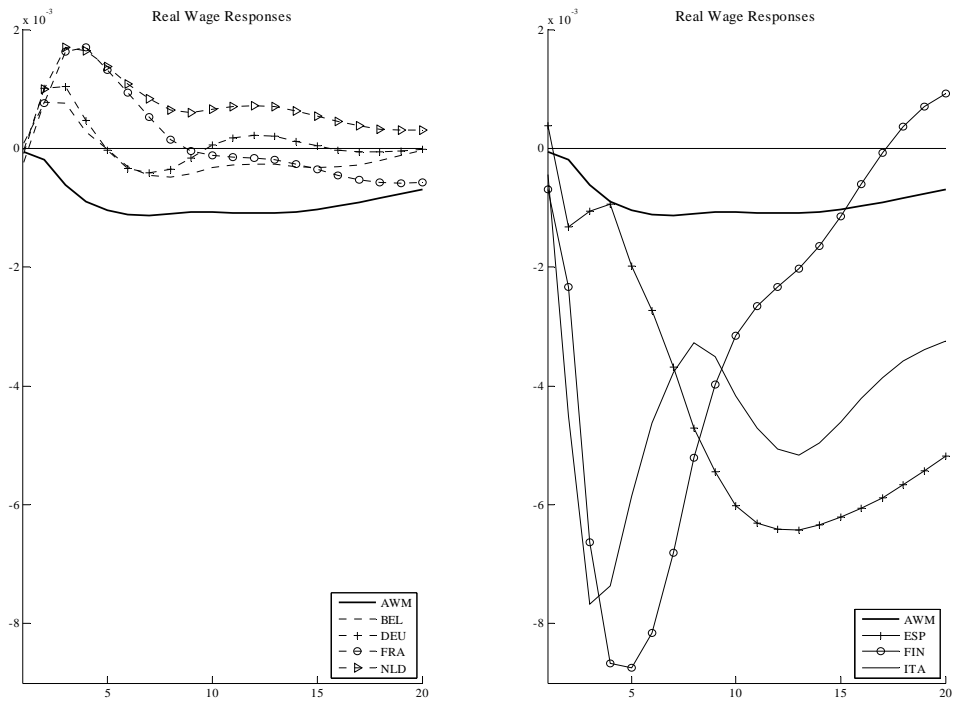
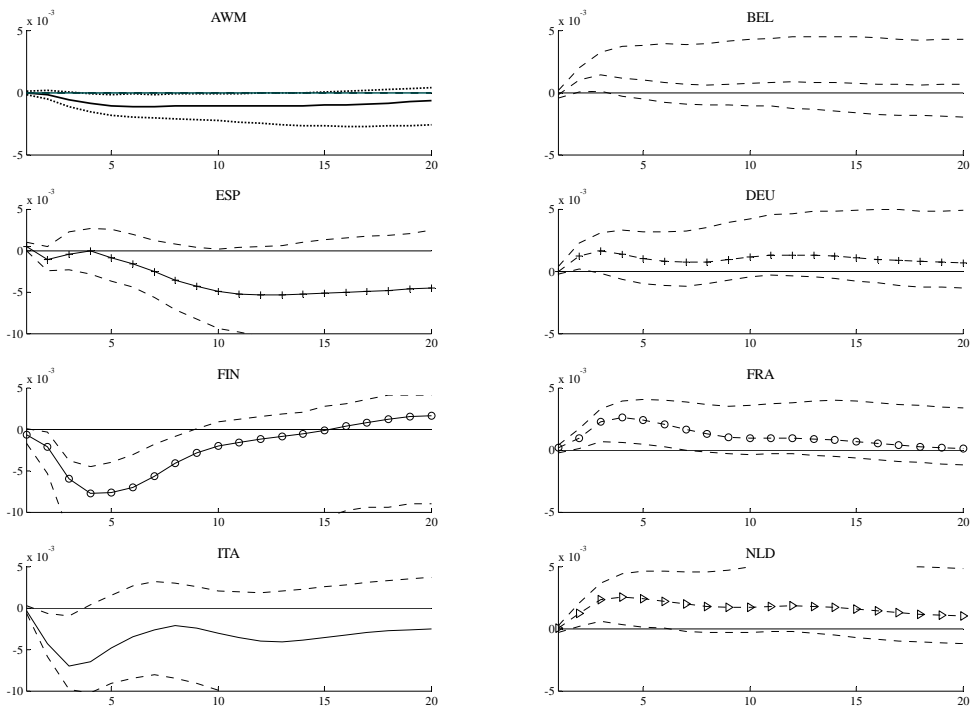


Figure 8  
Cross-country relative wage responses (relative to the area-wide response)



### 3.3. Cross-sectoral differences in monetary transmission

Next, we examine whether there are any significant differences in the response of sectors across countries. Figure 9 plots an analogous set of graphs as in Figure 6, but for the different sectors. The impulse responses depicted are weighted means of the impulse responses in the six countries. A few observations are worth making. First, the construction sector is clearly the most cyclical sector. Consistent with evidence from the United States, both output and employment fall quickly and sizeably in response to a monetary policy tightening. Manufacturing and trade, transport and communication respond quite significantly, but other services do not respond very much. Secondly, a similar picture is visible for nominal wages and prices. However, overall it appears that wages do respond somewhat faster than prices consistent with the overall real wage response discussed in Section 3.1. Figure 10 suggests, however, that real wages adjust most rapidly in industry and the construction sector and less so in services and agriculture, suggesting that the degree of wage rigidity may be relatively higher in services compared to industry. Again, Figure 11 shows that those differences are significant. The strong real wage response in industry stands out.

Figure 9

Cross-sectoral responses of real and nominal value added, compensation and employment

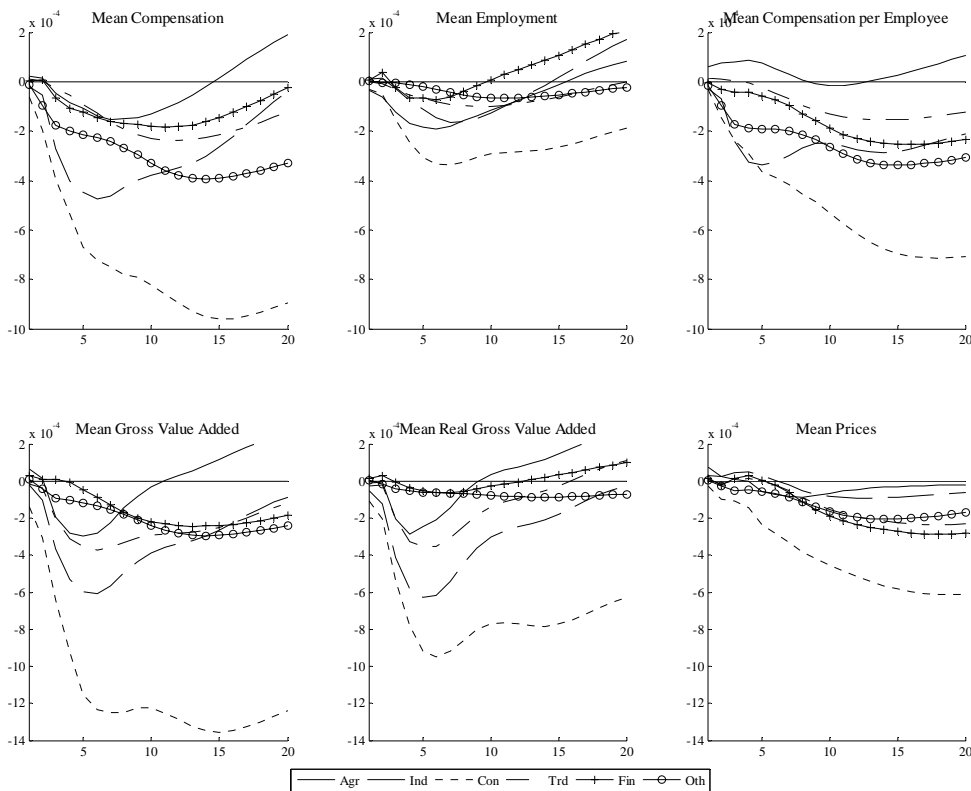


Figure 10

## Cross-sectoral real wage response

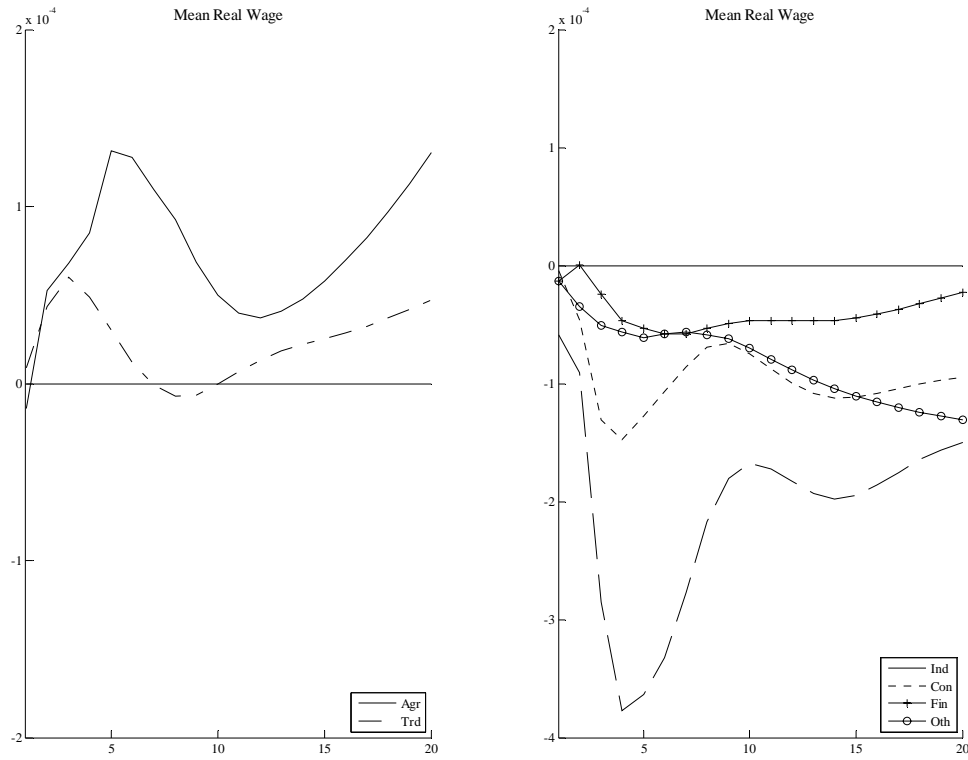
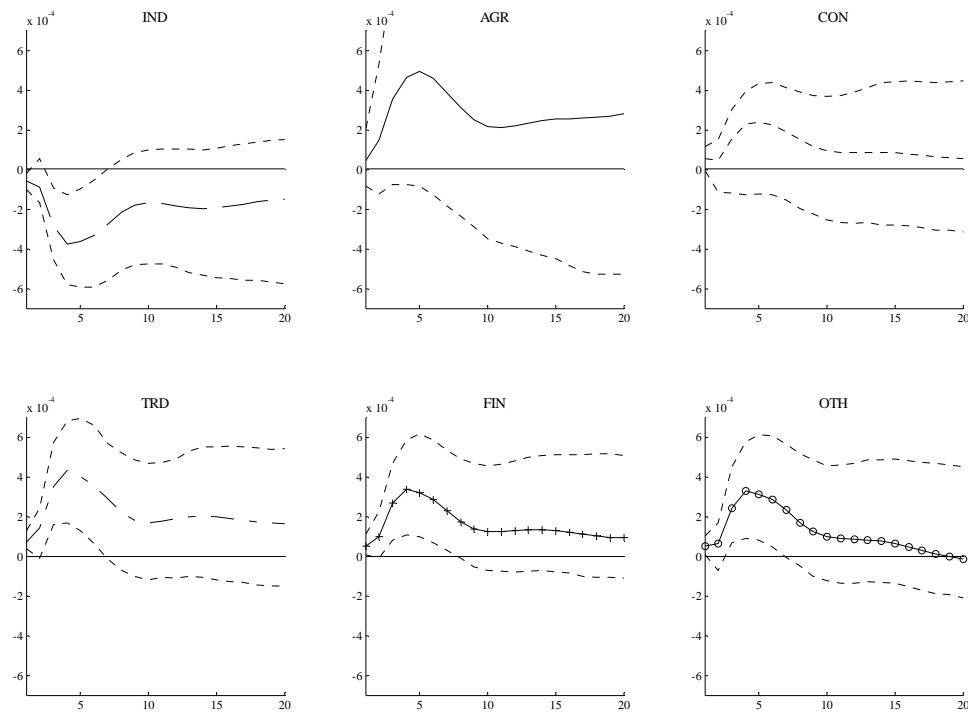


Figure 11

## Cross-sectoral relative wage responses (relative to wages in industry)



### 3.4. Changes over time in monetary transmission

Finally, while the degrees of freedom are limited given the small sample size, we can estimate the FAVAR on an even shorter period. Figures 12 and 13 compare the responses of the full-sample estimation with those for a shorter sample starting in 1991:Q1. Since 1991, the response of the GDP deflator is even more sluggish than over the full sample, while the real GDP effects are larger. In the labour market nominal wages and employment respond somewhat stronger. As a result, the real wage falls by more. Figure 13 shows that the cross-country real wage effects become somewhat erratic. However, it is striking that the response of real wages in Belgium, France, Germany and the Netherlands now become clearly negative after six quarters, suggesting that labour market reforms and monetary unification may have contributed to a more homogenous response of wages across the euro area.

Figure 12  
Different sample estimates

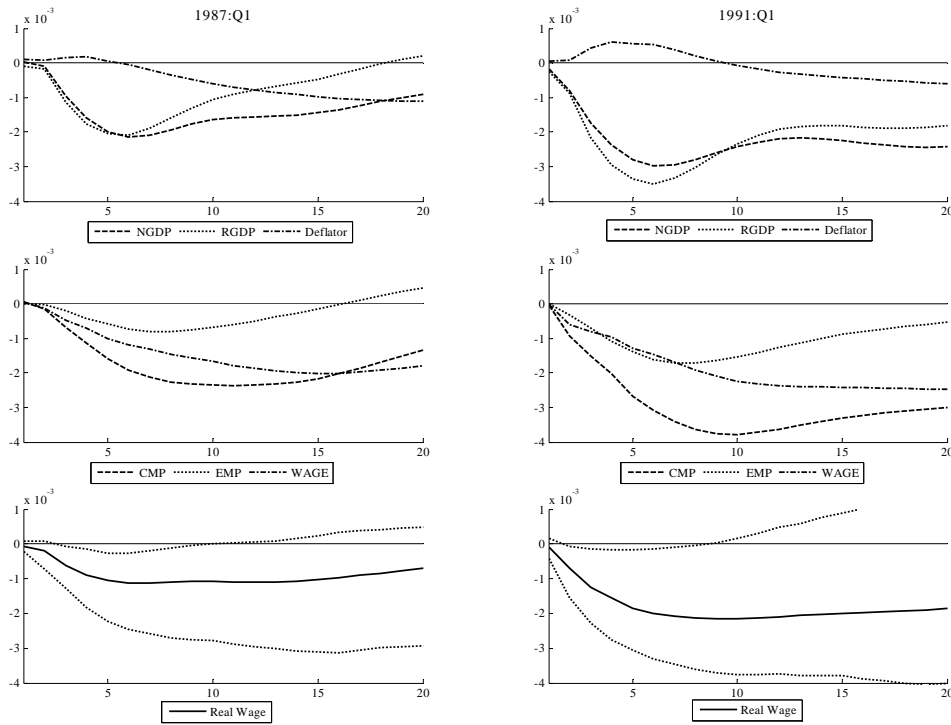
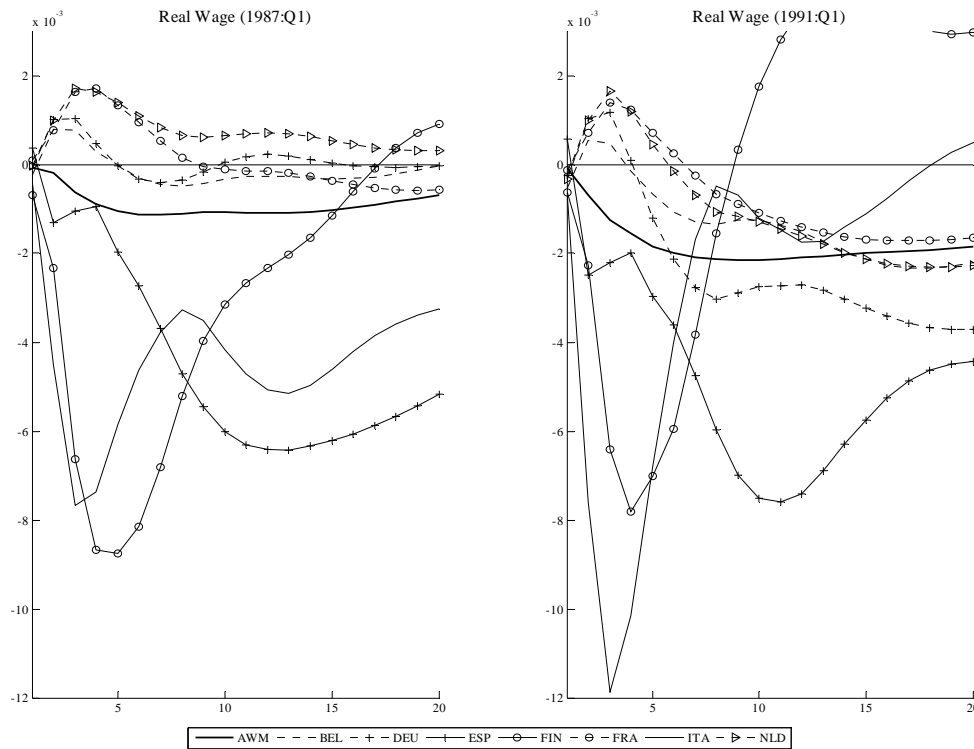


Figure 13  
Different sample estimates



#### 4. Conclusions

In this paper we have re-examined the impact of unexpected changes in monetary policy on the euro area economy using the FAVAR approach of Bernanke et al (2005). The objective is to derive some stylized facts about how the labour market, both quantities and prices, adjust in the euro area as a whole and across the various countries and sectors. These facts can then be used to validate the frictions of modern labour market matching models that need to be introduced in New Keynesian DSGE models. Our findings suggest that a monetary tightening has a significant negative impact on area-wide real wages, which is different from previous research. However, this aggregate response masks a quite different response across some of the largest euro area countries. In Germany, Belgium and particularly France real wages initially rise, while in Italy and Spain they fall quite significantly. Moreover, also the response across sectors can be quite different. In particular, the response of real wages in industry is quite a bit stronger than in the other sectors. Finally, there is some evidence that the response of the real wage has become stronger and more homogenous across countries more recently.

As usual, a number of caveats apply. As mentioned before, the sample period covers both the EMU period since 1999 and the transition period towards EMU before that starting in 1987. Identifying common monetary policy shocks in this earlier period is hazardous as there was no single monetary authority. As shown by Boivin, Giannoni and Mojon (2008), in that period common monetary policy shocks may have been associated with differential risk premia across countries (as also hinted at by the differential interest rate response in Figure 5). This may partly explain cross-country differences to the

policy response. Second, the identification of the policy shock through contemporaneous zero restrictions remains controversial. It would be useful to investigate how robust the results are with respect to alternative identification schemes.

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## Data Appendix

The data set is comprised of 338 variables spanning 1987:q1 to 2005:q4 from various European statistical sources, the OECD, and the ECB’s Area Wide Model (AWM). US data is provided by the Fred II database at the Federal Reserve Bank of St. Louis. The “Country” column lists the area scope of the variable, “Variable Definition” provides just that, “Transform” is 1- no transformation; 2- first difference; 4- logarithm; 5-first difference of logarithm. The “Fast” column denotes variables that are assumed to be fast-moving in the estimation. All variables that are not “fast,” are “slow.”

<b>Country</b>	<b>Variable Definition</b>	<b>Transform</b>	<b>Fast</b>
AWM	Short-term interest rate	1	F
AWM	Commodity Prices	5	F
AWM	Effective exchange rate (EER12)	5	F
AWM	Government expenditure	5	
AWM	Harmonised price index	5	
AWM	Gross investment deflator	5	
AWM	Real gross investment	5	
AWM	Employment (persons), total economy	5	
AWM	Long-term interest rate	1	F
AWM	Imports of goods and services deflator	5	
AWM	Real imports of goods and services	5	
AWM	Personal consumption deflator	5	
AWM	Personal consumption	5	
AWM	Unit labour costs, total economy	5	
AWM	Unemployment rate	2	
AWM	Compensation to employees	5	
AWM	Exports of goods and services deflator	5	
AWM	Real exports of goods and services	5	
AWM	GDP deflator	5	
AWM	GDP (constant prices)	5	
AWM	Average hours worked per employee, total economy	5	
AUT	Consumer price index	5	
AUT	Long-term interest rate	1	F
AUT	Short-term interest rate	1	F
AUT	PPI all items (OECD)	5	
AUT	Unfilled job vacancies	5	
AUT	Unit labour costs, total economy	5	
AUT	Unemployment rate	2	

BEL	Manufacturing capacity utilisation rate	1	
BEL	Compensation of employees, total economy	5	
BEL	" " agricultural, hunting, forestry and fishing products	5	
BEL	" " total industry	5	
BEL	" " construction	5	
BEL	" " trade, repairs, hotels, restaurants, transport and communication	5	
BEL	" " financial intermediation, real estate	5	
BEL	" " other services	5	
BEL	Consumer price index	5	
BEL	GDP deflator	5	
BEL	Private final consumption deflator	5	
BEL	Employment (persons), total economy	5	
BEL	" " agricultural, hunting, forestry and fishing products	5	
BEL	" " total industry	5	
BEL	" " construction	5	
BEL	" " trade, repairs, hotels, restaurants, transport and communication	5	
BEL	" " financial intermediation, real estate	5	
BEL	" " other services	5	
BEL	Final consumption of households (constant prices)	5	
BEL	Final consumption of households (current prices)	5	
BEL	GDP (constant prices)	5	
BEL	Gross value added (constant prices), total economy	5	
BEL	" " agricultural, hunting, forestry and fishing products	5	
BEL	" " total industry	5	
BEL	" " construction	5	
BEL	" " trade, repairs, hotels, restaurants, transport and communication	5	
BEL	" " financial intermediation, real estate	5	
BEL	" " other services	5	
BEL	Gross value added (current prices), total economy	5	
BEL	" " agricultural, hunting, forestry and fishing products	5	
BEL	" " total industry	5	
BEL	" " construction	5	
BEL	" " trade, repairs, hotels, restaurants, transport and communication	5	
BEL	" " financial intermediation, real estate	5	
BEL	" " other services	5	
BEL	Average hours worked per employee, total economy	5	
BEL	Long-term interest rate	1	F
BEL	Short-term interest rate	1	F
BEL	PPI manufacturing domestic sales, total industry	5	
BEL	Industrial production, manufacturing, total industry	5	
BEL	Unemployment rate	2	
DEU	Manufacturing capacity utilisation rate	1	
DEU	Compensation of employees, total economy	5	
DEU	" " agricultural, hunting, forestry and fishing products	5	
DEU	" " total industry	5	
DEU	" " construction	5	
DEU	" " trade, repairs, hotels, restaurants, transport and communication	5	
DEU	" " financial intermediation, real estate	5	
DEU	" " other services	5	
DEU	Consumer price index	5	
DEU	DAX 30 equity index, end of period closing price	5	F
DEU	GDP deflator	5	
DEU	Private final consumption deflator	5	
DEU	Employment (persons), total economy	5	
DEU	" " agricultural, hunting, forestry and fishing products	5	
DEU	" " total industry	5	
DEU	" " construction	5	

DEU	" " trade, repairs, hotels, restaurants, transport and communication	5	
DEU	" " financial intermediation, real estate	5	
DEU	" " other services	5	
DEU	Final consumption of households (constant prices)	5	
DEU	Final consumption of households (current prices)	5	
DEU	GDP (constant prices)	5	
DEU	Gross value added (constant prices), total economy	5	
DEU	" " agricultural, hunting, forestry and fishing products	5	
DEU	" " total industry	5	
DEU	" " construction	5	
DEU	" " trade, repairs, hotels, restaurants, transport and communication	5	
DEU	" " financial intermediation, real estate	5	
DEU	" " other services	5	
DEU	Gross value added (current prices), total economy	5	
DEU	" " agricultural, hunting, forestry and fishing products	5	
DEU	" " total industry	5	
DEU	" " construction	5	
DEU	" " trade, repairs, hotels, restaurants, transport and communication	5	
DEU	" " financial intermediation, real estate	5	
DEU	" " other services	5	
DEU	Average hours worked per employee, total economy	5	
DEU	Long-term interest rate	1	F
DEU	Short-term interest rate	1	F
DEU	Labour productivity, total economy	5	
DEU	PPI manufacturing domestic sales, total industry	5	
DEU	Industrial production, manufacturing, total industry	5	
DEU	Unfilled job vacancies	5	
DEU	Unit labour costs, total economy	5	
DEU	Unemployment rate	2	
ESP	Manufacturing capacity utilisation rate	1	
ESP	Compensation of employees, total economy	5	
ESP	" " agricultural, hunting, forestry and fishing products	5	
ESP	" " total industry	5	
ESP	" " construction	5	
ESP	" " trade, repairs, hotels, restaurants, transport and communication	5	
ESP	" " financial intermediation, real estate	5	
ESP	" " other services	5	
ESP	Consumer price index	5	
ESP	GDP deflator	5	
ESP	Private final consumption deflator	5	
ESP	Employment (persons), total economy	5	
ESP	" " agricultural, hunting, forestry and fishing products	5	
ESP	" " total industry	5	
ESP	" " construction	5	
ESP	" " trade, repairs, hotels, restaurants, transport and communication	5	
ESP	" " financial intermediation, real estate	5	
ESP	" " other services	5	
ESP	Final consumption of households (constant prices)	5	
ESP	Final consumption of households (current prices)	5	
ESP	GDP (constant prices)	5	
ESP	Gross value added (constant prices), total economy	5	
ESP	" " agricultural, hunting, forestry and fishing products	5	
ESP	" " total industry	5	
ESP	" " construction	5	
ESP	" " trade, repairs, hotels, restaurants, transport and communication	5	
ESP	" " financial intermediation, real estate	5	
ESP	" " other services	5	

ESP	Gross value added (current prices), total economy	5	
ESP	" " agricultural, hunting, forestry and fishing products	5	
ESP	" " total industry	5	
ESP	" " construction	5	
ESP	" " trade, repairs, hotels, restaurants, transport and communication	5	
ESP	" " financial intermediation, real estate	5	
ESP	" " other services	5	
ESP	Long-term interest rate	1	F
ESP	Short-term interest rate	1	F
ESP	PPI manufacturing domestic sales, total industry	5	
ESP	Industrial production, manufacturing, total industry	5	
ESP	Unemployment rate	2	
EUR	PPI manufacturing domestic sales, total industry	5	
EUR	Industrial production, manufacturing, total industry	5	
FIN	Compensation of employees, total economy	5	
FIN	" " agricultural, hunting, forestry and fishing products	5	
FIN	" " total industry	5	
FIN	" " construction	5	
FIN	" " trade, repairs, hotels, restaurants, transport and communication	5	
FIN	" " financial intermediation, real estate	5	
FIN	" " other services	5	
FIN	Consumer price index	5	
FIN	GDP deflator	5	
FIN	Private final consumption deflator	5	
FIN	Employment (persons), total economy	5	
FIN	" " agricultural, hunting, forestry and fishing products	5	
FIN	" " total industry	5	
FIN	" " construction	5	
FIN	" " trade, repairs, hotels, restaurants, transport and communication	5	
FIN	" " financial intermediation, real estate	5	
FIN	" " other services	5	
FIN	Final consumption of households (constant prices)	5	
FIN	Final consumption of households (current prices)	5	
FIN	GDP (constant prices)	5	
FIN	Gross value added (constant prices), total economy	5	
FIN	" " agricultural, hunting, forestry and fishing products	5	
FIN	" " total industry	5	
FIN	" " construction	5	
FIN	" " trade, repairs, hotels, restaurants, transport and communication	5	
FIN	" " financial intermediation, real estate	5	
FIN	" " other services	5	
FIN	Gross value added (current prices), total economy	5	
FIN	" " agricultural, hunting, forestry and fishing products	5	
FIN	" " total industry	5	
FIN	" " construction	5	
FIN	" " trade, repairs, hotels, restaurants, transport and communication	5	
FIN	" " financial intermediation, real estate	5	
FIN	" " other services	5	
FIN	Average hours worked per employee, total economy	5	
FIN	Long-term interest rate	1	F
FIN	Short-term interest rate	1	F
FIN	Labour productivity, total economy	5	
FIN	PPI all items (OECD)	5	
FIN	Unfilled job vacancies	5	
FIN	Unit labour costs, total economy	5	
FIN	Unemployment rate	2	
FRA	Manufacturing capacity utilisation rate	1	

FRA	Compensation of employees, total economy	5	
FRA	" " agricultural, hunting, forestry and fishing products	5	
FRA	" " total industry	5	
FRA	" " construction	5	
FRA	Consumer price index	5	
FRA	GDP deflator	5	
FRA	Private final consumption deflator	5	
FRA	Employment (persons), total economy	5	
FRA	" " agricultural, hunting, forestry and fishing products	5	
FRA	" " total industry	5	
FRA	" " construction	5	
FRA	Final consumption of households (constant prices)	5	
FRA	Final consumption of households (current prices)	5	
FRA	GDP (constant prices)	5	
FRA	Gross value added (constant prices), total economy	5	
FRA	" " agricultural, hunting, forestry and fishing products	5	
FRA	" " total industry	5	
FRA	" " construction	5	
FRA	" " trade, repairs, hotels, restaurants, transport and communication	5	
FRA	" " financial intermediation, real estate	5	
FRA	" " other services	5	
FRA	Gross value added (current prices), total economy	5	
FRA	" " agricultural, hunting, forestry and fishing products	5	
FRA	" " total industry	5	
FRA	" " construction	5	
FRA	" " trade, repairs, hotels, restaurants, transport and communication	5	
FRA	" " financial intermediation, real estate	5	
FRA	" " other services	5	
FRA	Average hours worked per employee, total economy	5	
FRA	Long-term interest rate	1	F
FRA	Short-term interest rate	1	F
FRA	Labour productivity, total economy	5	
FRA	PPI all items (OECD)	5	
FRA	Industrial production, manufacturing, total industry	5	
FRA	Unfilled job vacancies	5	
FRA	Unit labour costs, total economy	5	
FRA	Unemployment rate	2	
IRL	Manufacturing capacity utilisation rate	1	
IRL	Consumer price index	5	
IRL	GDP deflator	5	
IRL	Private final consumption deflator	5	
IRL	Average hours worked per employee, total economy	5	
IRL	Long-term interest rate	1	F
IRL	Short-term interest rate	1	F
IRL	Labour productivity, total economy	5	
IRL	Industrial production, manufacturing, total industry	5	
IRL	Unit labour costs, total economy	5	
IRL	Unemployment rate	2	
ITA	Manufacturing capacity utilisation rate	1	
ITA	Compensation of employees, total economy	5	
ITA	" " agricultural, hunting, forestry and fishing products	5	
ITA	" " total industry	5	
ITA	" " construction	5	
ITA	" " trade, repairs, hotels, restaurants, transport and communication	5	
ITA	" " financial intermediation, real estate	5	
ITA	" " other services	5	
ITA	Consumer price index	5	

ITA	GDP deflator	5	
ITA	Private final consumption deflator	5	
ITA	Employment (persons), total economy	5	
ITA	" " agricultural, hunting, forestry and fishing products	5	
ITA	" " total industry	5	
ITA	" " construction	5	
ITA	" " trade, repairs, hotels, restaurants, transport and communication	5	
ITA	" " financial intermediation, real estate	5	
ITA	" " other services	5	
ITA	Final consumption of households (constant prices)	5	
ITA	Final consumption of households (current prices)	5	
ITA	GDP (constant prices)	5	
ITA	Gross value added (constant prices), total economy	5	
ITA	" " agricultural, hunting, forestry and fishing products	5	
ITA	" " total industry	5	
ITA	" " construction	5	
ITA	" " trade, repairs, hotels, restaurants, transport and communication	5	
ITA	" " financial intermediation, real estate	5	
ITA	" " other services	5	
ITA	Gross value added (current prices), total economy	5	
ITA	" " agricultural, hunting, forestry and fishing products	5	
ITA	" " total industry	5	
ITA	" " construction	5	
ITA	" " trade, repairs, hotels, restaurants, transport and communication	5	
ITA	" " financial intermediation, real estate	5	
ITA	" " other services	5	
ITA	Average hours worked per employee, total economy	5	
ITA	Long-term interest rate	1	F
ITA	Short-term interest rate	1	F
ITA	Labour productivity, total economy	5	
ITA	PPI manufacturing domestic sales, total industry	5	
ITA	Unemployment rate	2	
NLD	Amsterdam exchange index	5	F
NLD	Manufacturing capacity utilisation rate	1	
NLD	Compensation of employees, total economy	5	
NLD	" " agricultural, hunting, forestry and fishing products	5	
NLD	" " total industry	5	
NLD	" " construction	5	
NLD	" " trade, repairs, hotels, restaurants, transport and communication	5	
NLD	" " financial intermediation, real estate	5	
NLD	" " other services	5	
NLD	Consumer price index	5	
NLD	GDP deflator	5	
NLD	Private final consumption deflator	5	
NLD	Employment (persons), total economy	5	
NLD	" " agricultural, hunting, forestry and fishing products	5	
NLD	" " total industry	5	
NLD	" " construction	5	
NLD	" " trade, repairs, hotels, restaurants, transport and communication	5	
NLD	" " financial intermediation, real estate	5	
NLD	" " other services	5	
NLD	Final consumption of households (constant prices)	5	
NLD	Final consumption of households (current prices)	5	
NLD	GDP (constant prices)	5	
NLD	Gross value added (constant prices), total economy	5	
NLD	" " agricultural, hunting, forestry and fishing products	5	
NLD	" " total industry	5	

NLD	" " construction	5	
NLD	" " trade, repairs, hotels, restaurants, transport and communication	5	
NLD	" " financial intermediation, real estate	5	
NLD	" " other services	5	
NLD	Gross value added (current prices), total economy	5	
NLD	" " agricultural, hunting, forestry and fishing products	5	
NLD	" " total industry	5	
NLD	" " construction	5	
NLD	" " trade, repairs, hotels, restaurants, transport and communication	5	
NLD	" " financial intermediation, real estate	5	
NLD	" " other services	5	
NLD	Average hours worked per employee, total economy	5	
NLD	Long-term interest rate	1	F
NLD	Short-term interest rate	1	F
NLD	Labour productivity, total economy	5	
NLD	PPI manufacturing domestic sales, total industry	5	
NLD	Unit labour costs, total economy	5	
NLD	Unemployment rate	2	
USA	Consumer price index	5	
USA	GDP (chain linked)	5	
USA	GDP deflator (chain linked)	5	
USA	Industrial production, total industry	5	
USA	Personal consumption expenditures	5	
USA	3 month treasury bill	1	F
USA	Trade weighted exchange rate index (major currencies)	5	F