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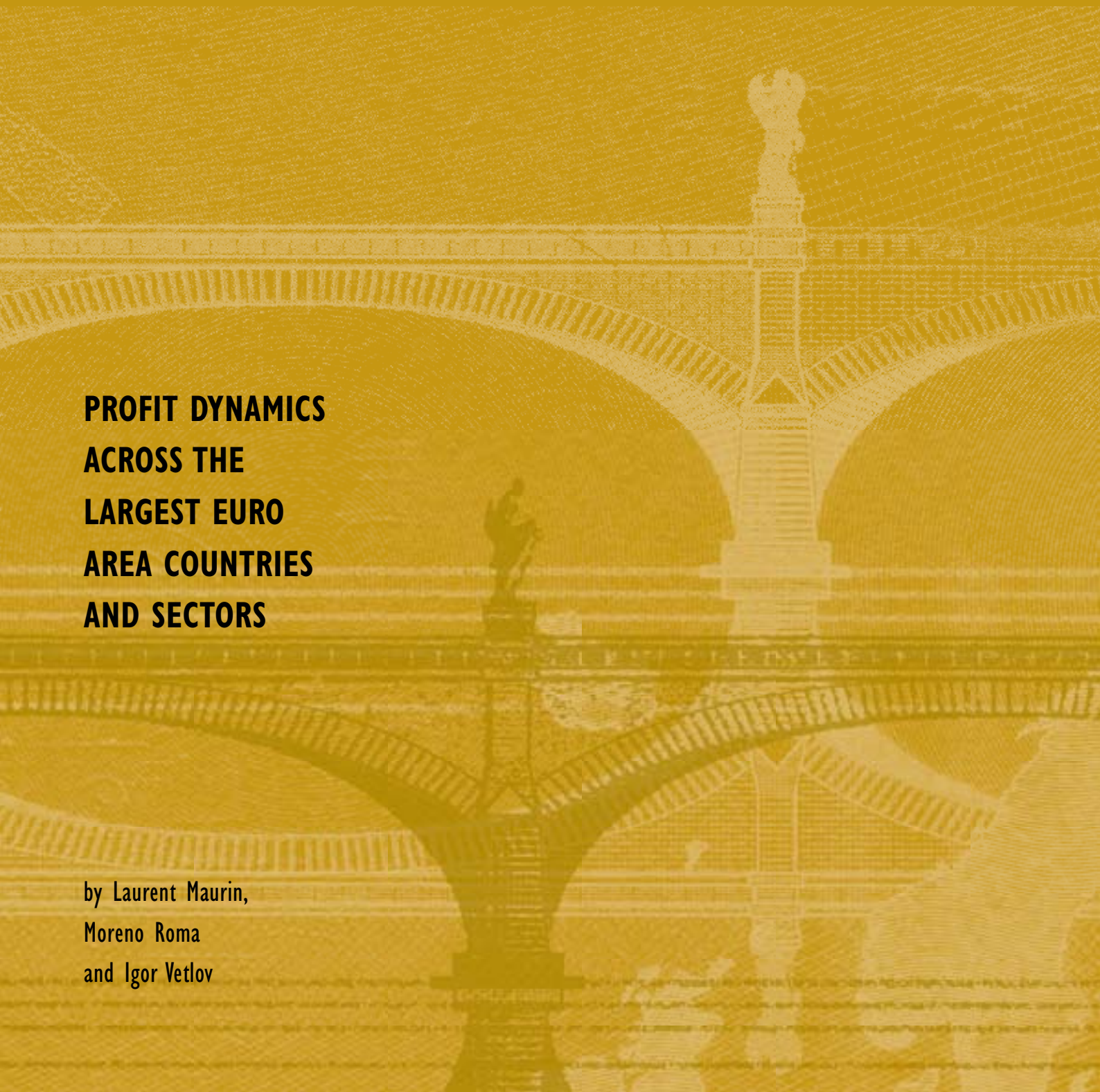

PROFIT DYNAMICS ACROSS THE LARGEST EURO AREA COUNTRIES AND SECTORS

by Laurent Maurin,
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by Laurent Maurin[2], Moreno Roma[2], and Igor Vetlov[3]

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Abstract

This paper explores the behavior of profits in the four largest euro area countries (Germany, France, Italy and Spain) and the euro area as a whole, while at the same time considering three main sectors (manufacturing, construction and services) in each economy over the period 1988–2010. The paper presents stylized facts about profit developments and, applying a vector autoregressive modeling framework, discusses the sensitivity of profits to four distinctive structural shocks (a demand shock, an employment shock, a wage and price mark-up shocks). In addition, it provides the shock decomposition of historical developments in profits across countries and sectors.

Key words: Profits, sectoral determinants, VARs, impulse responses, historical decomposition

JEL classification: C32, E23, E25.

Non-technical summary

The analysis of profit developments is an important part of the macroeconomic assessment and projection undertaken by the European Central Bank and the Eurosystem. Among other indicators, profits are often used to evaluate the financial health of the corporate sector, its ability to finance investment expenditures via internal funding as well as to attract external financing. In addition, profits constitute an important share of the total income of households (e.g., through distributed dividends) and, in turn, affect private consumption. Some components of profits (e.g., profit margins) are also regularly monitored in assessing inflationary pressures, which emerge from price-setting decisions of profit-maximizing firms targeting a desired level of profitability.

Analysing profit developments also allows acquiring additional insights on the structural rigidities characterizing an economy and the shocks hitting it. Overall, given the role played by institutional factors in shaping the behaviour of firms and households, an empirical analysis of profits in the euro area should indeed benefit from taking into account country and sector specific factors. So far, the empirical literature on profit determination is relatively scarce. In an attempt to narrow this knowledge gap, this paper explores the behavior of profits using a disaggregated approach by analysing the four largest euro area countries (Germany, France, Italy and Spain) and the euro area as a whole, while at the same time considering three main sectors (manufacturing, construction and services) in each economy. This perspective allows exploiting a rich set of results which can be compared across different countries and sectors. Furthermore, within the estimated individual vector autoregressive (VAR) models, the paper discusses the sensitivity of profits to various economic shocks and provides an historical shock decomposition of profit developments over the 1988–2010 period.

In terms of stylized facts, the services sector has the highest profit share (the ratio of profits to nominal value added). Moreover, its profit share is less volatile than in other sectors, while featuring some positive trend in several countries since end-1980s. On the contrary, the profit share in construction is highly volatile and characterized by idiosyncratic dynamics across the countries examined. Finally, the profit share in industry generally exhibited a significantly higher degree of synchronization across the countries considered (as also notably experienced in the last recession).

Based on an impulse-response analysis of the estimated small-scale VAR models, several interesting findings emerge. First, across countries and sectors, positive demand shocks have a positive impact on whole economy profits which remains noticeable for approximately 6-8 quarters. Moreover, the initial effect of a demand shock is much larger in the manufacturing and construction sector (and for the

latter, the response following a demand shock is particularly heterogeneous across countries). Second, a positive wage mark-up shock has a negative initial impact on profits lasting between 4 to 8 quarters. In all countries and in the euro area, the effect on profits of an increase in wages across sectors is stronger in construction - possibly reflecting the labour intensive nature of this sector - while broadly comparable across the remaining sectors. Third, a positive price mark-up shock has generally an initial positive effects on profits but this effect subsequently reverts once demand fall in reaction to increasing prices. The magnitude and extent of responses tend to differ widely across countries and sectors, most likely reflecting different degree of cross-country and sector price stickiness.

As regards the historical shock decomposition analysis, focusing on the whole economy, in the case of Germany and to a lesser extent in the euro area, the historical fluctuations in the growth rate of profits appear to be mainly driven by demand shocks and only to a lesser extent by employment shocks. On the contrary, in the other countries fluctuations in the growth rate of profits are generally driven by various shocks having opposite offsetting effects, as for example, demand and employment. With the exception of Spain, wage mark-ups seem to play a smaller role in the historical decomposition of aggregate profits growth in the vast majority of countries examined.

As regards the unprecedented contraction in profits in the manufacturing sector experienced during the 2008–2009 recession, it was largely driven by negative demand shocks in all the countries examined as well as in the euro area. Profits in the construction sector appear to be driven largely by idiosyncratic factors while the divergent impact of the shocks in the services sector makes the inference of general conclusions in this sector particularly challenging.

1 Introduction

The analysis of profit developments is an important part of the macroeconomic assessment and projection undertaken by the European Central Bank and the Eurosystem. Among other indicators, profits are often used to evaluate the financial health of the corporate sector, its ability to finance investment expenditures via internal funding as well as to attract external financing. In addition, profits constitute an important share of the total income of households (e.g., through distributed dividends) and, in turn, affect private consumption. Some components of profits (e.g., profit margins) are also regularly monitored in assessing inflationary pressures, which emerge from price-setting decisions of profit-maximizing firms targeting a desired level of profitability.

Notwithstanding the relevance of profits in regular economic analysis and forecasting, the empirical literature on profit determination is relatively scarce. In an attempt to narrow the knowledge gap, as a fact finding exercise, this paper explores the behavior of profits using a disaggregated approach by examining the four largest euro area countries (Germany, France, Italy and Spain) and the euro area as a whole, while at the same time considering three main sectors (manufacturing, construction and services) in each economy. This perspective allows exploiting a rich set of results which can be compared across different countries and sectors.

More specifically, in line with the practice generally employed in the preparation of macroeconomic projections, profits are defined in terms of national account statistics, i.e. gross operating surplus excluding the income of the self-employed. Using the maximum available common sample data set, 1988–2010, the paper provides some stylized facts about profit developments across the considered countries and sectors. Furthermore, within the estimated individual vector autoregressive (VAR) models, it discusses the sensitivity of profits to various economic shocks and provides an historical shock decomposition of profit developments over the considered sample.

The analysis indicates that positive demand shocks have a positive impact on profits and that the initial effect of a demand shock is much larger in the manufacturing and construction sectors. Across countries, the path of persistence of demand shocks is particularly heterogenous in the construction sector. In all countries and in the euro area, the effect on profits of an increase in wages across sectors is stronger in construction - possibly reflecting the labour intensive nature of this sector - while broadly comparable across the remaining sectors. A positive price mark-up shock has generally an initial positive effect on profits which subsequently revert once demand fall in reaction to increasing prices. The magnitude and extent of these responses tend to differ widely across countries and sectors, most likely reflecting heterogenous cross-country and sector price stickiness.

The paper also explores the main driving forces behind the historical fluctuations of profits across euro area countries and sectors using the same categories of shocks discussed above. For the whole economy, in Germany and to a lesser extent in the euro area, the historical fluctuations in profits appear to be mainly driven by demand shocks and only to a lesser extent by employment shocks. On the contrary, in the other countries the fluctuations are driven by various shocks having opposite offsetting effects on profits' growth, as for example, demand and employment shocks in some cases. With the exception of Spain, wage mark-ups seem to play a smaller role in the historical decomposition of aggregate profits growth in the vast majority of countries examined.

The remainder of the paper is structured as follows. Section 2 reviews the literature discussing the theoretical framework for analysing profits as well as the main empirical findings based on previous studies. Some stylised facts for the four countries analysed and the euro area are then presented in Section 3. A presentation of the empirical strategy and the main results follow in Section 4 and Section 5, respectively. Finally, some concluding remarks are contained in Section 6. Appendix A details a model of profit determination in the long run and Appendix B reports the main results of a correlation analysis. Appendix C presents the results of the integration tests carried out on the profit share in each sector of each economy and finally Appendix D provides the estimated impulse-response functions and the historical decomposition of profits.

2 Literature Review

The objective of this section is twofold. First, it provides a general overview of the theoretical foundations on profit analysis focusing on the key factors influencing both the long-run and the short-run developments in profits. Second, it familiarizes the reader with the main empirical results reported in the literature.

2.1 Micro-foundations of profit determination

While the empirical analysis of the paper utilizes reduced-form macro and sectoral level models, noting a high degree of endogeneity of profits, in this section we draw largely on a general equilibrium approach to modeling profits in order to develop an economic intuition from the theoretical micro-foundations.

First, a definition of what is meant by profits is needed. While in practice definition of firm's profits can be very tightly bounded by some formal accounting requirements, on a macroeconomic level it may be subject to a variety of interpretations. This is clearly reflected in a multiplicity of profit indicators analyzed in the literature. To avoid narrowing of the discussion to specific measures of profits or profitability in what follows we focus on a general concept of profits in line with

economic theory, namely, economic profit defined as the difference between firm's revenues and the opportunity costs of inputs (including the cost of capital). In terms of theoretical underpinnings, the mainstream approach to modeling profits rests on models of imperfect competition, in particular, monopolistic competition (Chamberlin (1960), Spence (1976), Dixit and Stiglitz (1977)).[1] This allows studying profit adjustment in the short run as well as its determination in the long run.[2]

In the long run, positive profits arise due to the ability of monopolistically competitive producers to set the price as a mark-up over marginal costs of production. The size of the mark-up reflects firms' market power. Under some simplifying assumptions, e.g. in the case of a Cobb-Douglas production function with constant returns to scale and neutral technological process, it can be shown that the equilibrium mark-up is determined by the price elasticity of demand. Furthermore, in the long run, the labor, capital and monopolistic profit shares will be a function of the elasticity of output with respect to the factors of production and the mark-up (see Annex A for a discussion):

$$s_L = \frac{WL}{PY} = \frac{1-\alpha}{\mu}, s_K = \frac{RK}{PY} = \frac{\alpha}{\mu}, s_\Pi = \frac{PY - WL - RK}{PY} = \frac{\mu - 1}{\mu}, \qquad (1)$$

where s_L, s_K, s_Π denote respectively the labour, capital and economic profit shares, Y is the real output, P is the price of output, K denotes capital, L denotes labour, W is the nominal wage, R is the nominal rental cost of capital, α is the output elasticity of capital with $0< \alpha <1$, $\frac{1-\mu}{\mu}$ denotes the steady-state price elasticity of demand with $\mu >1$.

The above theoretical framework suggests that the mark-up is proportional to the labor share and can be also interpreted as the gap between the marginal product of labor (mpl) and the real wage:

$$\mu = (1-\alpha)s_L^{-1} = (1-\alpha)\left[\frac{WL}{PY}\right]^{-1} = \frac{mpl}{W/P}. \qquad (2)$$

The empirical literature (see the subsection below) often utilizes more aggregate (national accounts based) measures of profits such as the profit margin (the ratio between output price and the nominal unit labor costs) or the profit share (the ratio of gross operating surplus to the value of output). Clearly, these alternative measures of profits are closely related. For example, in the case of a Cobb-Douglas

[1] Alternative approaches to model product market imperfections typically explore customer-firm relationship which allows firms setting price above marginal costs. See, for example, a search-matching model developed by Marthä and Pierrard (2009), where firms invest into advertising to search for customers, establish long-term contracts with their customers and bargain over prices.

[2] Under perfect competition positive economic profits are not sustainable in the long run, as new firms attracted by positive profits will be continuously entering the market until the price of the product or service is equal to average costs of production and there are no economic profits.

production function, the profit margin indicator m and the (gross) profit share f will be inversely determined by the labor share and correlate positively with the mark-up μ:

$$m = \frac{P}{WL/Y} = s_L^{-1} = \mu/(1-\alpha), \tag{3}$$

$$f = \frac{PY - WL}{PY} = 1 - s_L = 1 - (1-\alpha)/\mu, \tag{4}$$

$$s_\Pi = 1 - \frac{1}{1-\alpha} m^{-1} = 1 - \frac{1}{1-\alpha}(1-f). \tag{5}$$

Admittedly, numerous structural factors determining the level of competition in the economy (e.g. technological know-how, legal regulation, foreign competition, etc.) affect the equilibrium level of the mark-up. In this regard, differences of economic environment in which companies or sectors operate may result in heterogeneity of the long-run mark-ups, and hence profits, at a firm or sectoral level.

Concerning the short run, temporal deviations of monopolistic profits from equilibrium may arise in response to economic shocks[3], e.g. fluctuations in the level of market competition, changes in demand, production technology or costs of inputs of production. While the cyclicality of profits in absolute terms (co-movement of profits and output) is well-recognized in the empirical literature, the relative responsiveness of profits to economic shocks is subject to theoretical and empirical debates. The cyclical dynamics of profits will be largely determined by the ability of firms to set prices and alter factors of production in a flexible manner in response to economic shocks. This ability, however, may be significantly limited by nominal and real rigidities present in the economy.[4] Furthermore, various economic frictions may also induce substantial asymmetry in price response to shocks, which will depend on the direction of the adjustment (upward versus downward) and the source of the shock. For example, cost push shocks may have a greater impact when prices have to be raised than when they have to be reduced (downward nominal rigidity), reductions in demand are more likely to induce a price change than increases in demand (due to the competitive structure of the market, the company-customer relationship, etc.).

As discussed above, the level of the mark-up depends on the degree of market competition. In this regard, the more competitive the market is, the more likely a firm will adjust its price in response to shocks in order to avoid a fall in profits (Martin (1993); Small and Yates (1999)). As a result, stronger competition should induce a greater responsiveness of prices to cost and demand shocks and, therefore, less variability of profits. On the other hand, the sensitivity of profits with respect to

[3] Economic shocks can be viewed as unexpected exogenous changes in economic conditions driving a wedge between actual and optimal allocation of resources.

[4] Nominal and real rigidities can be rationalized on the basis of various economic frictions reflecting exogenous structural features of economic environment in which firms operate: staggered price and wage setting, investment and/or capital adjustment costs, habit formation in consumption, hiring and firing costs, incomplete information, etc.

variation in output may be low as the degree of market power rises (Hall (1986)). In this case, the flatness of the marginal cost curve implied by the scale of real rigidities associated with imperfect competition makes price adjustment following a shock to be less likely than in case of variable marginal costs.[5]

The cyclicality of the price mark-up depends on the nature of the structural shocks underlying economic developments, the relative flexibility of price and wage setting and variation in the desired mark-ups.[6] In this regard, differences across economic sectors in terms of adjustment mechanisms and exposure to structural shocks are expected to induce sector-specific dynamics in profits.

For a constant desired mark-up, if prices are more flexible than wages, a positive demand shock will produce an increase in the implied mark-up and profits. The same shock could also lead to a reduction in the implied mark-up in case wages are more flexible than prices. Rigidity of output prices may also imply that a cost push shock produces a reduction in the mark-up and profits (Macallan *et al.* (2008)).

Firm may also find it optimal to alter the desired mark-up in response to a shock. A large number of theoretical models featuring endogenous desired mark-up typically explores a possibility that the elasticity of demand may vary over an economic cycle. For example, the demand elasticity may change over the cycle reflecting compositional variation in spending (Galí (1994), Bils (1989)), cyclicality of product variety (Weitzman (1982)) or market entry (Chatterjee *et al.* (1993)). In most cases, the mark-up will respond counter-cyclically to demand shocks. Similarly, customer-base models (Phelps (1994), Bils (1989), Phelps and Winter (1970)) or implicit collusion models (Rotemberg and Woodford (1992)) also predict that the mark-up may response counter-cyclically to demand shocks.

Besides determining the sensitivity of profit variation over an economic cycle, the endogenous variation in the implied mark-up also affects the propagation of shocks. In an environment of price stickiness the mark-up will move pro-cyclically in response to technology shocks and counter-cyclically in case of demand or policy shocks (Rotemberg and Woodford (1999)). Consequently, the output response to technology shocks will be smaller and the response to demand or policy shocks will be larger than in case of flexible-price economy (perfect competition).[7]

[5]Moreover, monopolistic competitive firms have little incentive to restore output to pre-shock levels facilitating persistent variation in output following a shock. Thus, imperfect competition may also be viewed as an important source of business cycles since it contributes to vulnerability of output (and profits) to various demand and policy shocks (Hall (1986)).

[6]The desired mark-up denotes the ratio between price and marginal cost that would be chosen by firms in the absence of nominal rigidities (Rotemberg and Woodford (1999))

[7]In fact, in most general equilibrium models counter-cyclicality of the mark-up following a monetary policy shock dampens the response of prices and amplifies the impact of the shock on output.

2.2 Main empirical findings

The empirical literature has been mainly focusing on the estimation and analysis of the cyclical behavior of alternative measures of profits. A bulk of research has focused on the mark-up, defined as the wedge between price and marginal costs. A number of papers has also considered more aggregate profit measures like profit margins or profit shares.

Hall (1986) reports large estimates of the mark-up for US industries revealing a high degree of imperfect competition in the economy. These estimates, however, are not consistent with the relatively low level of observed profitability of firms reported in Hall (1988).[8] Oliveira Martins *et al.* (1996) collects evidence on relative size of average mark-ups across sectors in the OECD countries and analyze its relationship to the market structure (level of segmentation and degree of product differentiation), entry barriers, state monopoly, innovation rents related to R&D spending and exposure to foreign competition. In particular, they find that the mark-ups for services and communication are higher then in the manufacturing sector, reflecting a higher degree of monopoly or the role of legislation and possibly due to innovation rents. Low mark-ups in manufacturing is related to a higher exposure to foreign competition. Mark-ups are smaller in the construction sector due to a high degree of fragmentation. Similarly, estimates of the sectoral mark-up for 8 euro area countries and the US reported over 1981–2004 in Christopoulou and Vermeulen (2008) confirm that mark-ups in the services sector are on average higher than in the manufacturing sector. McDonald (1997) analyzes the determinants of the profitability of Australian manufacturing firms and finds that industry concentration is positively related to firms' profit margin, while both union density and real wage inflation are negatively associated with firm profits. Likewise, Fariñas and Huergo (2003) repot that in Spain the mark-up is higher in more concentrated industries. Finally, Przybyla and Roma (2005) and Neiss (2001) present robust evidence on the importance of the mark-up in explaining cross-country differences in average inflation in respectively EU and OECD countries. In particular, there is significant negative cross-section correlation between the level of competition and average inflation rates.

A number of empirical contributions suggested that mark-ups in the US are counter-cyclical reflecting strong pro-cyclicality of the marginal costs (Bils (1987), Rotemberg and Woodford (1991)). The presence of overhead labor costs, fixed cost of production, imperfectly competitive labor market, costs of adjusting the labor input, and labor hoarding tend to produce estimates of the marginal costs which feature a more pronounced pro-cyclical pattern than those based on the standard measure of the labor share (Rotemberg and Woodford (1999)). Similarly, applying

[8] The latter may be attributed to the impact of market entry which is expected to eliminate persistent profits in the long run, even if entry does not respond quickly enough to eliminate cyclical fluctuations in profits.

Rotemberg and Woodford (1991) approach Oliveira Martins and Scarpetta (2002) find strong support for the hypothesis of counter-cyclical behavior of price mark-ups in manufacturing sector of major industrial countries. The presence of downward labour rigidities is reported to amplify the estimated counter-cyclicality of the mark-up.

In contrast, Nekarda and Ramey (2010) find that in the US alternative measures of the mark-up based on the labor share are pro-cyclical at both the economy-wide and the manufacturing sector level. Similar results are reported by Macallan *et al.* (2008) and Fariñas and Huergo (2003) for respectively the UK and Spain. Fariñas and Huergo (2003) find that the mark-up in the Spanish manufacturing sector is pro-cyclical: labor adjustment costs are significant and asymmetric (firing costs are higher than hiring costs). Macallan *et al.* (2008) investigates the cyclical behavior of alternative measures of the mark-up in the UK in line with numerous refinements to definition of the mark-up discussed in Rotemberg and Woodford (1999): CES production function, overhead labour, labour adjustment costs, imported raw material. Overall, the authors find that both economy-wide and industry-level mark-ups and profit margins are pro-cyclical, i.e. tend to rise in booms. There is, however, no strong evidence found that pro-cyclicality of the profit margin is stronger in less concentrated industries. Similarly, McDonald (1997) finds that the cyclicality of profit margins in Australian manufacturing sector depends on industry concentration - firms' margins are pro-cyclical in concentrated industries and are counter-cyclical in less concentrated industries.

3 Stylised facts from a sectoral and country perspective

The empirical analysis carried out in this paper covers the aggregate economy, the manufacturing, services and construction sectors for the euro area as a whole, Germany, France, Italy and Spain, over the period 1988Q1–2010Q4 (92 quarterly observations). Profits are defined as gross operating surplus excluding the income of the self employed (computed for each sector and country, as customary, adjusting compensation per employees for the number of self employed). All data come from Eurostat.[9] Data for the euro area before 1995Q1 are backcasted using growth rates obtained from an aggregation of the four largest euro area countries included in the analysis.

Looking at the share of profit as a percentage of value added in each sector, the services sector generally features the highest profit share with an average over the period 1988–2010 ranging from 40 per cents in Germany to 36 per cents in France (see Table I in Appendix B). This is compatible with the notion that profits in

[9] We use gross value added at basic prices (constant and current prices), gross operating surplus (current prices), value added deflator, compensation of employees (current prices), total employment and employees (number of heads).

services are generally higher than in other industries due to, inter alia, more limited competition as reported in the review of the empirical literature above. Together with a structural increase of the share of services in value added in the euro area (ESCB (2006)), the profit share in services has been trending up in Germany, France, Italy and the euro area since mid 1980s (see Figure I in Appendix B). This increase was particularly strong, in excess of 10 p.p., in the case of Italy and took place largely since the beginning of the 1990s reflecting large-scale privatisations and restructuring of state-owned companies in the non-manufacturing sector (mainly in transport, communication and finance) (Torrini (2005)). The profit share in services is generally less volatile than in other sectors (especially since 1995) and it is generally highly positively correlated with the aggregate profit share in all countries (as one would expect given the large weight of services in value added) (see Tables II and III in Appendix B).

The profit share in construction generally displays larger volatility than the respective shares for the total economy and services (see Figure I and Table I in Appendix B). Moreover, it is characterized by diverse dynamics across countries most likely reflecting important idiosyncratic characteristics of national housing markets and residential investments such as land availability and regulation (Alvarez *et al.* (2010)). These differences notwithstanding, since mid-1980s construction displayed the lowest average share of profits - compared to the other sectors - in all the countries examined and in the euro area ranging from 22% in Germany to 36% in Italy. In Spain, and to some extent in France and in the euro area, it exhibited a V shape pattern, falling from mid 1980s to mid-end of the 1990s and increasing sharply afterwards from low levels. In Germany, it increased substantially since 2005. The profit share in construction has generally a low correlation with the profit share in the other sectors in all countries except in Spain.

Finally, the profit share in industry generally declined substantially in the countries examined and in the euro area from the beginning of 1990 to the end of the 1992–93 recession exhibiting a significantly larger cross-country synchronization than in services and the overall economy (as also notably experienced in the last recession). This decline was particularly strong in Spain and Italy. Since 1992–93 the profit share in industry increased considerably in Germany up to 2006 (and it was booming between 2003 and 2007 in tandem with a rapid expansion in foreign demand and export) before plummeting during the last recession.

The stylised facts presented are broadly in line with those of other studies such as Oliveira Martins *et al.* (1996) and Christopoulou and Vermeulen (2008) discussed in the literature review. Keeping in mind the different methodologies and sample periods considered and the fact that these studies focus primarily on estimation of mark-ups across countries at a highly disaggregated level to investigate their competitive structure, some commonalities with our results emerge. In particular, average

mark-ups are reported to be heterogeneous across countries and sectors indicating a large role for country-specific policies. Moreover, mark-ups in the services sector are generally higher suggesting that departures from perfect competition are more common in this sector. In addition mark-ups in Italy (and in the construction sector in particular) are also found to be elevated.

4 Methodology

Using the data detailed above, we now turn to the estimation of a suite of VAR models estimated for the major sectors of the four largest euro area economies and the euro area as a whole. Our choice of VAR models as the main modeling tool is driven by the desire to establish a flexible analytical setup which allows both exploring the data properties as well as imposing identifying restrictions, thus, facilitating structural analysis. The variables in the VAR are assumed to be driven by various structural economic shocks which we identify within the estimated models. The sensitivity of profits to the identified shocks is then discussed and structural shock decomposition of the historical series of profits at country and sectoral level is performed and analysed.

4.1 Variable selection

In order to keep the dimension of the estimated VAR models manageable we restrict the number of endogenous variables to 4 series: the real value added Y_t, the value added deflator P_t, the compensation per employee W_t, and total employment L_t. Besides keeping the modeling framework parsimonious, this minimum set of variables allows us to capture the variation in the demand and supply conditions as well as price and wage rigidities both at a country and sectoral level.

The profits Π_t are not modeled directly in order to avoid problems of endogeneity, instead, they are derived implicitly within the model, resulting from the national account identity. More specifically, once the models are estimated, the impulse-response analysis and historical shock decomposition of profits are conducted by augmenting the estimated models with an identity based on the four variables incorporated within each VAR model.

$$\Delta\Pi_t = \frac{1}{\alpha}(\Delta Y_t + \Delta P_t) - \frac{1-\alpha}{\alpha}(\Delta W_t + \Delta L_t), \tag{6}$$

where $1-\alpha$ is the sample average of the labor income share in the nominal value added, and Δx_t denotes the growth rate of a variable x_t expressed in per cents.

Concerning the issue of possible long-term relationship (co-integration analysis) between the variables in levels, appendix C provides details of the results of unit root tests conducted on the profit share. Various specification for the deterministic

part are used but in almost all the cases, it appears that one cannot reject the null of non-stationarity of the profit share over the period. Although, presumably, over the long run the series evolve along some balanced growth path, within the given, relatively short estimation sample, the imposition of a common trend for the four variables does not ensure stationarity of the series. Within the modelling framework, the non-stationarity may reflect the presence of variable-specific trends or breaks associated with institutional changes such as targeted structural reforms or economic policies (market liberalization, product or sector specific trade policies, etc.). Comprehensive explanation of these idiosyncratic trends in the data, however, goes beyond the explorative mission of the paper. Therefore, in order to ensure the stationarity of the VAR, we choose to estimate the models with variables in annual differences.[10]

4.2 VAR model estimation

The general specification of a VAR model of order q estimated for a country i and sector j is as follows:

$$\Delta X_t^{i,j} = \sum_{l=1}^{q} A_q^{i,j} \Delta X_{t-l}^{i,j} + \epsilon_t^{i,j}, \tag{7}$$

where X_t is a vector of endogenous variables, A_q is a matrix of coefficients, and ϵ_t is a vector of *i.i.d.* disturbances.

Altogether, 20 VAR models are estimated: for the aggregate economy and its three major sectors (manufacturing, services, construction) in four countries (Germany, France, Italy, and Spain) and the euro area. The country and sector specific VARs are estimated over the period from 1988Q1 to 2010Q4 using the annual growth in each of the series described above. The coefficients of the VAR models are estimated applying ordinary least squares. Starting with a general VAR specification of four lags, the number of lags q for each VAR model is determined by optimal lag-selection procedure based on the Schwarz information criterion. As regards the latter, in most cases the optimal choice of lags was set to 1 or 2.[11]

In order to identify the structural shocks, we employ the recursive decomposition with the ordering commonly followed in the literature: $\Delta L_t \rightarrow \Delta W_t \rightarrow \Delta P_t \rightarrow \Delta Y_t$, which implies that employment is ordered first in the VAR, being the variable which reacts instantaneously only to idiosyncratic shocks, and adjusts with lag to all other shocks. This is consistent which most empirical studies which suggest that the labour

[10] Alternatively, we estimated specific trends for each of the four series, using a Hodrick-Prescott filter. Results based on such a decomposition were tested in a previous version of the paper and are available upon request. The empirical conclusions remain broadly similar to those developed in this version of the paper.

[11] Given the space constraints, the estimation results for the 20 VAR, including the coefficients and the standard diagnostic tests are not reported. They are available under request.

reaction is somewhat sluggish in euro area economies. Wages are ordered second in the VAR. While they are contemporaneously affected by employment shocks and idiosyncratic shocks, wages react to activity and prices with a lag. Finally, in line with standard practices in monetary policy VARs, prices are ordered before output, which comes last. This ordering allows us to capture demand shocks which, first, affect the product market and then spills-over onto the labor market. In line with standard labour demand equations, employment react to wages and output with a lag, while wages react to prices with a lag.[12]

The ordering described above, thus, allows us to identify the following stationary structural shocks: a demand shock, a price mark-up shock, a wage mark-up shock and an employment shock. Following the imposed identification scheme, the employment shock is associated with the equation for the employment and may be interpreted as either a negative labor productivity shock or a positive labour supply shock (or a matching function shock). In terms of standard economic reasoning, positive efficiency shock is expected to have a negative impact on employment as well as domestic inflation via reduction in marginal costs of production. Its impact on output and real wages is expected to be positive. By contrast, a positive labour supply shock will be associated with rising employment, output, but falling real wages. The wage mark-up shock is associated with the equation for the nominal compensation and reflects stochastic variation in the market power of the labor force. A positive shock to the wage mark-up is associated with rising nominal wages and higher cost of output. As a result, the shock implies an increase in prices and fall in output and employment. The price mark-up shock is associated with the equation for the value added deflator and reflects stochastic variation in the level of product market competition. A positive price mark-up shock is expected to increase prices and later nominal wage, while reducing output and employment. Lastly, the demand shock is associated with the equation for the real value added and is expected to have positive impact on all the considered variables. Obviously, the set of shocks is limited and highly stylised. This modeling choice aims at providing robust and relatively intuitive results, in the context of the large number of estimated VAR models.

5 Results

This section reports the results of the empirical investigation. First, it discusses the behaviour of profits across the countries and sectors examined as a response to the identified shocks, then it decomposes from an historical perspective their developments in terms of the shock contributions.

[12] Estimates, not shown in the paper, generally confirm that results are robust to alternative ordering of the shocks between wages and employment. Moreover, generalized impulses were also implemented.

5.1 Impulse-response analysis

We are interested at gaining hindsight on the reaction of profits to selected economic shocks with a particular focus on analysing these reactions across countries and sectors. To this end, we conduct standard impulse-response analysis of year-on-year profit growth (gross operating surplus) using the accounting identity (6) to four distinctive structural shocks equal to one standard deviation of the endogenous variable: a demand shock (such as a confidence shock or a foreign demand shock), an employment shock, a wage mark-up and a price mark-up shock. In order to capture uncertainty about the responses we construct 95 percent empirical confidence bounds applying the bootstrap methodology.[13] Appendix D reports estimates of the impulse-response functions (IRF) and the respective confidence bounds for a period up to twenty eight quarters following the shock. Overall, there is a substantial degree of uncertainty regarding the short-run profit responses in case of wage and employment shocks, while the responses to demand shocks are often reported to be significant across countries and sectors. Several interesting findings regarding the point estimates of the impulse-responses are worth mentioning.

First, across countries and sectors, profits tend to respond mostly to demand shocks as these shocks have the strongest impact. Positive demand shocks have a positive impact on whole economy profits which lasts for approximately 6-8 quarters, for Italy and Germany and around 10 quarters for France and Spain. Afterwards this shock has either a nil or slightly negative reverting impact on profits. In all countries and in the euro area the initial effect of the demand shock tends to be larger in the manufacturing and the construction sector. Conversely, the impact of demand shocks on services is less pronounced. Across countries, the path of persistence of demand shocks is relatively homogenous.

Second, employment shocks generally have a negative impact on profits, which appears to be stronger in the case of France and the euro area. In some cases (Italy and Germany), these shocks have a relatively more muted but persistent effect, providing evidence of a sluggish adjustment in the labour market.

Third, a positive wage mark-up shock has generally a negative initial impact on profits lasting between 4 to 8 quarters. The effect on profits of an increase in wages across sectors is generally stronger in construction (with an initial effect being between 2 to 4 times larger than in the whole economy) - reflecting the labour intensive nature of this sector - while broadly comparable across the remaining sectors.

Lastly, a positive price mark-up shock has an initial positive effect on profits

[13] In particular, following Runkle (1987), on the basis of the estimated baseline models we randomly draw the model disturbances and using the estimated baseline model parameters generate artificial realizations of the endogenous variables. These artificial series are applied to get new estimates of the model parameters and the new impulse-responses. After replicating these steps 10000 times we compute empirical confidence intervals for each impulse-response.

which subsequently reverts once demand falls in reaction to increasing prices. The magnitude and extent of responses tend to differ widely across countries and sectors, most likely reflecting heterogenous cross-country and sector price stickiness. However, the beneficial effects on profits of a price mark-up shock appears to be around 2-3 quarters maximum, after this period the positive effects are wiped-out. As for the wage mark-up shock, the effect on profits of an unexpected increase in prices is stronger in the manufacturing and construction sectors compared to the other sectors.

5.2 Shock decomposition

Having estimated the shocks and the response of profits, we now construct the historical decomposition of profits into shocks contributions. Such decomposition reflects the cumulated effects of both the contemporaneous and lagged shocks. We review the main driving forces behind the historical fluctuations of profits across euro area countries and sectors since 1999. We focus on a more recent period starting in 1999 to iron out potential differences across sectors and countries mainly related to idiosyncratic exchange rate and monetary policy shocks as well as heterogeneous inflation rates preceding the euro introduction and also given the large volatility of some sectors (such as construction) during the 1991–1992 recession.[14] We present the decomposition of year-on-year growth rates of profits using the same categories of shocks discussed above: a demand shock, an employment shock, a wage mark-up and a price mark-up shock (see Figures XII-XVI in the Appendix). For ease of exposition, results are discussed first for the whole economy and then for the constituent sectors.

As regards profit developments at a whole economy level, in Germany and to a lesser extent in the euro area, the historical fluctuations in the growth rate of profits appear to be mainly driven by demand shocks and only to a lesser extent by employment shocks. On the contrary, in the other countries the fluctuations are driven by various shocks having opposite offsetting effects on profits' growth. For example, demand and employment shocks have in some instances opposite effects on profits possibly suggesting that firms react to demand conditions adjusting (with some delay) their labour force in order to achieve a desired or optimal level of profitability. With the exception of Spain, wage mark-ups seem to play a minor role in the historical decomposition of aggregate profits.

In case of the manufacturing sector, the unprecedented contraction in profits recorded in this sector during the 2008–2009 recession was largely driven by negative demand shocks in all the countries examined as well as in the euro area. Interest-

[14] It is also likely that estimated decompositions are sensitive to the initial observations, over the first few years, an effect which vanishes after some time. The results are available upon request since the beginning of the nineties.

contraction of the demand shock thus leading to an unprecedented contraction of the growth rate of profits in the manufacturing sector.

In the service sector, the growth rate of profits across the modeled economies are driven by all the considered shocks, sometimes with offsetting effects. The latter makes the inference of general conclusions for services particularly challenging. This notwithstanding, contrary to the manufacturing sector, demand shocks do not generally appear to be the major driver of profit fluctuations in the services sector.

Lastly, the main determinants of profits in the construction sector differ widely cross the countries examined confirming the idiosyncratic nature of this sector. Employment shocks generally appear to be a driving force in Germany and the euro area, while several shocks play a role in the other countries.

6 Conclusions

This paper examined the behaviour of profits in the period 1988–2010 in the four largest euro area countries (Germany, France, Italy and Spain) and in the euro area as a whole, both at economy-wide and sectoral level (services, manufacturing and construction). The analysis indicated that services sector features the highest profit share and that this share - less volatile than in other sectors - trended up in several countries since mid-1980s. The profit share in construction was highly volatile and characterized by idiosyncratic dynamics across the countries examined, while the profit share in industry generally exhibited a significantly larger synchronization (as also notably experienced in the last recession).

Applying estimated small-scale VAR models at the country and sectoral level, the paper discusses impulse-response analysis of profits to four distinctive structural shocks: a demand shock, an employment shock, a wage mark-up and a price mark-up shock. The results indicate that across countries and sectors, positive demand shocks have a positive impact on whole economy profits which lasts for approximately 6-8 quarters and that the initial effect of a demand shock is much larger in the manufacturing and construction sector. Across countries, the path of persistence of demand shocks is particularly heterogenous in the construction sector. A positive wage mark-up shock has generally a negative initial impact on profits across countries and sectors lasting between 4 to 8 quarters. In all countries and in the euro area, the effect on profits of an increase in wages across sectors is stronger in construction - reflecting the labour intensive nature of this sector - while broadly comparable across the remaining sectors. A positive price mark-up shock has generally an initial positive effects on profits which subsequently revert once demand fall in reaction to increasing prices. The magnitude and extent of responses tend to differ widely across countries and sectors, most likely reflecting heterogenous cross-country and sector price stickiness.

Finally, the paper explores the main driving forces behind the historical fluctuations of profits since the end of the nineties using the same categories of shocks discussed above. For the whole economy, in Germany and to a lesser extent in the euro area, the historical fluctuations in the growth rate of profits appear to be mainly driven by demand shocks and only to a lesser extent by employment shocks. On the contrary, in the other countries the fluctuations are driven by various shocks having offsetting effects on profits' growth. With the exception of Spain, wage mark-up shocks seem to play a smaller role in the historical decomposition of aggregate profits growth in the vast majority of countries examined.

The unprecedented contraction in profits in the manufacturing sector experienced during the 2008–2009 recession was largely driven by negative demand shocks in all the countries examined as well as in the euro area. The main determinants of profits in the construction sector appear to be driven largely by idiosyncratic factors while the divergent impact of the shocks in the services sector makes the inference of general conclusions in this sector particularly challenging.

There are several caveat associated with this analysis. First, to make the analysis tractable and comparable across a relatively large number of sectors and countries, the chosen VARs have a parsimonious structure. Additional factors possibly affecting labour and product market developments at a country and sectoral level could also play a role. Second, the analysis is restricted to modeling short-term profit behavior, thus leaving the long-term determination of profits outside the scope of the paper. These limitations are left for further research.

References

Alvarez, L., Bulligan, G., Cabrero, A., Ferrara, L. and H., S. (2010). *Housing Cycles in the Major Euro Area Countries*. Documentos Ocasionales 1001, Banco de España.

Bils, M. (1987). The cyclical behaviour of marginal cost and price. *American Economic Review*, **77** (5), 838–855.

— (1989). Pricing in a customer market. *Quarterly Journal of Economics*, **104** (4), 699–718.

Chamberlin, E. (1960). *The Theory of Monopolistic Competition*. Cambridge: Harvard University Press.

Chatterjee, S., Cooper, R. and Ravikumar, B. (1993). Strategic complementarity in business formation: Aggregate fluctuations and sunspot equilibria. *Reviwe of Economic Studies*, **60**, 765–811.

Christopoulou, R. and Vermeulen, P. (2008). *Markups in the Euro Area and the US over the Period 1981-2004. A Comparison of 50 Sectors*. Working Paper 856, European Central Bank.

Dixit, A. and Stiglitz, J. (1977). Monopolistic competition and optimum product diversity. *American Economic Review*, **67** (3), 297–308.

ESCB (2006). *Competition, Productivity and Prices in the Euro Area Services Sector*. Occasional Paper 44, European Central Bank.

Fariñas, J. and Huergo, E. (2003). Profit margins, adjustment costs and the business cycle: An application to Spanish manufacturing firms. *Oxford Bulletin of Economics and Statistics*, **65** (1), 49–72.

Galí, J. (1994). Monopolistic competition, business cycles, and the composition of aggregate demand. *Journal of Economic Theory*, **63**, 73–96.

Hall, R. (1986). Market structure and macroeconomic fluctuations. *Brookings Papers on Economic Activity*, (2), 285–322.

— (1988). The relationship between price and marginal cost in US industry. *Journal of Political Economy*, (96), 921–947.

Macallan, C., Millard, S. and Parker, M. (2008). *The Cyclicality of Mark-ups and Profit Margins for the United Kingdom: Some New Evidence*. Working Paper 351, Bank of England.

Marthä, T. Y. and Pierrard, O. (2009). *Search in the Product Market and the Real Businesss Cycle*. Working Paper 1036, European Central Bank.

Martin, C. (1993). Price adjustment and market structure. *Economic letters*, **41** (2), 139–143.

McDonald, J. (1997). *The Determinants of Firm Profitability in Australian Manufacturing*. Working Paper 17, Melbourne Institute.

Neiss, K. S. (2001). The markup and inflation: Evidence in OECD countries. *Canadian Journal of Economics*, **34** (2), 570–587.

Nekarda, C. and Ramey, V. (2010). *The Cyclical Behaviour of the Price-Cost Markup*. paper prepared for the sixth conference of *The International Research Forum on Monetary Policy*, March 26-27, The Federal Reserve Board in Washington, D.C., available at http://www.ecb.int/events/conferences/html/researchforum6.en.html.

Oliveira Martins, J. and Scarpetta, S. (2002). Estimation of the cyclical behaviour of mark-ups: A technical note. In *OECD Economic Studies*, 27, pp. 173–188.

—, — and Pilat, D. (1996). Mark-up pricing, market structure and the business cycle. In *OECD Economic Studies*, 27, pp. 71–82.

Phelps, E. S. (1994). *Structural Slumps*. Cambridge, MA: Harvard University Press.

— and Winter, S. (1970). Optimal price policy under atomistic competition. In E. Phelps (ed.), *Microeconomic Foundations of Employment and Inflation Theory*, W.W. Norton and Co, New York, pp. 309–337.

Przybyla, M. and Roma, M. (2005). *Does Product Market Competition Reduce Inflation? Evidence from EU Countries and Sectors*. Working Paper 453, European Central Bank.

Rotemberg, J. J. and Woodford, M. (1991). Markups and the business cycle. In O. J. Blanchard and S. Fischer (eds.), *NBER Macroeconomics Annual 1991*, vol. 6, MIT Press, pp. 63–129.

— and — (1992). Oligopolistic pricing and the effects of aggregate demand on economic activity. *Journal of Political Economy*, **100**, 1153–1207.

— and — (1999). The cyclical behavior of prices and costs. In J. Taylor and M. Woodford (eds.), *Handbook of Macroeconomics*, Elsevier, pp. 1051–1135.

Runkle, D. E. (1987). Vector autoregressions and reality. *Journal of Business & Economic Statistics*, (5), 437–442.

Small, I. and Yates, T. (1999). What makes prices sticky? Some survey evidence for the United Kingdom. In *Bank of England Quarterly Bulletion*, pp. 262–270.

Spence, A. M. (1976). Product selection, fixed costs, and monopolistic competition. *Review of Economic Studies*, **43** (2), 217–235.

Torrini, R. (2005). *Profit Share and Returns on Capital Stock in Italy: the Role of Privatisations Behind the Rise of the 1990s*. CEPR Discussion Paper 671, CEPR.

Weitzman, M. L. (1982). Increasing returns and the foundations of unemployment theory. *Economic Journal*, **92** (368), 787–804.

Annex

A Profit determination in the long run: An example

This annex provides some detailed calculations exemplifying determination of monopolistic profits and factor income in the long run. To facilitate the presentation we use standard in the literature specification of demand and production schedules. Furthermore, since our focus is on long run equilibrium, we assume full flexibility of prices and costs. Let a downward sloping demand schedule faced by a monopolistic firm to be:

$$P_t = D_t^{\frac{1-\mu_t}{\mu_t}}, \tag{A.1}$$

where t denotes the time script, P_t is the price of output, D_t is the quantity demanded and $\frac{1-\mu_t}{\mu_t}$ denotes the time varying price elasticity with $\mu > 1$.

The production schedule is given by a standard Cobb-Douglas production function with constant returns to scale and neutral technological process:

$$Y_t = A_t K_t^{\alpha} L_t^{1-\alpha}, \tag{A.2}$$

where Y_t denotes output, K_t denotes capital, L_t denotes labour, A_t denotes the total factor productivity, and α denotes the output elasticity of capital.

The profit maximization problem involves choosing capital, labor and price for given level of factor prices, production technology and demand constraints. More formally:

$$\underset{L_t, K_t, P_t}{Max} \left(P_t D_t - W_t L_t - R_t K_t\right), \tag{A.3}$$

subject to nominal wage W_t, nominal rental cost of capital R_t, demand (A.1), production function (A.2) and the market clearing condition $Y_t = D_t$.

Substituting the constraints (A.1), (A.2) and the market clearing condition into the objection function (A.3), the unconstrained maximization problem becomes:

$$\underset{L_t, K_t}{Max} \left[\left(A_t K_t^{\alpha} L_t^{1-\alpha}\right)^{\frac{1}{\mu_t}} - W_t L_t - R_t K_t\right]. \tag{A.4}$$

The resulting optimality conditions state that in equilibrium the marginal revenues are equal to marginal cost of labor and capital (after some re-arrangement):

$$\frac{1}{\mu_t} P_t = \frac{1}{1-\alpha} \frac{W_t L_t}{Y_t} = \frac{1}{\alpha} \frac{R_t K_t}{Y_t}. \tag{A.5}$$

The optimal price is set as a mark-up over marginal costs:

$$P_t = \mu_t \left[\frac{1}{A_t \alpha^{\alpha} (1-\alpha)^{1-\alpha}} R_t^{\alpha} W_t^{1-\alpha} \right], \tag{A.6}$$

where μ_t denotes the mark-up and the term in square brackets is the nominal marginal cost. From (A.5) the long run production factor income and monopolistic profit shares can be estimated:

$$s_{L,t} = \frac{W_t L_t}{P_t Y_t} = \frac{1-\alpha}{\mu_t}, \tag{A.7}$$

$$s_{K,t} = \frac{R_t K_t}{P_t Y_t} = \frac{\alpha}{\mu_t}, \tag{A.8}$$

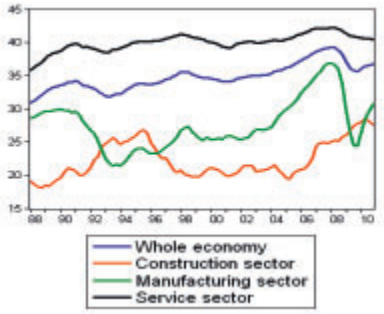
$$s_{\Pi,t} = \frac{P_t Y_t - W_t L_t - R_t K_t}{P_t Y_t} = \frac{\mu_t - 1}{\mu_t}, \tag{A.9}$$

where $s_{L,t}$, $s_{K,t}$, $s_{\Pi,t}$ denote respectively the labour, capital and profit share.

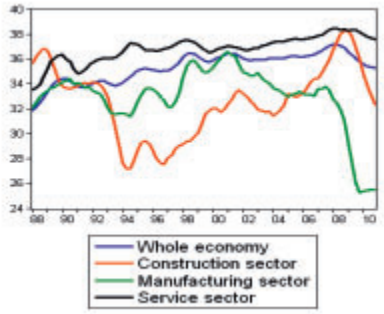
B Profit shares

Figure I: Estimates of profit shares (in per cents of nominal value added)

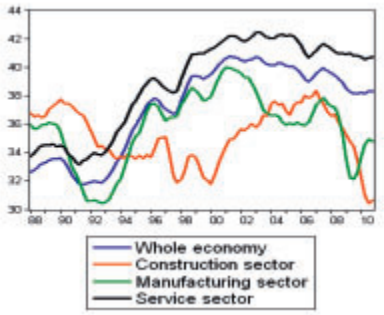
(a) Germany



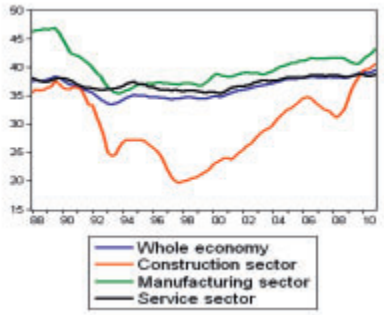
(b) France



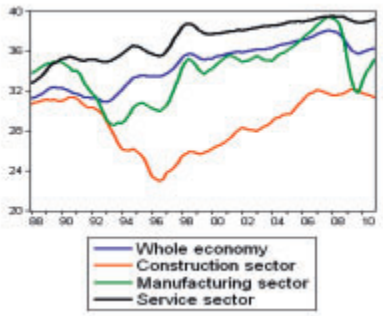
(c) Italy



(d) Spain



(e) Euro Area



Note: This figure depicts the estimates of profit share in the whole economy as well as its three main sectors.

Table I: Average profit share (% nominal value added, 1988q1-2010q4)

	Euro Area	Germany	France	Italy	Spain
Whole economy	34.5	34.6	34.8	36.7	36.5
Construction sector	28.9	21.9	32.4	35.4	30.4
Manufacturing sector	34.2	27.9	32.8	35.7	40.6
Services sector	36.8	39.7	36.3	38.3	37.3

Table II: Relative volatility of sector profit shares (ratio of standard deviations to the whole economy, 1988q1-2010q4)

	Euro Area	Germany	France	Italy	Spain
Construction sector	1.36	1.55	2.64	0.72	3.44
Manufacturing sector	1.36	2.05	2.47	0.89	1.68
Services sector	0.81	0.62	0.91	1.04	0.64

Table III: Cross-correlation of profit shares (1988q1-2010q4)

	Whole economy	Construction	Manufacturing	Services
Euro Area				
Whole economy	**1.00**	0.10	0.61	0.91
Construction sector	-	**1.00**	0.51	0.07
Manufacturing sector	-	-	**1.00**	0.36
Services sector	-	-	-	**1.00**
Germany				
Whole economy	**1.00**	0.39	0.54	0.88
Construction sector	-	**1.00**	-0.16	0.52
Manufacturing sector	-	-	**1.00**	0.13
Services sector	-	-	-	**1.00**
France				
Whole economy	**1.00**	0.22	0.20	0.96
Construction sector	-	**1.00**	-0.11	0.19
Manufacturing sector	-	-	**1.00**	0.00
Services sector	-	-	-	**1.00**
Italy				
Whole economy	**1.00**	-0.23	0.67	0.99
Construction sector	-	**1.00**	0.00	-0.28
Manufacturing sector	-	-	**1.00**	0.58
Services sector	-	-	-	**1.00**
Spain				
Whole economy	**1.00**	0.83	0.70	0.90
Construction sector	-	**1.00**	0.78	0.75
Manufacturing sector	-	-	**1.00**	0.58
Services sector	-	-	-	**1.00**

C Integration tests

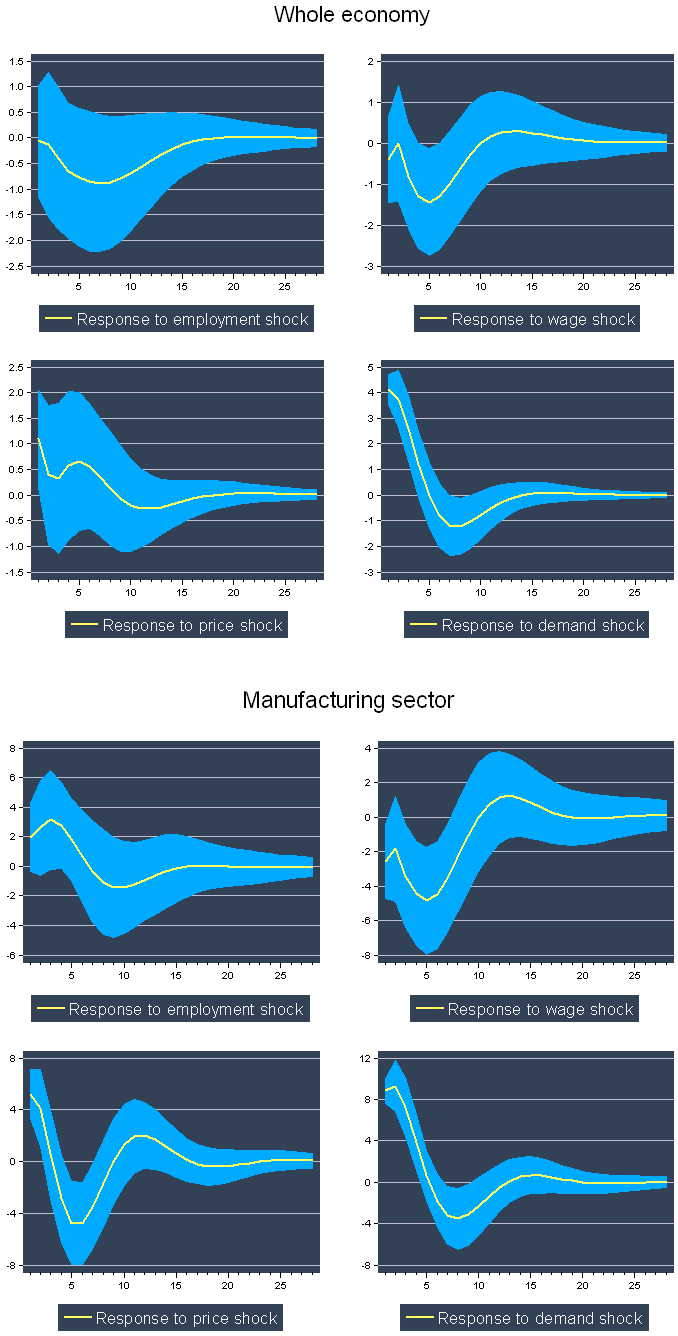
Table IV: Unit root ADF test of profit share, 1988q1-2010q4

Sector	Deterministic terms	Euro Area		Germany		France		Italy		Spain	
		Lags	*t*-statistics	Lags	*t*-statistics	Lags	*t*-statistics	Lags	*t*-statistics	Lags	*t*-statistics
Whole economy	-	0	1.48	1	0.72	0	0.83	0	0.72	0	0.63
	Constant	0	-1.54	0	-2.10	0	-2.82	0	-1.45	0	-0.20
	Constant, Trend	0	-1.25	0	-2.49	0	-2.05	0	-1.02	0	-1.70
Construction	-	1	-0.27	3	0.89	0	-0.79	1	-0.62	0	0.33
	Constant	1	-1.10	1	-2.24	0	-1.82	0	-2.78	0	-0.47
	Constant, Trend	1	-1.53	1	-2.38	0	-2.01	0	-2.78	3	-1.24
Manufacturing	-	0	0.13	1	-0.22	0	-0.84	0	-0.44	0	-0.55
	Constant	1	-1.95	1	-2.15	0	-0.52	0	-1.83	0	-2.08
	Constant, Trend	1	-2.69	1	-2.77	0	-1.16	0	-1.79	0	-2.06
Services	-	0	1.85	0	0.74	3	0.57	0	0.92	0	0.35
	Constant	0	-2.80	0	-3.78**	0	-3.44*	0	-1.51	0	-1.61
	Constant, Trend	0	-3.20	0	-3.68*	0	-4.59**	0	-1.44	0	-2.56

Note: Null hypothesis - the series is a unit root process; ** - the null hypothesis rejection at 1 per cent level of significance; * - the null hypothesis rejection at 5 per cent level of significance.

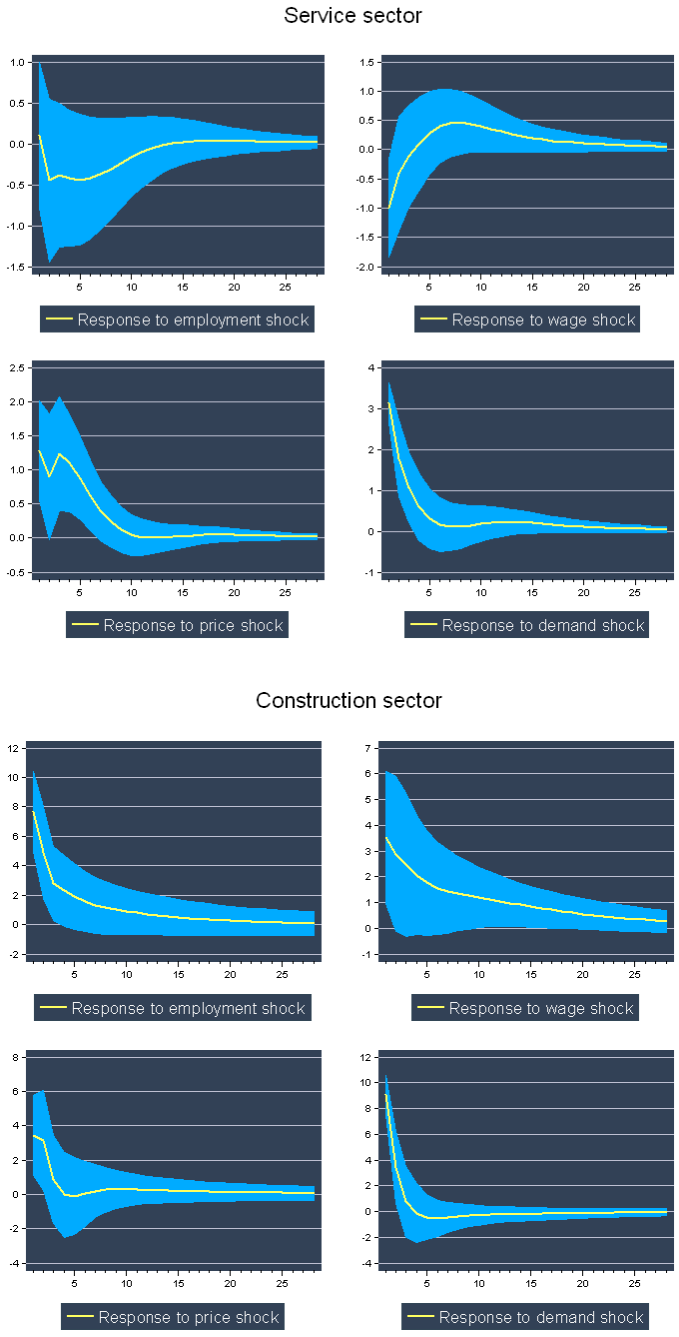
D Impulse responses and shock decomposition

Figure II: Impulse-responses of profits in Germany (Annual growth rate)



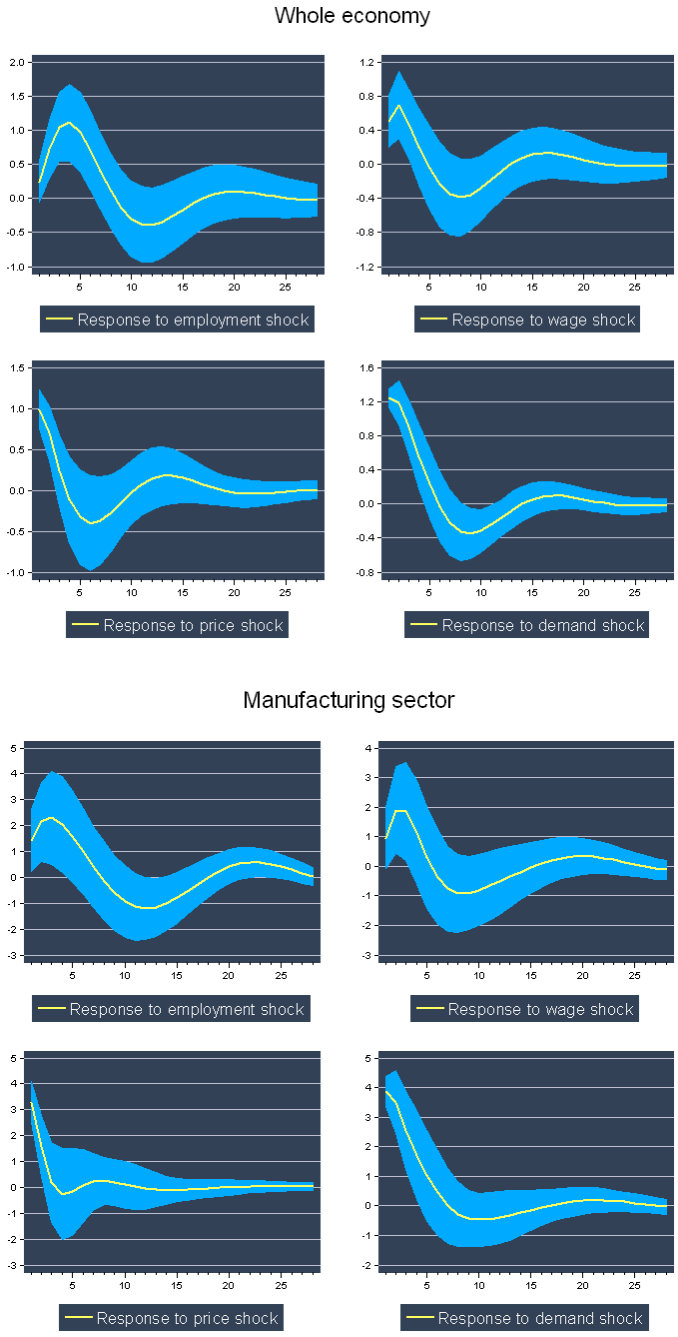
Note: The figures depict the impulse responses of profits to selected shocks equal to one standard deviation. The change is reported in deviation from the de-meaned annual growth rate in percentage points. The point estimate is obtained as the median of the bootstrap distribution on which also the 95% confidence bands are computed. 10000 replications have been used.

Figure III: Impulse-responses of profits in Germany (Annual growth rate)



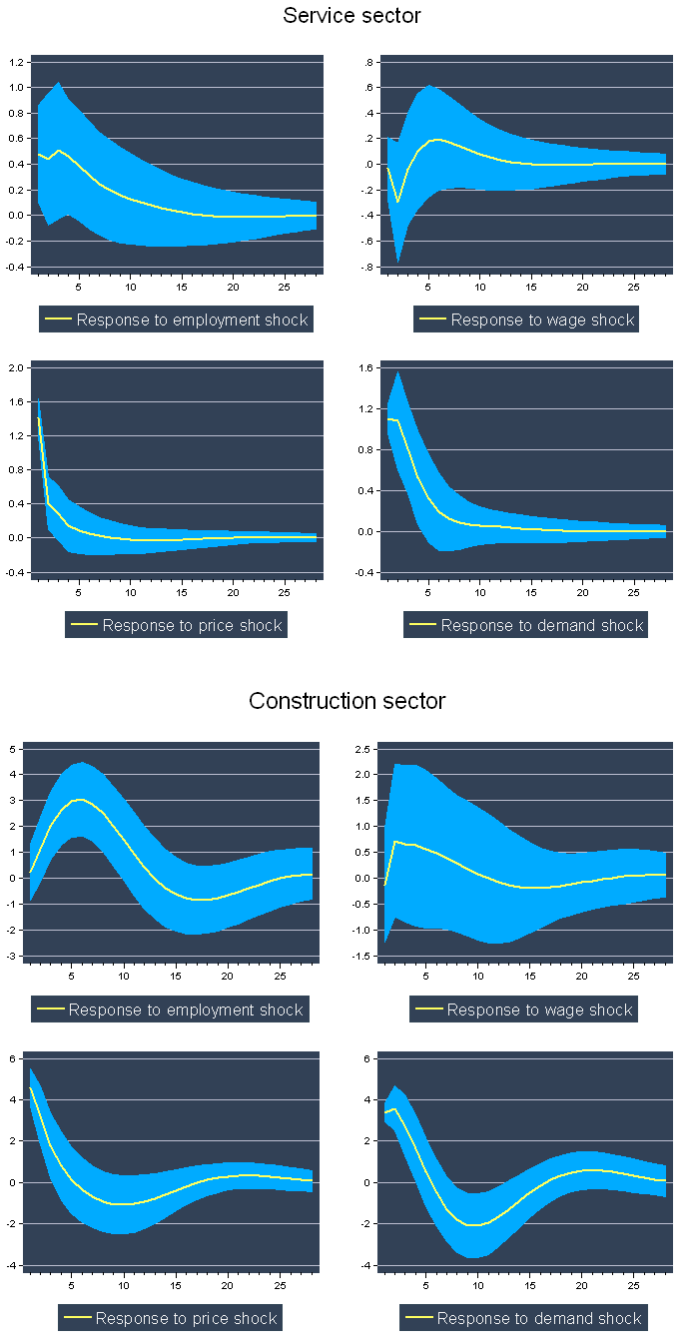
Note: The figures depict the impulse responses of profits to selected shocks equal to one standard deviation. The change is reported in deviation from the de-meaned annual growth rate in percentage points. The point estimate is obtained as the median of the bootstrap distribution on which also the 95% confidence bands are computed. 10000 replications have been used.

Figure IV: Impulse-responses of profits in France (Annual growth rate)



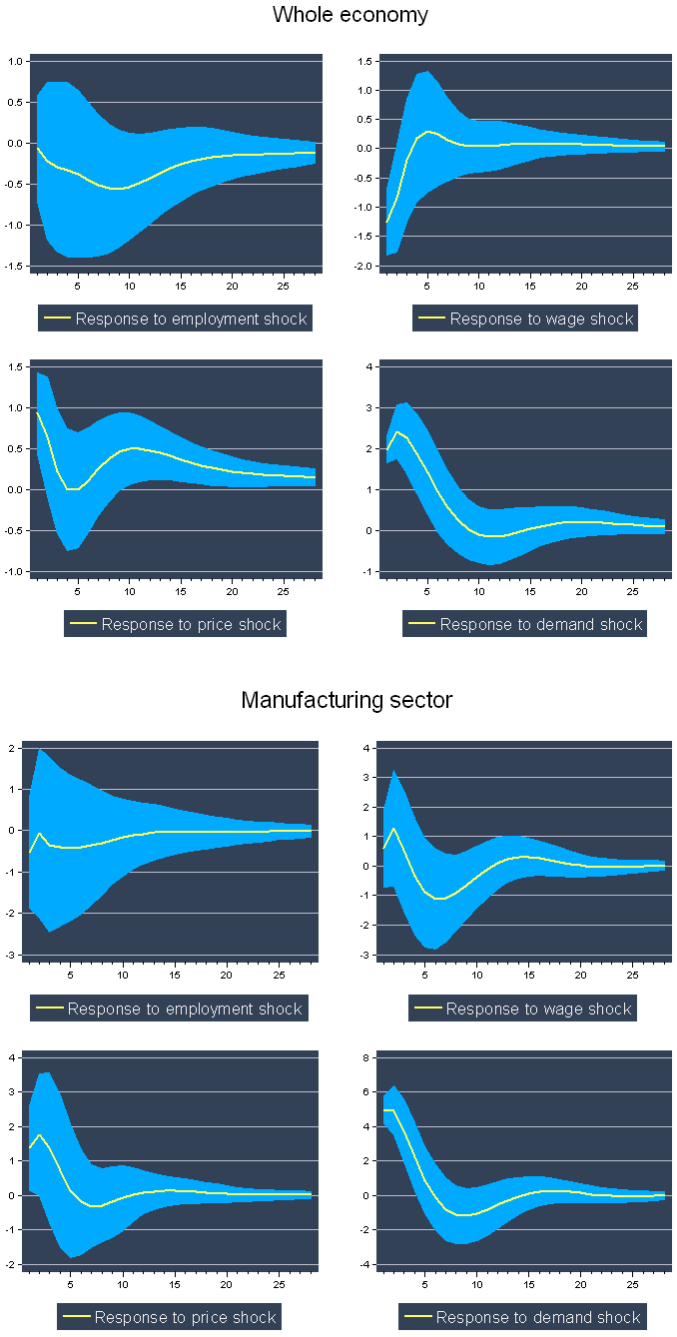
Note: The figures depict the impulse responses of profits to selected shocks equal to one standard deviation. The change is reported in deviation from the de-meaned annual growth rate in percentage points. The point estimate is obtained as the median of the bootstrap distribution on which also the 95% confidence bands are computed. 10000 replications have been used.

Figure V: Impulse-responses of profits in France (Annual growth rate)



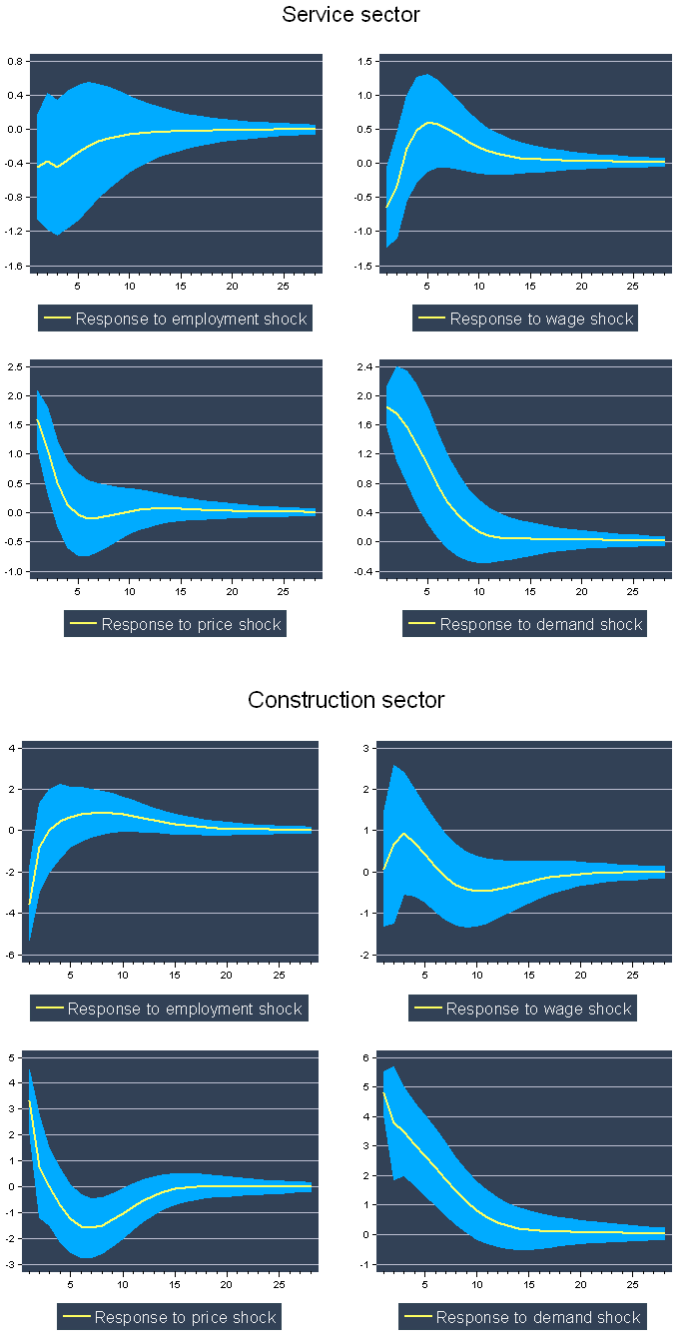
Note: The figures depict the impulse responses of profits to selected shocks equal to one standard deviation. The change is reported in deviation from the de-meaned annual growth rate in percentage points. The point estimate is obtained as the median of the bootstrap distribution on which also the 95% confidence bands are computed. 10000 replications have been used.

Figure VI: Impulse-responses of profits in Italy (Annual growth rate)



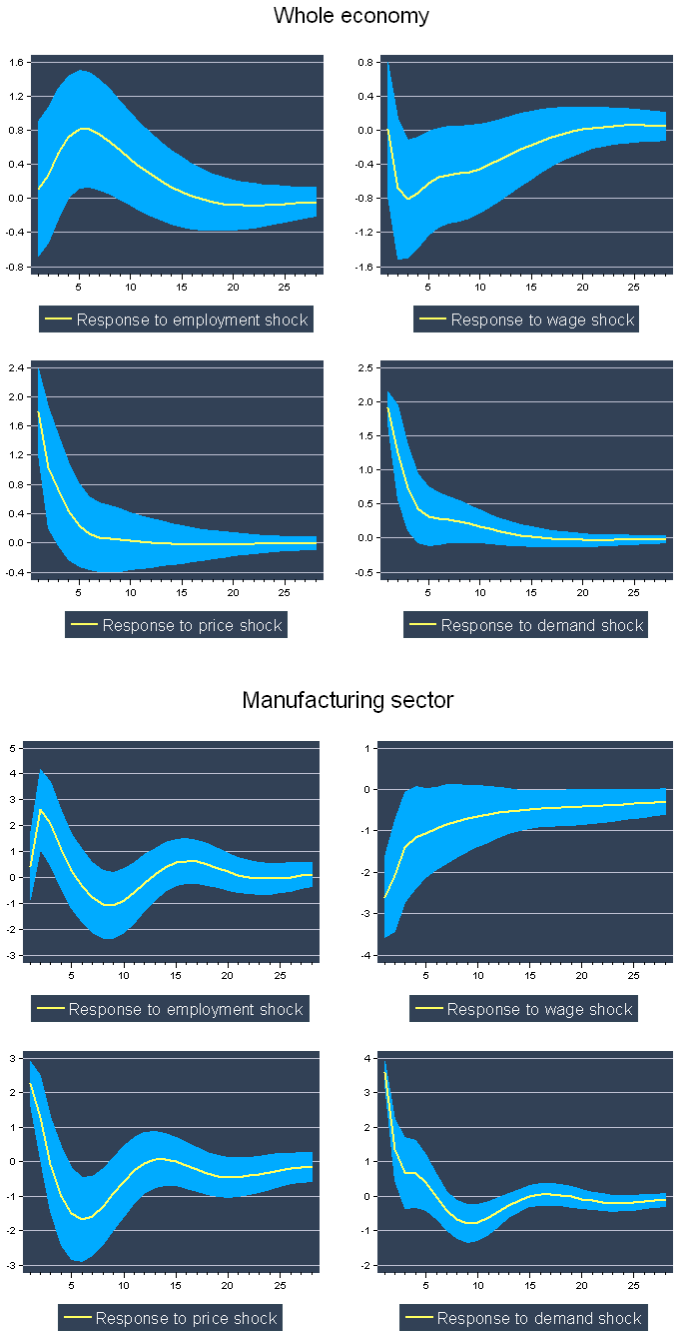
Note: The figures depict the impulse responses of profits to selected shocks equal to one standard deviation. The change is reported in deviation from the de-meaned annual growth rate in percentage points. The point estimate is obtained as the median of the bootstrap distribution on which also the 95% confidence bands are computed. 10000 replications have been used.

Figure VII: Impulse-responses of profits in Italy (Annual growth rate)



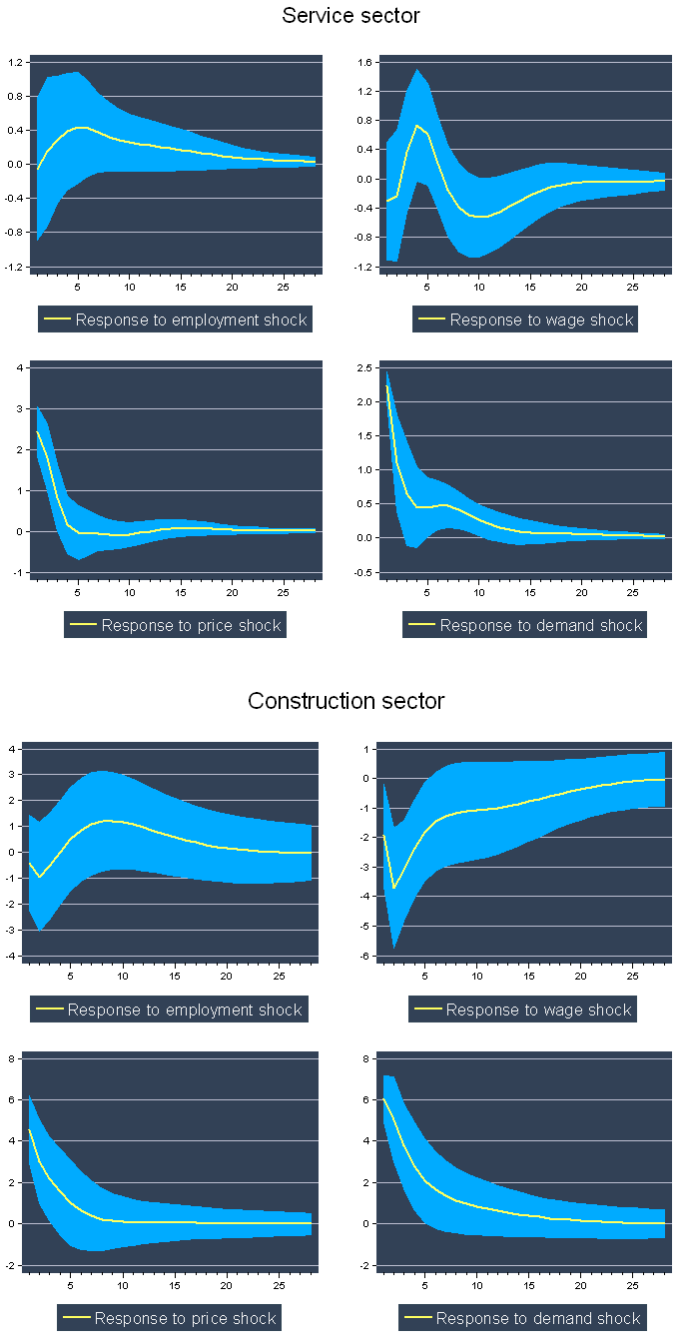
Note: The figures depict the impulse responses of profits to selected shocks equal to one standard deviation. The change is reported in deviation from the de-meaned annual growth rate in percentage points. The point estimate is obtained as the median of the bootstrap distribution on which also the 95% confidence bands are computed. 10000 replications have been used.

Figure VIII: Impulse-responses of profits in Spain (Annual growth rate)



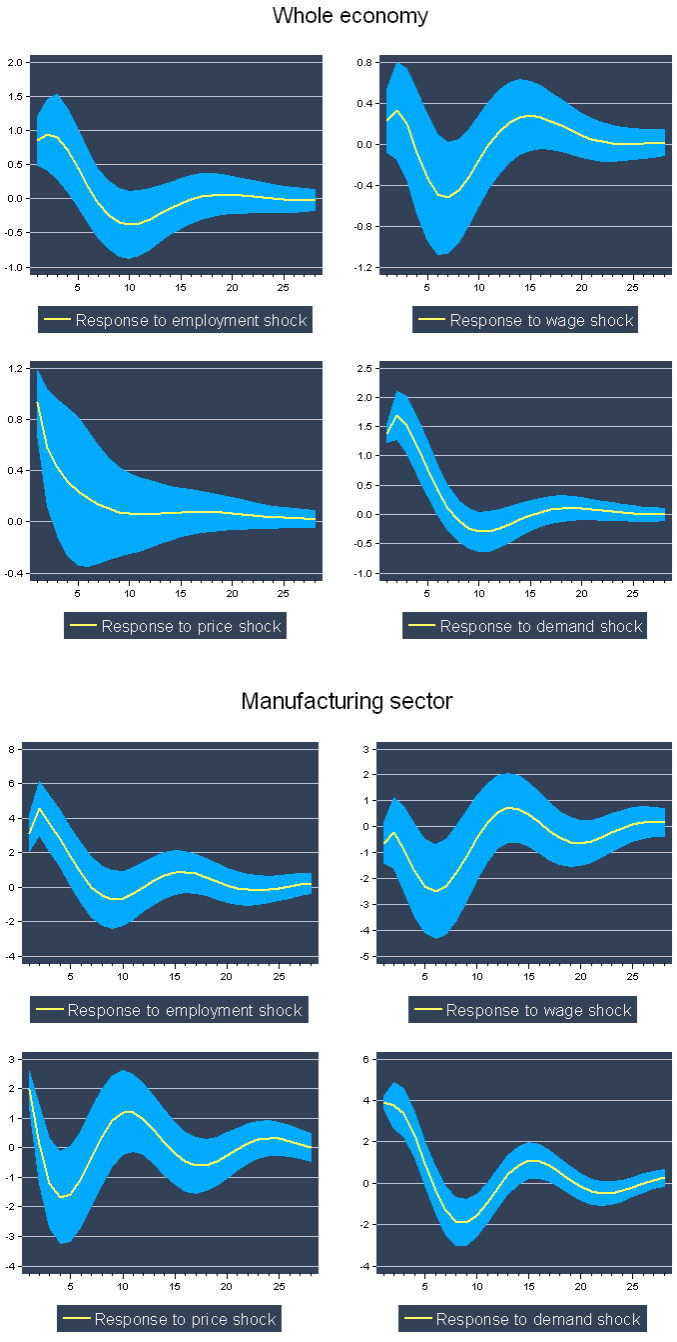
Note: The figures depict the impulse responses of profits to selected shocks equal to one standard deviation. The change is reported in deviation from the de-meaned annual growth rate in percentage points. The point estimate is obtained as the median of the bootstrap distribution on which also the 95% confidence bands are computed. 10000 replications have been used.

Figure IX: Impulse-responses of profits in Spain (Annual growth rate)



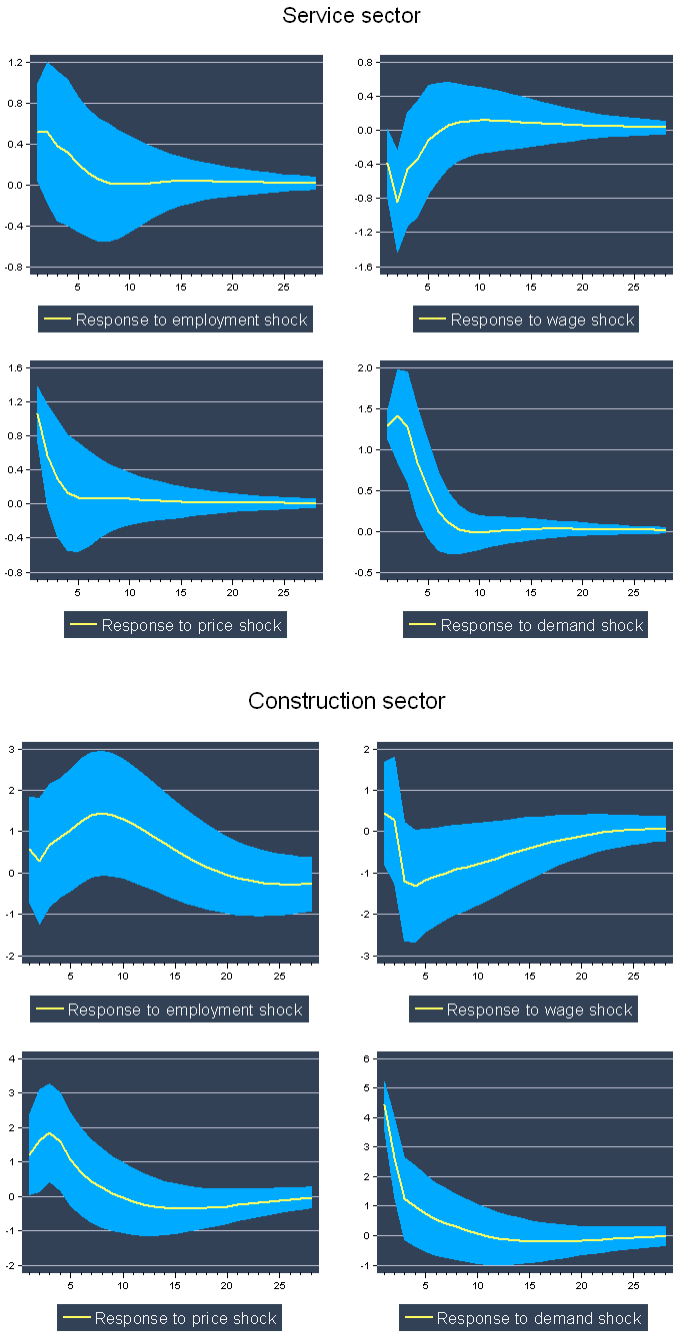
Note: The figures depict the impulse responses of profits to selected shocks equal to one standard deviation. The change is reported in deviation from the de-meaned annual growth rate in percentage points. The point estimate is obtained as the median of the bootstrap distribution on which also the 95% confidence bands are computed. 10000 replications have been used.

Figure X: Impulse-responses of profits in the euro area (Annual growth rate)



Note: The figures depict the impulse responses of profits to selected shocks equal to one standard deviation. The change is reported in deviation from the de-meaned annual growth rate in percentage points. The point estimate is obtained as the median of the bootstrap distribution on which also the 95% confidence bands are computed. 10000 replications have been used.

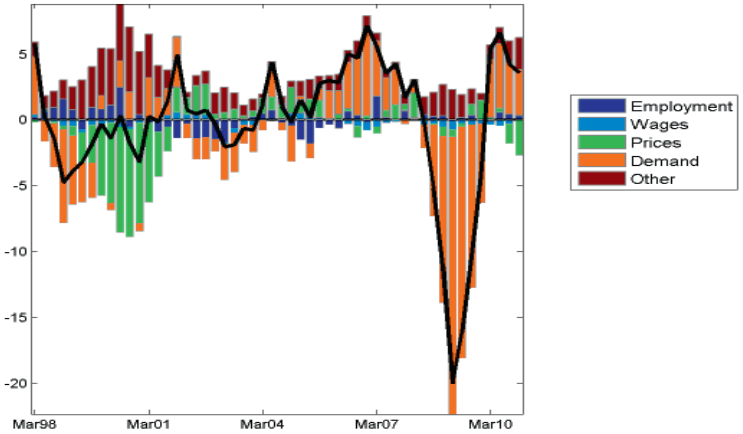
Figure XI: Impulse-responses of profits in the euro area (Annual growth rate)



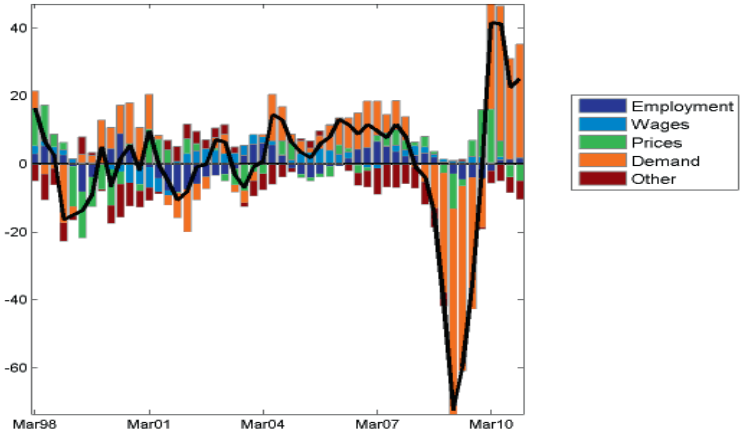
Note: The figures depict the impulse responses of profits to selected shocks equal to one standard deviation. The change is reported in deviation from the de-meaned annual growth rate in percentage points. The point estimate is obtained as the median of the bootstrap distribution on which also the 95% confidence bands are computed. 10000 replications have been used.

Figure XII: Shock decomposition of annual growth in profits in Germany (in percentage points)

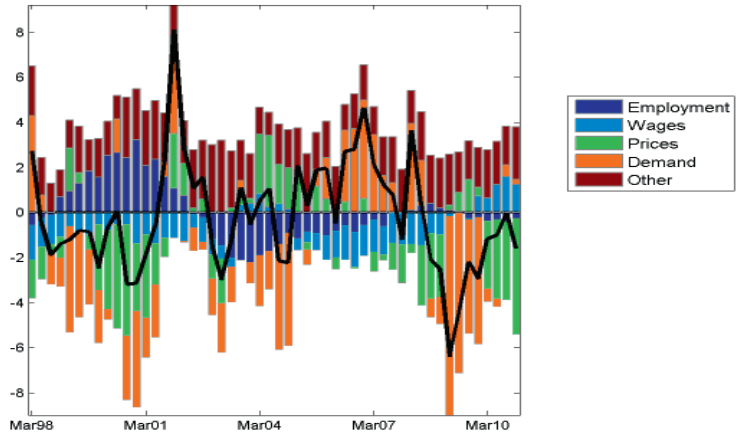
(a) aggregate



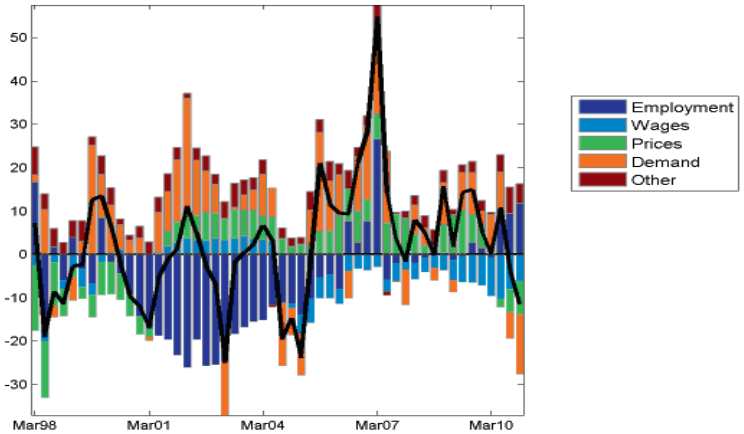
(b) industry



(c) services



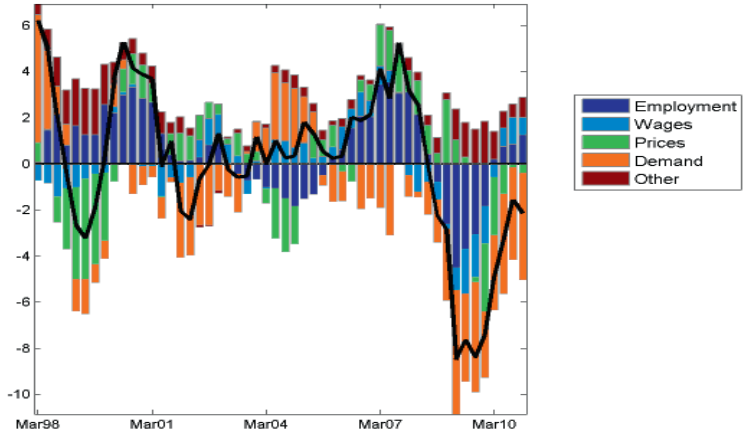
(d) construction



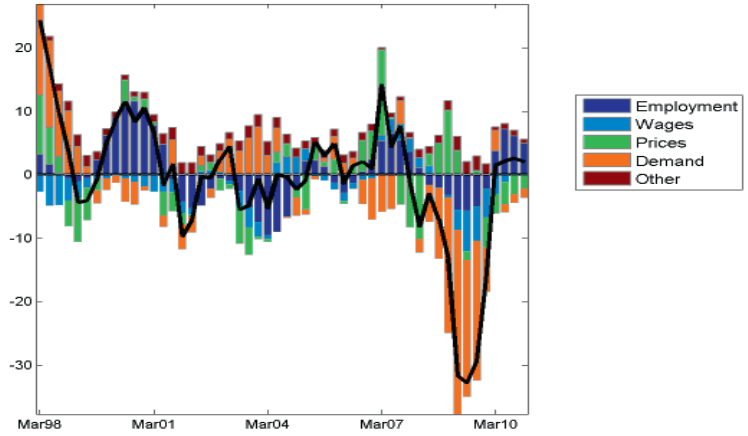
Note: This figure depicts the decomposition of profit growth into the contributions of economic shocks. The profit growth is reported in percentage points in deviation from sample average.

Figure XIII: Shock decomposition of annual growth in profits in France (in percentage points)

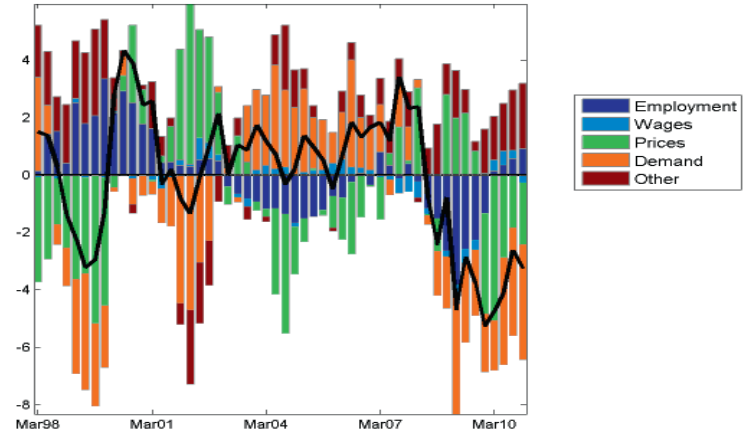
(a) aggregate



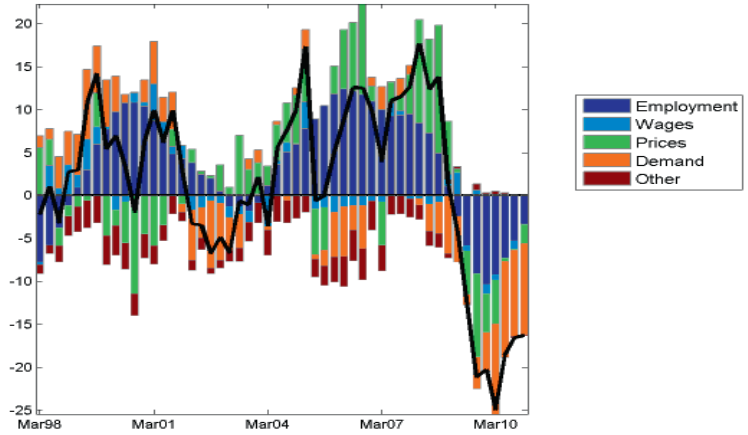
(b) industry



(c) services



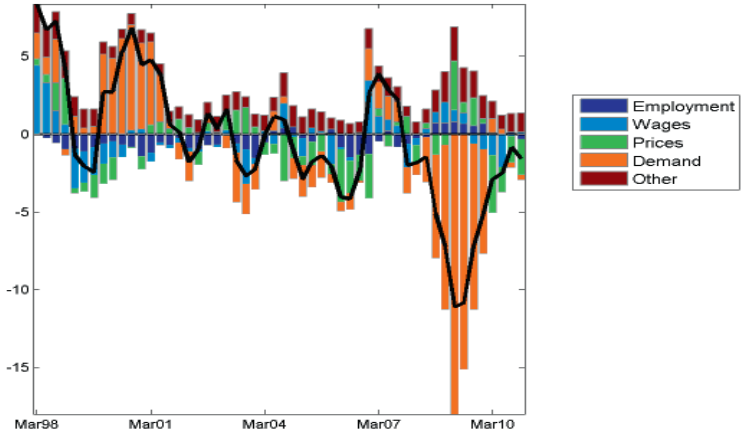
(d) construction



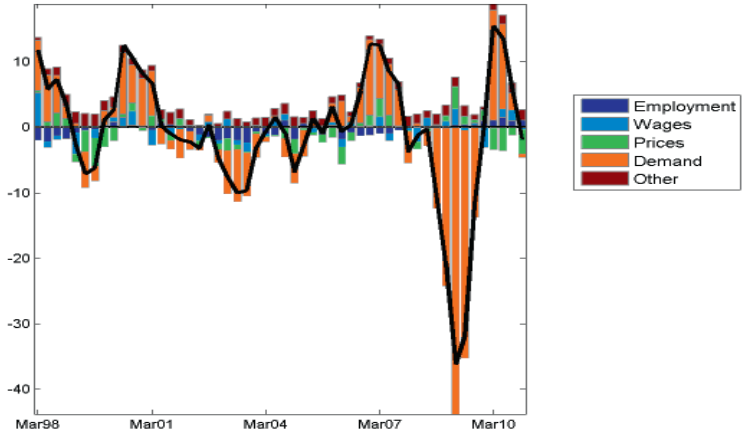
Note: This figure depicts the decomposition of profit growth into the contributions of economic shocks. The profit growth is reported in percentage points in deviation from sample average.

Figure XIV: Shock decomposition of annual growth in profits in Italy (in percentage points)

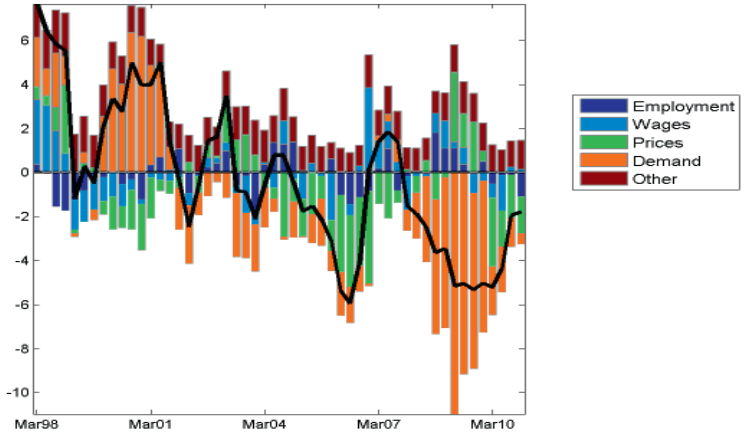
(a) aggregate



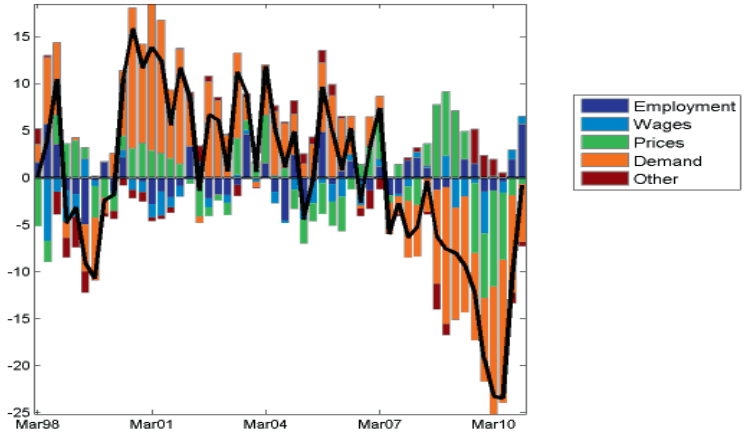
(b) industry



(c) services



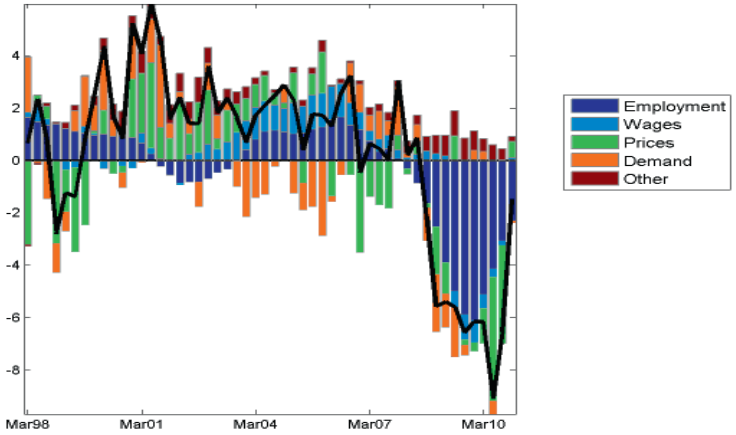
(d) construction



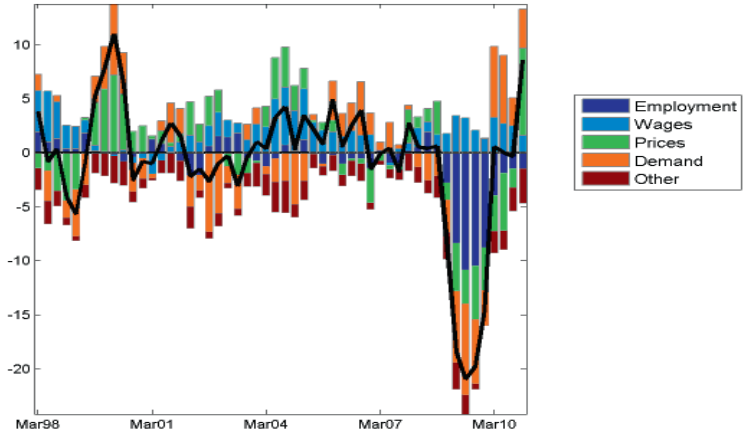
Note: This figure depicts the decomposition of profit growth into the contributions of economic shocks. The profit growth is reported in percentage points in deviation from sample average.

Figure XV: Shock decomposition of annual growth in profits in Spain (in percentage points)

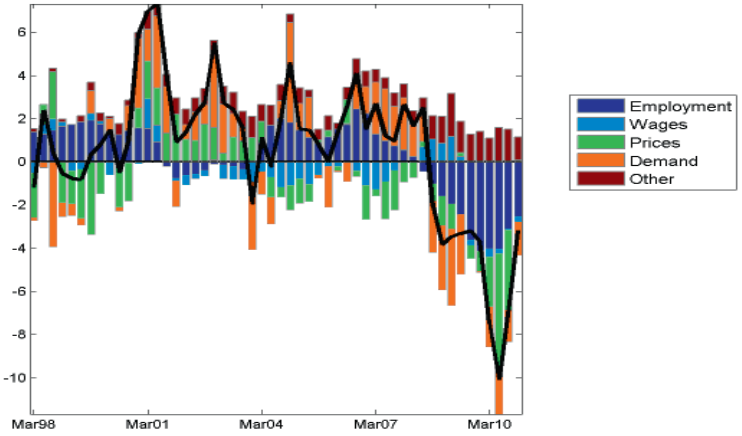
(a) aggregate



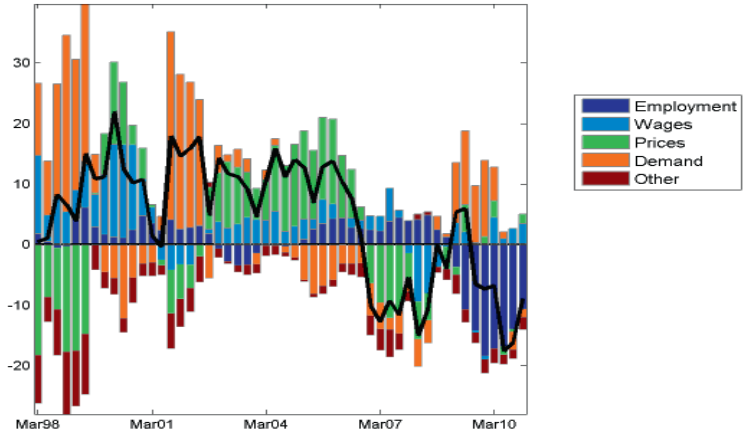
(b) industry



(c) services



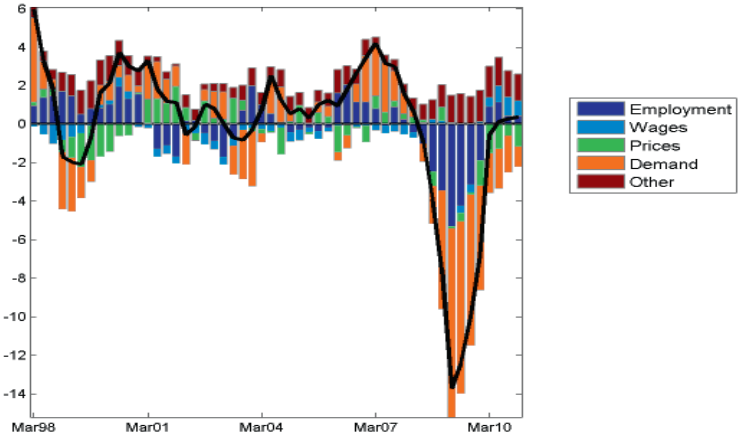
(d) construction



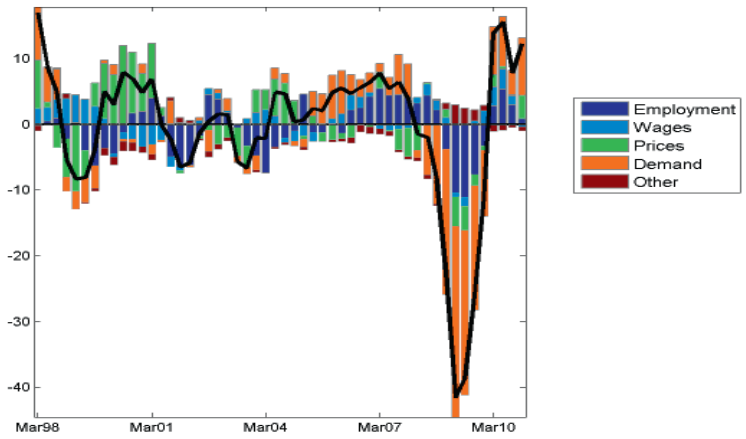
Note: This figure depicts the decomposition of profit growth into the contributions of economic shocks. The profit growth is reported in percentage points in deviation from sample average.

Figure XVI: Shock decomposition of annual growth in profits in the Euro Area (in percentage points)

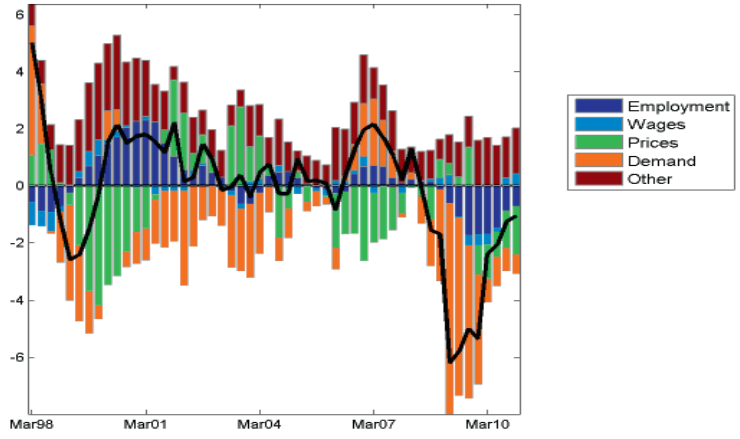
(a) aggregate



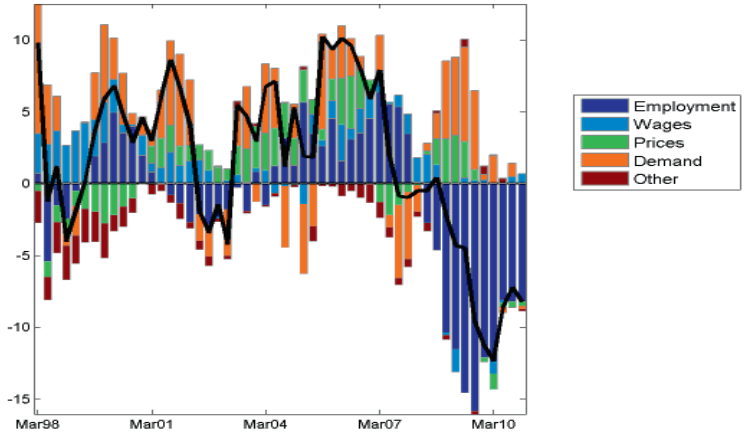
(b) industry



(c) services



(d) construction



Note: This figure depicts the decomposition of profit growth into the contributions of economic shocks. The profit growth is reported in percentage points in deviation from sample average.