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Monthly Report

# Is there any Chance of a Compromise in the Greek Crisis?

# Natural Gas and Electricity Prices

# Energy Cost Shares and Energy Intensities in Manufacturing

# Energy and Industrial Competitiveness

The Vienna Institute for International Economic Studies
Wiener Institut für Internationale Wirtschaftsvergleiche

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SANDRA LEITNER
ROBERT STEHRER
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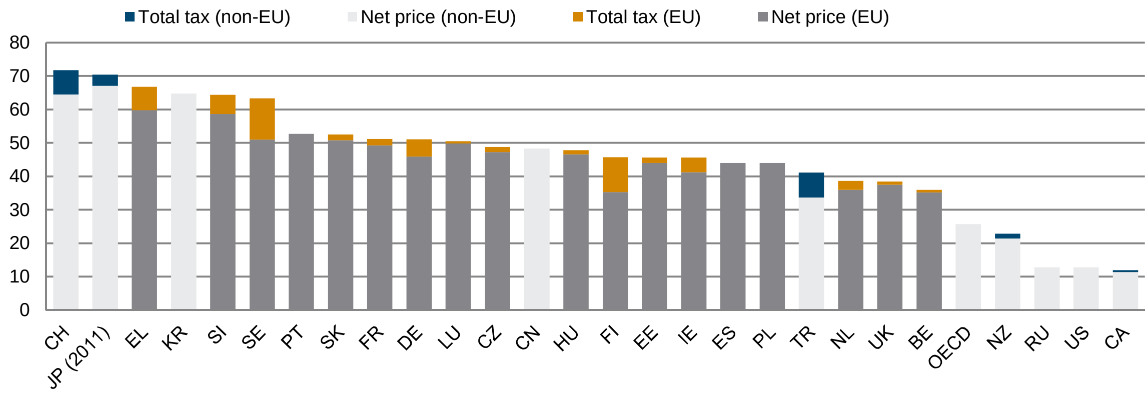
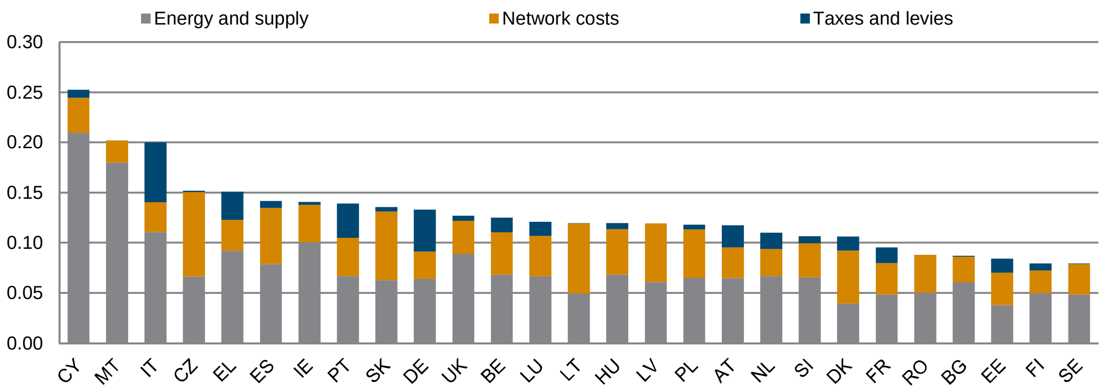
### Natural gas price for industry and its components in 2012 by country, in USD/MWh



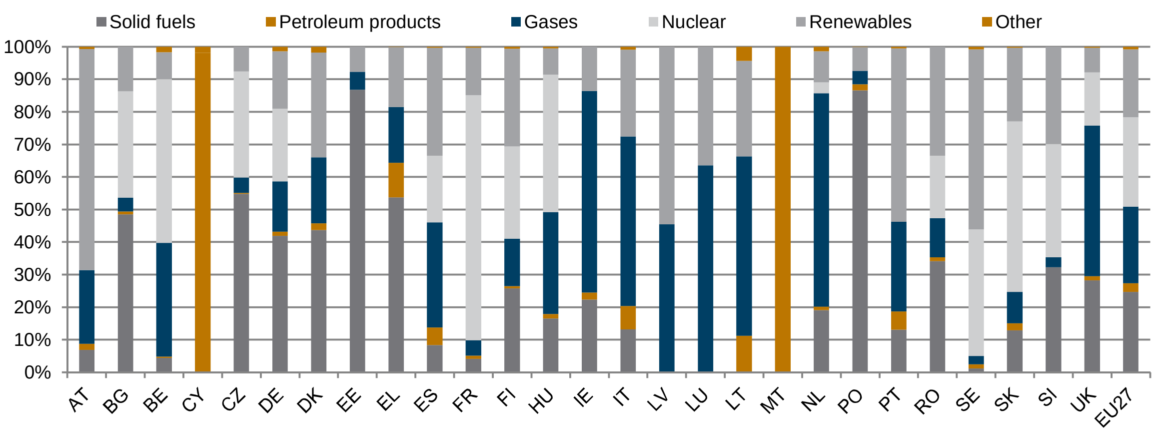

Source: IEA, national statistics.

### Electricity price for industry in EU Member States in 2012, in EUR/kWh




Note: Average electricity price based on the electricity consumption data from WIOD (2007/2008) weighted by the number of enterprises taken from Eurostat.
Source: Eurostat, World Input-Output Database (WIOD) and wiiw calculations.

### Electricity generation mix in the EU Member States, 2010




Source: European Commission Energy-Country Factsheets 2012.

# Is there any Chance of a Compromise in the Greek Crisis?

ANSWERED BY MICHAEL LANDESMANN

*The short answer to the above question is yes. The prerequisite of a compromise is that political leaders are willing to consider a joint responsibility for resolving the debt and growth problems that Europe is facing as a whole.*

*Europe is loaded with high debt levels. A number of renowned European economists have put forward proposals to deal with the European debt problem which is choking Europe's recovery and might lead to long-term stagnation or even disintegration of the euro area (see e.g. the PADRE proposal by Paris and Wyplosz, 2014; also the latest 'Monitoring the Eurozone' Report signed by – amongst other – Corsetti, Lane, Reichlin, Weder di Mauro; see Corsetti et al., 2015). Politics is behind the curve and politicians are pretending that somehow the problem will get resolved without having to face difficult cross-European and within-country distributive issues and also accept the legitimacy of alternative economic strategies which are rooted in the heterogeneity of European electoral outcomes but also in economic analysis itself.*

*In order to deal with the European debt problem the following has to be recognised:*

- *The build-up of debt prior to the crisis was the joint responsibility of insufficient (or inexistent) monitoring and regulation of the banking systems at the European level; this was an inexcusable 'blind spot' in the EU's institutional structure which had committed itself to fully liberalised capital markets. Hence creditor and debtor countries have to take joint blame for the build-up of unsustainable debt situations in countries such as Greece.*
- *An essential condition to emerge from a debt trap is to make a sustained joint effort to achieve growth (see also Watt, 2015). The proposals by the new Syriza government to relax the fiscal constraint in the form of 'only' targeting a 1.5% primary surplus (rather than the 4-5% sustained primary surplus envisaged in the current IMF-EU-ECB programme) as well as to move towards growth-related repayments of the debt scheme are eminently reasonable and have been supported by a wide range of economists (see Mauro, 2015; Fratzscher et al., 2015; Darvas, 2015).*
- *There has to be a recognition that dealing with longer-term current account issues within Europe is of utmost importance. The negligence of this in the current Syriza programme is worrying and it has to be addressed with a range of tools to expand and modernise export capacity in Greece (but also in many other chronic deficit countries). This has to be a prime target not only at the national level but also requires a mobilisation of resources at the EU level (in the context of the European investment initiative, using EU Structural funds, EIB resources, etc.). Relying simply on a wage-driven adjustment process of 'real exchange rates' in a recessionary climate will not remove this obstacle to sustainable growth.*

- *Countries within the euro area are entitled – within the context of not imposing burdens on other countries' taxpayers – to choose their own strategies to deal with longer-run development processes. The EU, IMF, ECB, etc. should not pretend that there is a single 'model' of economic development as regards the role of the state, the system of labour relations, the financing and role of public services, etc. Such a 'single model' view has no basis in economic theory or in the track record of a wide range of economic approaches within Europe or internationally (see the diversity of Scandinavian, Anglo-Saxon, German models in Europe or of Korea, Japan, etc. in Asia). Hence the Syriza government, which received a mandate from its electorate, has the right to negotiate a different structure of reform policies with regard to a further loan/debt repayment programme compared to the previous government.*
- *Syriza is also right in aiming to discuss the European debt problem at the pan-European level (they suggested a 'European debt conference') and not only in relation to Greece. The bargaining processes between debtors and creditors should not simply be subject to behind-the-scenes negotiations (which are skewed in favour of creditors) but should be subject to the political scrutiny of European electorates. The wider context in which such negotiations would take place might allow the European public to recognise that there are longer-term structural issues to be resolved in the design of further steps of integration which are not just relevant in relation to Greece but concern the future of the European Union as a whole.*

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# Natural gas and electricity prices in the EU and its major industrial competitors

BY VASILY ASTROV AND DORIS HANZL-WEISS

This note provides a detailed comparative analysis of gas and electricity prices across EU member countries, over time, and in comparison with the EU's major external competitors: the United States, Japan, China and Russia. [1]

## NATURAL GAS PRICES

In continental Europe, the dynamics of upstream gas prices has been until recently broadly following the oil price dynamics. This is hardly surprising given that the region is heavily dependent on gas imports and import contracts that typically link the gas price to that of oil. The bulk of imported natural gas historically came from three major external suppliers: Russia (Soviet Union), Norway, and Algeria, largely via pipelines. At present, imported gas accounts for about half of EU gas consumption, with half of those imports coming from Russia. The bulk of gas imports to continental Europe are carried out within the framework of long-term contracts which typically stipulate supply volumes for years in advance and contain a formula linking the gas price to the price of oil/oil products, with the gas price generally being adjusted on a quarterly basis and following the oil price with a several-month lag. This means that swings in the global oil prices – including the continuous increase during the pre-crisis years, a sharp decline in 2008-2009 and the subsequent rebound in the years thereafter – have translated into changes in gas import prices in Europe with only a short time delay. At the same time, the pass-through to end-user prices for industry has been generally more limited and cushioned by other (less volatile) end-price components such as transport and distribution costs and margins, which are typically heavily regulated. In particular, regulated gas transport costs, which are usually relatively stable, account for a significant share of the final price. As a result, although gas prices paid by the final consumers often increased as much as upstream prices in absolute terms, the increase in percentage terms has been generally much smaller (Morgan and Emoto, 2007). In addition, excise taxes on gas which are levied in many EU countries have in some cases provided an extra cushion to end-user prices.

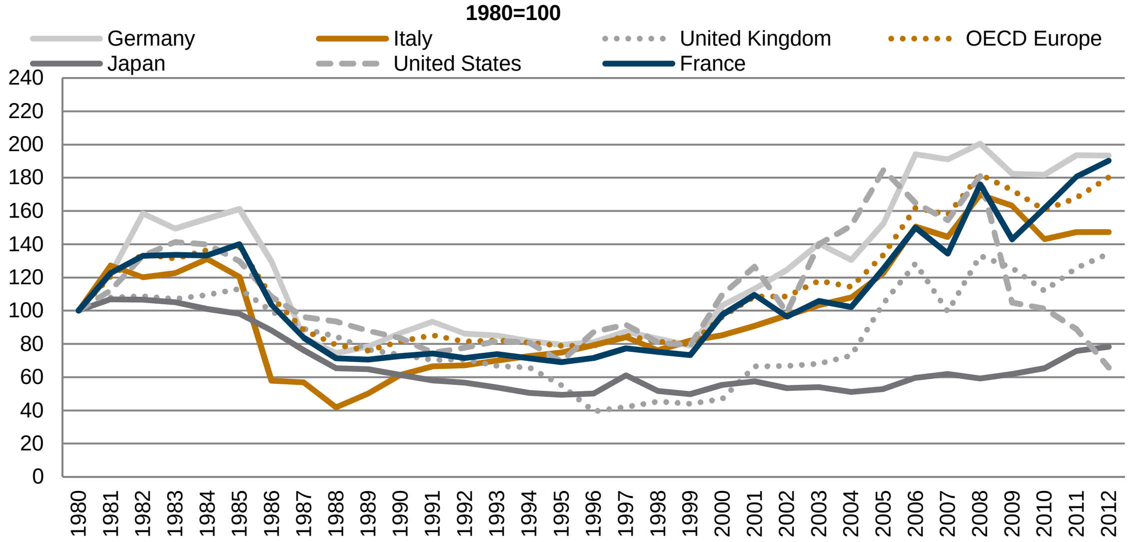
Starting from 2009, the gas prices in continental Europe have somewhat de-coupled from the oil prices and initially declined (Figure 1). This has been the combined effect of weak gas demand in Europe and the shale gas 'revolution' in the Unites States, as a result of which the US have become almost self-sufficient in terms of gas supply. The new situation resulted in numerous re-negotiations of long-term gas supply contracts in favour of buyers.[2] However, more recently the gas price decline has come to a halt and has even reversed in a number of countries (Figure 1), as the share of LNG in European

1 This note is based on a paper written as part of the European Competitiveness Report 2014.

2 According to IEA (2013), 'the result of negotiation and, occasionally, arbitration between European importers and their external suppliers has been a higher share of gas sold with reference to the prices at European gas trading hubs, lower base prices, as well as revisions to take or pay provisions'.

markets started falling again due to their diversion towards more lucrative markets in the Asian-Pacific basin.

**Figure 1 / Development of real gas end-user price for industry**




Note: Deflated with PPI.
Source: Own calculations based on IEA data.

From 2006 on gas prices started declining relative to oil prices, and since 2009 they have been rapidly falling also in absolute terms thanks to the rapid increase in shale gas supplies. As can be seen from Figure 1, the resulting drop in real gas prices for industry in the United States has been dramatic and un-mirrored in other countries and regions (see e.g. Kefferpütz, 2010). The increased gas supplies in the US have also been helped by the existing export restrictions: in order to export natural gas, producers need to obtain an export licence from the regulatory authorities (however, restrictions are likely to be relaxed in the near future). As a result of increased exports, gas prices in the US are expected to rise somewhat in the near term; nevertheless, a sizeable price gap with respect to Europe and Japan will persist (IEA, 2013).

Domestic gas tariffs in China and Russia have been historically set with little regard to international energy price developments. In China, gas prices continue to be heavily regulated, with upstream prices and transport tariffs being set by the central government and end-user prices by provincial authorities. However, since 2006 the country has become a net gas importer, with more expensive imported gas putting the traditional 'cost-plus' formula increasingly under pressure,[3] although the impact of higher upstream prices on end-user prices was mitigated by tariff regulation in other segments of the value chain (HSBC, 2013). The high level of gas prices for industry in China also partly reflects the still existing cross-subsidisation between industrial and residential users – the latter generally pay much less than industry.

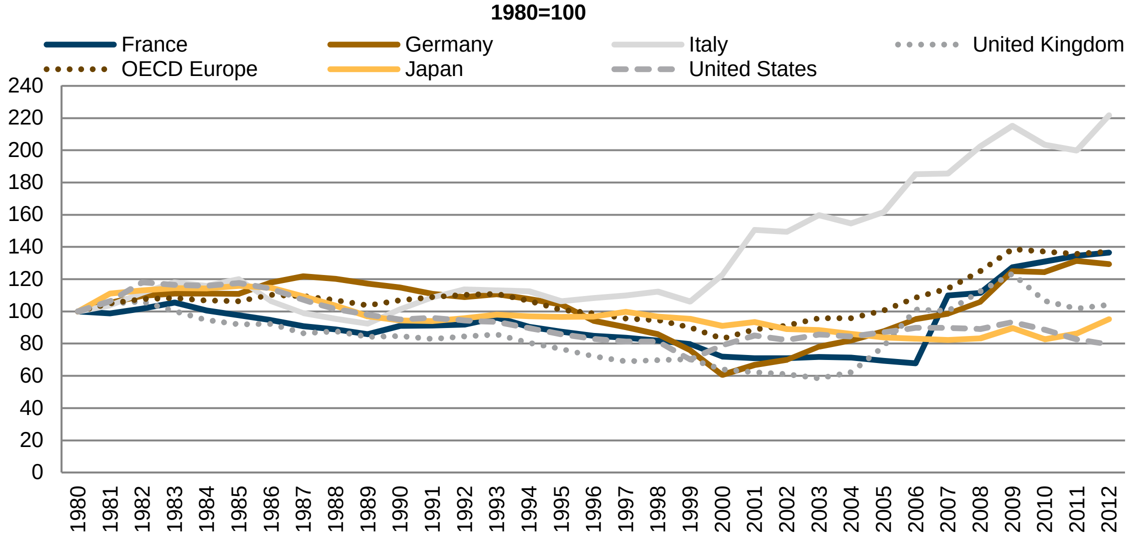
[3] This 'cost-plus' formula implied that retail gas prices in China corresponded to the costs of domestic gas production plus the transportation and distribution tariffs regulated by the government.

In Russia, the low gas prices paid by industry help offset the negative impact of poor energy efficiency on industrial competitiveness, particularly in energy-intensive branches which are prominent in Russia. This low level of tariffs reflects to a large extent the cross-subsidisation of domestic customers by Russia's state-owned gas monopolist Gazprom at the expense of export shipments (largely to Europe, which is the main export market and where prices are the highest). Although since 2006, Russia has launched a programme of gradual domestic tariff hikes, not least because of the country's WTO-accession commitments, the initial targets have been repeatedly postponed. As a result, the real gas price for domestic industrial users in Russia has increased only moderately over the past several years.

## ELECTRICITY PRICES

Between the mid-1980s and the beginning of the 2000s, trends in real industrial end-user prices for electricity in the EU, the United States and Japan were largely similar, showing an overall declining trend (Figure 2). However, while in the US electricity prices saw a steady decline over this entire period, EU electricity prices started to decrease only ten years later. In the EU, the price rise was tremendous: in 2012 prices were some 40% above the 1980 level, with the differences among the EU member countries widening considerably. In the United States, however, electricity prices rose only modestly and started to fall in 2010 as a result of the boom in the production of shale gas, which has been increasingly replacing coal in power generation. By 2012, real electricity prices in the US were some 20% below the 1980 level, whereas in Japan they were nearly as high as in 1980.

**Figure 2 / Development of real electricity end-user price for industry**

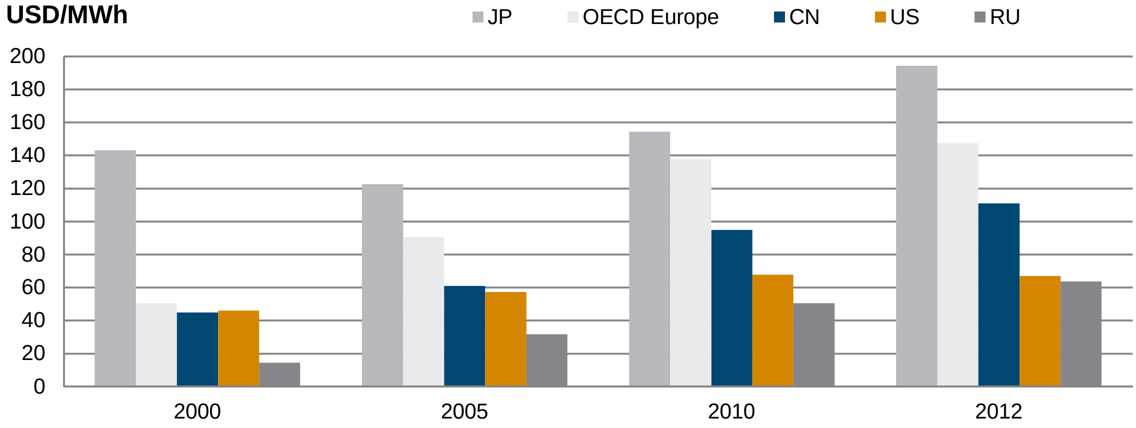



Note: Deflated with PPI.
Source: Own calculations based on IEA data.

As a result of these developments, electricity price differences across the world regions have widened tremendously over the past twelve years (Figure 3). While nominal electricity prices are the highest in Japan and the lowest in Russia, the gap between Europe and China on the one hand and the US on the other hand has increased dramatically. In 2012, European electricity prices stood on average at USD 147 per MWh – one quarter below Japan's level but some 30% above that of China and double the

US and Russian level. Interestingly, the widened price gap between Europe and the US can be only partly attributed to the recent shale gas revolution which took effect only at the end of the 2000s: the bulk of the gap dates back to the pre-crisis years and is due to the price growth in Europe.

**Figure 3 / Nominal end-user electricity prices in industry**




Source: IEA and national statistics (CN, RU).

In its New Policies Scenario, IEA projects that the gap in industrial electricity prices between the United States on the one hand and the EU and China on the other hand will continue to widen modestly (IEA, 2013). By 2035, electricity prices in the EU are projected to increase by 24% and become the highest among the major industrialised countries. Chinese prices are projected to rise too, by almost 20%, thus remaining below the EU level.

There is a wide variation in electricity prices for industry not only between the European Union and other major economies, but also within the EU, with the highest prices observed in Cyprus, Malta and Italy, and the lowest in Sweden, Finland, Estonia, Bulgaria and Romania. For instance, electricity prices in Cyprus are three times higher than those in Sweden. In most EU Member States, energy and supply is the most important component of electricity end-user prices for industry. However, network costs make up almost 60% of the price in Lithuania and the Czech Republic, and about 50% in Slovakia, Denmark and Latvia. Finally, taxes and levies which are set nationally are the highest in Germany and Italy, accounting for 32% and 30%, respectively, of the electricity price. By contrast, no taxes and levies for industrial electricity consumers are charged in Lithuania, Malta, Latvia and Romania. However, one has to bear in mind that these prices are weighted average prices, while large energy-intensive industries may have benefited in the past from long-term supply contracts or self-generation, resulting in lower electricity costs.

Overall, between 2008 and 2012 industrial electricity prices increased in most EU Member States, with the exception of Romania, Slovenia, Hungary, Denmark and the Netherlands. Price increases were the lowest in Slovakia and Sweden with 2% and 4%, respectively, but reached about 17% in Germany, and were even higher in Latvia and Estonia (30%). Table 1 demonstrates that these price increases were largely driven by the strongly rising network costs and taxes and levies, while energy and supply costs even went down in a number of countries. For instance, in Germany energy and supply costs fell by 10%, while network costs increased by 3%, and taxes and levies by as much as 204% over this time period. However, since a harmonised reporting methodology for the breakdown of electricity prices into individual cost components is missing, any cross-country comparisons should be made with caution.

**Table 1 / Electricity price developments in the EU countries, 2008-2012, cumulative % change**

| | Energy and supply | Network costs | Taxes and levies | Total price |
|---|---|---|---|---|
| Austria | -8.4 | 28.7 | 48.1 | 8.4 |
| Belgium | -13.2 | 33.0 | 9.4 | 4.2 |
| Bulgaria | 16.2 | 42.8 | 100.0 | 23.8 |
| Cyprus [1] | 38.7 | 0.9 | 1.3 | 30.0 |
| Czech Republic | -14.6 | 39.5 | -8.3 | 8.3 |
| Denmark | -40.7 | 81.7 | 3.0 | -2.5 |
| Estonia | 32.3 | 5.0 | 174.5 | 30.9 |
| Finland | 3.9 | 24.2 | 169.2 | 16.1 |
| Germany | -10.4 | 3.4 | 204.2 | 17.2 |
| Greece [2] | 20.9 | -7.3 | 157.4 | 26.2 |
| Hungary | -17.8 | -7.9 | 158.3 | -11.1 |
| Ireland [2] | 11.5 | -5.1 | 540.0 | 8.0 |
| Italy | 1.7 | 18.4 | 143.0 | 26.6 |
| Latvia | 12.7 | 60.8 | 0.0 | 32.0 |
| Lithuania [1] | 6.5 | 15.4 | -91.3 | 7.3 |
| Luxembourg [3] | 2.0 | 2.3 | -2.3 | 1.9 |
| Malta | 15.3 | 0.0 | 0.0 | 13.4 |
| Netherlands | -15.3 | 32.2 | 18.4 | -1.7 |
| Poland | 29.9 | -1.2 | -15.8 | 12.9 |
| Portugal | 17.5 | 46.7 | 30.3 | 27.6 |
| Romania | -15.6 | -17.1 | 0.0 | -16.3 |
| Slovakia | -18.9 | 22.6 | 528.6 | 2.0 |
| Slovenia | -19.7 | -6.4 | 102.9 | -12.0 |
| Spain | -2.6 | 85.8 | 24.6 | 23.9 |
| Sweden | -11.7 | 34.0 | 20.0 | 3.8 |
| UK | 9.5 | 42.5 | 17.8 | 17.1 |

Notes: Consumption band IB: 20 MWh < Consumption < 500 MWh.
1) 2010-2010.- 2) 2009-2012.- 3) 2007-2011.
Source: Eurostat.

One important factor explaining the absolute levels and the dynamics of electricity prices is the generation mix. Although in the EU as a whole it is rather diversified, with about one quarter of electricity coming from coal (25%), gas (24%), nuclear power (27%) and renewables (21%), respectively, the average figure masks large differences across the EU Member States. In some countries, electricity generation is dominated by just one fuel: petroleum products in Cyprus and Malta (100%), coal in Estonia and Poland (about 86%), or nuclear power in France (75%), whereas e.g. in Germany, Denmark, Spain, Finland, Hungary, Romania and Slovenia the electricity generation mix is much more diversified.

These differences in the generation mix affect several components of the electricity price. For instance, energy and supply costs are determined by the variable costs of electricity generation, which are nearly negligible for renewables but higher for nuclear power, followed by coal, natural gas, and finally petroleum products. For instance, the high level of industrial electricity prices in Cyprus and Malta is entirely explained by the use of petroleum products in electricity generation, which drives the costs of energy and supply upwards. By contrast, countries such as France or Denmark, which derive the bulk of their electricity from nuclear power and renewables, have correspondingly low energy and supply costs. The boom of renewables in Denmark over the past several years also explains the impressive drop in the costs of energy and supply in this country (by 40% between 2008 and 2012, see Table 1).

On the other hand, the growing role of renewables has been to a large extent facilitated by the targeted EU support schemes such as the 'feed-in tariffs', which guarantee preferential rates for renewable electricity provided to the grid and represent long-term contracts, e.g. twenty years in Germany. They are usually paid by electricity consumers and linked to their consumption. Being part of either network costs (such as in Denmark) or taxes and levies (such as in the UK or Austria), the costs of renewables support are thus added to the electricity price, often compensating the low energy and supply costs associated with renewables used for electricity generation. Thus, the net price effect on the electricity end-user depends on who bears the costs of renewables support and may differ from one EU Member State to another.

In addition, the EU Emissions Trading Scheme (EU ETS) might imply higher energy costs – both direct and indirect (through higher energy prices) – for energy-intensive sectors, and thus the danger of their relocation outside the EU. To address this problem, there is a so-called 'carbon-leakage list' of industries subject to preferential treatment with respect to energy tariffs. Besides, in 2012 the European Commission adopted rules under which certain aid is allowed to compensate for EU ETS allowance costs passed on to electricity prices in sectors included in the list (European Commission, 2012).

## POTENTIAL REPERCUSSIONS FOR INDUSTRIAL COMPETITIVENESS

End-user gas and electricity prices for industry vary across countries by a very wide margin. In the case of natural gas, this reflects the regional fragmentation of wholesale gas markets and the differences in wholesale gas pricing formulas, on the one hand, and the varying degree of end-user price regulation, on the other. As far as electricity is concerned, the recent shale gas boom in the US has contributed somewhat towards lower electricity prices, as natural gas has been increasingly replacing coal in power generation. Europe's electricity prices are currently twice as high as those in the US, with a projected further widening of this gap.

The observed cross-country differences in energy prices – as long as they are not matched by corresponding gaps in energy intensity levels – may have important repercussions on both production costs and industrial competitiveness. For instance, cheap energy in the United States, particularly when it comes to natural gas, more than compensates for the relatively high energy intensity of its manufacturing[4] (which is only about 20% higher than in the EU) and potentially represents an important competitive advantage for US producers, particularly in energy-intensive branches. With respect to the other major EU competitors, energy cost competitiveness is likely to be less of an issue. In Russia, cheap energy is compensated by the very high energy intensity of production, whereas in both China and Japan energy prices are at least as high as in the EU, and are coupled with a much higher energy intensity of manufacturing[5] in China's case. At the same time, the potential energy cost disadvantages to Chinese industrial producers are probably counteracted by other cost factors such as the cheap labour.

4 Excluding NACE Rev. 1 23 (coke, refined petroleum and nuclear fuel).

5 Excluding NACE Rev. 1 23 (coke, refined petroleum and nuclear fuel).

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# Energy cost shares and energy intensities in manufacturing: comparing the EU with its major external competitors*

BY ROBERT STEHRER

## ENERGY COST SHARES IN MANUFACTURING PRODUCTION

Energy costs are nowadays increasingly seen as a major factor affecting a country's or industry's competitiveness, particularly so between the United States and the European Union. Here we provide a comparative analysis concerning the relevance of energy costs in production and the patterns of energy efficiency across countries and over time for the manufacturing sector. Table 1 shows the energy cost shares in manufacturing gross output[1] for the EU-27 and other major economies over the period 1995-2011 relying on the national supply and use tables, which provide information on inputs by type of energy product.[2]

**Table 1 / Energy cost shares in manufacturing, in basic prices (in % of gross output)***

| | 1995 | 2000 | 2007 | 2011 |
|---|---|---|---|---|
| EU-27 | 2.3 | 2.2 | 2.8 | 3.0 |
| EU-15 | 2.2 | 2.0 | 2.7 | 2.9 |
| EU-12 | 5.0 | 4.2 | 3.8 | 4.1 |
| China | 4.4 | 4.7 | 5.7 | 5.9 |
| Japan | 2.9 | 3.3 | 4.6 | 5.4 |
| USA | 2.3 | 2.8 | 3.1 | 2.9 |

Note: * Not including NACE Rev. 1 23 (coke, refined petroleum and nuclear fuel).
*Source:* WIOD; wiiw calculations.

For manufacturing (excluding NACE Rev. 1 23) the energy cost shares stand at about 3% in the EU-27 and 2.9% in the United States, and are higher in China (5.9%) and Japan (5.4%). Within Europe, energy cost shares are higher for the EU-12 countries (i.e. the new EU Member States without Croatia), with a difference of 1.2 percentage points in 2011. These energy cost shares have been generally increasing

* This note is based on a paper written as part of the European Competitiveness Report 2014.

[1] Manufacturing is defined as NACE Rev. 1 15-37. In the analysis we exclude industry NACE Rev. 1 23 (Coke, refined petroleum and nuclear fuel) which is motivated by the fact that the bulk of energy inputs in this industry are used as feedstock rather than as energy source. For detailed results including this industry, for the total economy level and by individual industries see Astrov et al. (2015).

[2] Data are available from the World Input-Out Database (WIOD) project (www.wiod.org). The energy inputs considered are coal (CPA 10); crude oil and natural gas (CPA 11); coke, refined petroleum and nuclear fuels (CPA 23); and electrical energy, gas, steam and hot water (CPA 40).

over time, though only slightly so, e.g. in the EU from 2.3% to 3.0% between 1995 and 2011. For the EU-12 these shares have even been decreasing from 5% to 4.1%.

Concerning their impact on competitiveness, these energy cost shares need to be compared with other cost components which enter the production process either as intermediate inputs or as payments to primary factors such as labour and capital. In manufacturing (again without NACE Rev. 1 23), value added, i.e. labour and capital income, is the largest cost component (about 30% of gross output), closely followed by services: non-tradable market services, transport and communication services, and business services together account for about 25% of gross output in the EU-27, 20% in the United States, 16% in Japan and 10% in China. The third most important cost component are inputs from medium-low-, medium-high- and high-tech input industries, with cost shares in the EU-27 of about 14% and 15% of gross output, respectively.

## ENERGY INTENSITIES IN MANUFACTURING PRODUCTION

Apart from energy prices, energy cost shares are driven by energy intensity (or the inverse of it, energy efficiency), i.e. energy use by unit of output.[3] Their dynamics can be traced over time in a comparative manner across countries. Additionally to the supply-use and input-output tables, the WIOD provides energy accounts, i.e. energy flows (gross energy use) in terajoule (TJ), with the same country and industrial coverage from 1995 until 2009. Energy intensity is measured as terajoules divided by value added, which is expressed in constant prices of 2005 and converted with PPP rates for 2005.[4]

**Table 2 / Energy intensity in manufacturing* (TJ per million USD of value added in PPPs of 2005), 1995 and 2009**

| | 1995 | 2009 |
|---|---|---|
| EU-27 | 12.2 | 9.1 |
| EU-15 | 11.0 | 9.4 |
| EU-12 | 23.4 | 7.8 |
| China | 26.4 | 13.3 |
| Japan | 11.2 | 9.9 |
| USA | 16.4 | 11.1 |

Note: * Not including NACE Rev. 1 23 (coke, refined petroleum and nuclear fuel).
*Source:* WIOD; wiiw calculations.

In manufacturing (again excluding NACE Rev. 1 23), the energy intensity levels were between 7.8 TJ/USD million of value added in the EU-12 and 13.3 in China in 2009. Thus, the energy intensity in China is higher than in the more advanced countries. Interestingly, the energy intensity of manufacturing in the EU-12 is found to be lower as compared to the EU-15, though a large differentiation across countries exists. However, the energy intensity of manufacturing in the EU-27 is still lower than in the United States, which also holds for almost all individual sectors.

3 For a comparison of energy intensities by industry see Astrov et al. (2015).

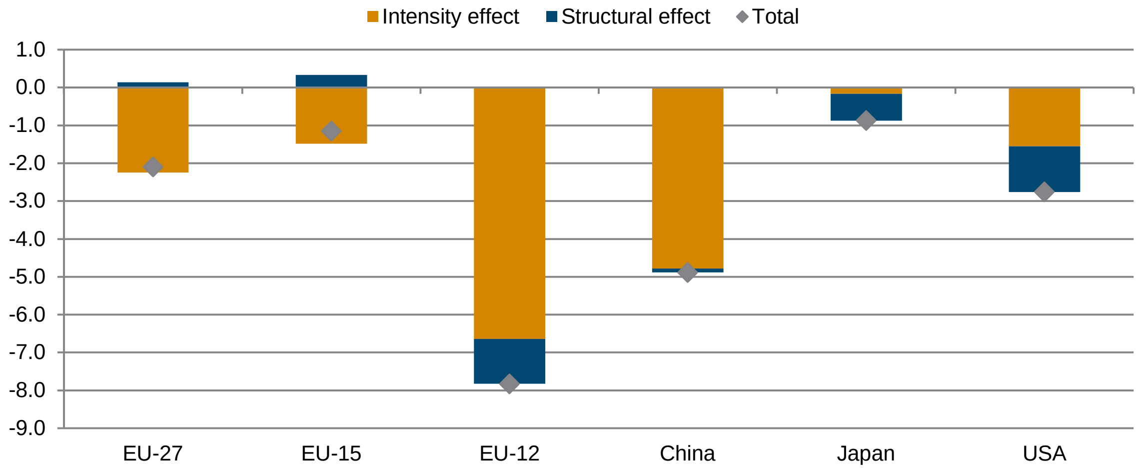
4 The results are to a certain extent sensitive to measurement issues (e.g. using energy intensities based on gross output versus value added, using exchange rates versus PPP rates) particularly for developing countries such as China (see Astrov et al., 2015).

## CONVERGENCE OF ENERGY INTENSITIES: THE ROLE OF ENERGY EFFICIENCY AND STRUCTURAL CHANGE

The convergence in energy intensities across countries observed over time, i.e. between 1995 and 2009, can be driven by two factors: First, energy intensity in each industry might decline; second, the structure of manufacturing may shift towards less energy-intensive industries, resulting in lower energy intensity for manufacturing as a whole. To analyse this in more depth, the log mean deviation index is applied (see Ang, 2004; Mulder and de Groot, 2012) allowing one to split changes in energy use per unit of output into an energy intensity and a structural effect.

**Figure 1 / Results from decomposition analysis of changes in energy intensity for manufacturing industries***

**Annualised growth rates in %, 1995-2009**




Note: * Without NACE Rev. 1 23 (coke, refined petroleum and nuclear fuel).
Source: WIOD; wiiw calculations.

Figure 1 demonstrates that in the manufacturing industries (excluding NACE Rev. 1 23 coke, refined petroleum and nuclear fuel) for all countries and regions an increase in overall energy efficiency (i.e. a decrease in energy intensity) can be observed. This results from the declines in energy intensities ranging from -0.2% per year in Japan, -1.5% in the EU-15 and the US, -4.8% in China to -6.6% in the EU-12. Thus, the intensity effect has dominated in all countries with the exception of Japan. The structural effect points towards a slight decrease in manufacturing energy efficiency in the EU-15, which is explained by a structural shift towards the chemical industry, which tends to be relatively more energy-intensive compared to the other industries. In the EU-12, Japan and the United States the negative contribution of the structural effect is mostly explained by a strong shift towards higher-tech industries such as electrical and optical equipment and transport equipment. Surprisingly, structural shifts are negligible in China. The reason for this is that though there has been a significant shift towards the electrical and optical equipment sector in China over this period, the initial energy intensity of this industry was rather high, and then strongly declined.

## SUMMARY

Summarising, this overview demonstrates that energy cost shares in manufacturing (without NACE Rev. 1 23) are generally relatively small in overall terms, standing at about 3% of gross output in the advanced countries considered here (EU-27, Japan and US), though they have been generally increasing over time. An exception to this are the EU-12, for which the shares decreased but are still higher compared to the EU-15. This suggests that other cost components, e.g. labour costs, costs of high-tech intermediates, R&D and innovation, business services, etc., are more important from an overall EU competitiveness perspective than energy costs, at least at a broad industrial classification.[5]

Further, though costs – including energy costs – might be a relevant aspect of competitiveness in some cases and industries, it should be stressed that several other dimensions can also affect the international performance of firms, including the quality of products, product differentiation, etc. These aspects are strictly related to the quality of the workforce and their skills and training, but also to the provisions of high-quality intermediates as well as geographic factors such as proximity to consumers. These other important determinants and dimensions of competitiveness such as product quality, product differentiation, and quality of the labour force are not considered in such a simple pure cost consideration.

Concerning energy intensity, one finds a strong convergence process: Within Europe, particularly the EU-12 countries have been successful in reducing their energy intensities (that is, increasing energy efficiency). For the manufacturing industries (excluding NACE Rev. 1 23 coke, refined petroleum and nuclear fuel), this process has been mostly driven by a technological reduction of energy intensities, although a structural shift towards higher-tech industries has also played a role, particularly in the EU-12 countries. By contrast, in the EU-15 a structural shift towards chemicals and chemical products (NACE Rev. 1 24) has constrained the scope of energy intensity reduction, which has been driven exclusively by technological improvements.

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5 For example, Renda (2013) and Riker (2012) argue that there are significant impacts of changing energy costs and intensities on some specific energy-intensive sectors which need to be investigated at a more disaggregated industry level.

# Energy intensity, energy cost shares and industrial competitiveness*

BY SANDRA LEITNER, VASILY ASTROV, ROBERT STEHRER AND OLGA PINDYUK

## THEORETICAL CONSIDERATIONS

Energy cost shares in manufacturing industries – though generally on the rise over the past two decades – are typically quite low. On average, they stand at some 2-3% of gross output, and e.g. labour-related expenses are a much more important cost factor for industries. However, on a more disaggregated basis, energy may account for up to 40-80% of production costs for some particularly energy-intensive sectors such as aluminium industry and chemicals (see e.g. European Commission, 2014a). One would expect that for these industries, changes in energy intensity or energy costs may have a considerable impact on their export competitiveness. In addition, in the case of other – less energy-intensive – industries even low energy cost shares may still affect export competitiveness on the margin. For instance, if profits of exporting or import-competing industries are not high enough to offset even an incremental increase in energy costs, export competitiveness may suffer as a result.

In line with the so-called 'Porter hypothesis', environmental and related energy regulations can induce energy efficiency and encourage innovations that help improve commercial competitiveness in the medium and long run (Porter and van der Linde, 1995). However, in order to lower their energy intensity, companies often need to undertake investments into new technologies which may have medium-run payback periods, thus making the firms less competitive in the short run. Loss of competitiveness is particularly likely when domestic emission mitigation policies are unilateral: according to the 'pollution haven hypothesis', domestic manufacturers may lose market share to foreign competitors and relocate production activity to unregulated economies as a result (Joseph and Pizer, 2011). In principle, government support policies can be used to mitigate the ensuing deterioration in industrial competitiveness. However, they might as well subvert the incentives for companies to restructure, resulting in expenditures that show little long-term promise for stimulating the economy or protecting the environment (Frondel et al., 2010). A similar effect could be expected at the industry level where it can be further reinforced by within-industry reallocations, with most energy-intensive firms potentially driven out of the market, etc.

The present article attempts to quantify the link between energy intensity/energy cost shares and competitiveness for a wide range of countries and industries based on the time series available from a single dataset (the World Input-Output Database, WIOD), which ensures internal consistency and comparability of data.

* This note is based on a paper written as part of the European Competitiveness Report 2014.

## EMPIRICAL RESULTS AND INTERPRETATION

To measure the impact of changes in energy intensity/energy cost shares on industrial competitiveness, a panel-data model for the period 1995-2007 was set up, using total (intra- and extra-EU) exports taken from WIOD as dependent variable.[1] The years 2008 and 2009 were excluded from the sample since the global economic and financial crisis may have impacted very differently across sectors, thus making results difficult to interpret. Reassuringly, the main results are similar for the full sample. Apart for our main variables of interest (i.e. energy intensity and energy cost shares), the model also included a range of control variables customarily used to explain the export performance of a country or industry, such as labour productivity, the shares of high- and medium-skilled labour, capital intensity, wages, and the size of the economy. The model was run on a sample of 21 EU countries[2] and 13 NACE 2-digit manufacturing sectors available from the World Input-Output Database.[3] Methodologically, the model was estimated in first differences with country-industry fixed effects, thus explaining the export dynamics of each industry in each country over time.

Table 1 shows the results of our estimations for the total sample of industries (columns 1-3). Energy intensity is negatively related to exports (column 1) and so is the total energy cost share (column 2). In column 3 we split the energy cost share into its main components. In this case, only the cost share of electricity, gas, steam and hot water (CPA 40 according to VIOD classification) has an ‘expected’ significant negative relationship with exports, but energy intensity becomes insignificant.[4] These results suggest that a rise in the cost share component CPA 40 by 1 percentage point (p.p.) is statistically associated with a 1.6% decline of exports.

It should be noted that, although statistically significant, the elasticity of exports with respect to electricity costs is very low, considering that an increase in the electricity cost share of 1 p.p. of gross output is in fact very large given its initial low level.

These findings suggest that energy-related costs are not the main determinants of export competitiveness. For instance, the coefficient of labour productivity is positive and significant across all the model specifications, pointing to a positive productivity-competitiveness nexus. Wages are found to be positively though not significantly associated with exports. Intuitively, this makes sense: labour productivity gains need to be larger than wage increases in order to result in lower unit labour costs and improved competitiveness. Human capital matters for export competitiveness, too: an increase in the high-skilled labour share is associated with higher exports. Counter-intuitively, capital intensity is found to be negatively associated with exports. For this, however, one has to bear in mind that there are already two other variables included which are related to capital intensity: Labour productivity is measured as output per employed person which therefore includes capital intensity and a proxy for

1 This corresponds to the baseline specification. Alternative specifications using revealed comparative advantages (RCAs) as dependent variables were tried as well.

2 The panel covers 21 EU Member States (i.e. EU-28 without Bulgaria, Croatia, Cyprus, Latvia, Lithuania, Malta and Romania) as well as 9 non-EU countries: the United States, Turkey, Russia, Mexico, South Korea, Japan, Canada, China and Australia.

3 Coke, refined petroleum, and nuclear fuel industry (NACE 23) was excluded from the model, since it uses energy inputs such as crude oil primarily as a feedstock rather than as an energy source, and its inclusion may result in distorted estimation results.

4 When separately including the other cost shares, these are insignificant whereas energy intensity remains significantly negative.

human capital which relates to capital intensity via a capital-skill complementarity. This could point towards a certain degree of (multi-)collinearity amongst those variables. It should be noted that the coefficients (in absolute terms) are lower than or close to those for labour productivity.

The regressions were run also for a sub-sample of energy-intensive sectors: chemicals, other non-metallic minerals and metals. The results point again towards a negative effect of a higher share of the cost component CPA 40. The magnitude of the effect is similar. The coefficients for energy intensity are negative though insignificant in all specifications (columns 4-6) which might be caused by the limited variation in this small subset of the sample. Furthermore, for these industries competitiveness is unrelated to the share of high- and medium-skilled labour.

**Table 1 / Energy intensity, energy cost shares and industrial competitiveness: empirical findings**

| | Total industries[1)] | | | Energy-intensive industries[2)] | | |
|---|---|---|---|---|---|---|
| Dependent variable: exports | 1 | 2 | 3 | 4 | 5 | 6 |
| Energy intensity | -0.024* | | -0.018 | -0.067 | | -0.055 |
| | (-1.80) | | (-1.33) | (-1.63) | | (-1.30) |
| Energy cost share | | -0.008* | | | -0.002 | |
| | | (-1.75) | | | (-0.36) | |
| Cost share coal | | | 0.018 | | | 0.020 |
| | | | (0.74) | | | (0.72) |
| Cost share of oil and gas | | | 0.003 | | | 0.010 |
| | | | (0.27) | | | (0.87) |
| Cost share of coke, ref. petroleum | | | 0.001 | | | 0.012 |
| | | | (0.12) | | | (1.09) |
| Cost share of electricity, etc. | | | -0.016*** | | | -0.017** |
| | | | (-2.63) | | | (-1.99) |
| Labour productivity (GO based) | 0.329*** | 0.335*** | 0.329*** | 0.418*** | 0.444*** | 0.395*** |
| | (10.56) | (10.81) | (10.54) | (4.55) | (4.89) | (4.24) |
| Share of high-skilled labour | 0.726*** | 0.725*** | 0.717*** | 0.962 | 0.960 | 0.894 |
| | (2.89) | (2.89) | (2.86) | (1.64) | (1.63) | (1.52) |
| Share of medium-skilled labour | -0.376* | -0.398* | -0.365* | -0.757 | -0.729 | -0.674 |
| | (-1.81) | (-1.91) | (-1.75) | (-1.58) | (-1.51) | (-1.40) |
| Capital intensity | -0.283*** | -0.282*** | -0.279*** | -0.443*** | -0.439*** | -0.405*** |
| | (-6.90) | (-6.87) | (-6.80) | (-3.78) | (-3.73) | (-3.42) |
| Wage per employee | 0.066 | 0.064 | 0.061 | 0.010 | -0.003 | -0.013 |
| | (1.45) | (1.42) | (1.35) | (0.10) | (-0.03) | (-0.12) |
| GDP | -0.011 | 0.025 | -0.011 | 0.261 | 0.318 | 0.196 |
| | (-0.06) | (0.14) | (-0.06) | (0.66) | (0.81) | (0.49) |
| Constant | 0.070*** | 0.070*** | 0.071*** | 0.066*** | 0.066*** | 0.068*** |
| | (10.46) | (10.41) | (10.44) | (4.55) | (4.52) | (4.66) |
| Observations | 3,094 | 3,094 | 3,094 | 720 | 720 | 720 |
| R-squared | 0.06 | 0.06 | 0.06 | 0.06 | 0.059 | 0.08 |
| Number of i | 259 | 259 | 259 | 60 | 60 | 60 |

Notes: 1) Excluding NACE 23 – Coke, refined petroleum and nuclear fuel. 2) The sub-sample of energy-intensive sectors includes NACE 24 – Chemicals and chemical products, NACE 26 – Other non-metallic minerals, and NACE 27to28 – Basic metals and fabricated metals.
Source: Own calculations.

## CONCLUSIONS

Overall, the analysis fails to find strong evidence that export competitiveness of manufacturing industries – as measured by export growth – is significantly related to energy intensity, even in the case of energy-intensive sectors. The evidence with respect to energy cost shares is more interesting since the cost share of electricity, gas, steam and hot water (CPA 40) have the ‘expected’ negative association with export growth in all the specifications. This suggests that industries where this cost share has increased have experienced a loss in competitiveness. However, the observed impact is quantitatively small. These results indicate that other factors, above all labour productivity and the share of high-skilled workers, are more important for industrial competitiveness than energy costs.

These conclusions carry over to a number of robustness checks. For example, energy intensity remains insignificant if labour productivity based on value added is used alternatively, whereas the cost share of CPA 40 remains significantly negative, leaving other results mostly unaffected. This finding also holds when a different measure of competiveness, i.e. revealed comparative advantages is used for the total sample of industries. Interestingly, when revealed comparative advantages is measured in value-added terms, the coefficient for energy intensity becomes more negative and more often significant which might imply that industries which upgrade along value chains become less energy-intensive. These results however do not hold for the subset of energy-intensive industries where robustness checks yield more mixed results. When including the crisis period, i.e. using period 1995-2009, the above-mentioned results concerning the cost share of electricity, gas, steam and hot water (CPA 40) still hold while those on energy intensity remain negative though becoming insignificant, whereas the other cost share components in some cases become positively significant, which might be the result of the very differentiated impact of the crisis across industries.

These results are based on a relatively simple model specification, but they suggest that energy cost pressures have had limited impact on the export competitiveness of manufacturing industries. The results should be interpreted with caution. On the one hand, they may be partly explained by the generally low level of energy cost shares, or by the fact that energy price rises may have affected manufacturing producers in different countries in similar ways, resulting in no major shifts in relative competitiveness. As such, these findings are in line with those of the European Commission (2014b). On the other hand, it has to be borne in mind that these conclusions are based on the developments prior to the ‘shale gas revolution’ in the United States. It is possible that the increased energy price gap between the US and other countries may be impacting export competitiveness. These effects cannot be captured with our data. Moreover, due to data limitations, our findings are based on the NACE 2-digit level of aggregation. At a more disaggregated level, energy intensity and energy cost shares may potentially have a much greater impact on export competitiveness, e.g. in the case of energy-intensive sectors.

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# The editors recommend for further reading*

A view on shale oil and its impact: http://www.voxeu.org/article/shale-oil-and-gasoline-prices

BIS on oil and debt: https://www.bis.org/statistics/gli/glibox_feb15.htm

On Grexit: http://www.cer.org.uk/insights/greece-will-remain-euro-now

Greek choices: Gros: http://www.ceps.eu/book/grexit-2015-primer and Darvas: http://www.bruegel.org/nc/blog/detail/article/1551-greek-choices-after-the-elections/

Paolo Manasse on what Syriza can expect to get: http://www.voxeu.org/article/syriza-and-debt-talks-estimates-rubinstein-bargain-approach

Philippon calculates a fair relief for Greek debt: http://www.voxeu.org/article/fair-debt-relief-greece-new-calculations

Krugman on Switzerland: http://krugman.blogs.nytimes.com/2015/01/16/regime-change-in-switzerland/?module=BlogPost-Title&version=Blog

John Cochrane on SNB and ECB: http://johnhcochrane.blogspot.co.at/2015/01/snb-chf-ecb-and-qe.html

Ananyev and Guriev on trust and crisis of 2008-2009 (in Russia): http://www.voxeu.org/article/crises-and-trust

Start of a new debate on secular stagnation at Vox: http://www.voxeu.org/debates/secular-stagnation

Krugman on globalisation and convergence: http://krugman.blogs.nytimes.com/2015/01/14/convergence-in-two-global-economies/?module=BlogPost-Title&version=Blog

Interview in the Potemkin Review with Piketty in which he answers the critics from the left: http://potemkinreview.com/pikettyinterview/

Williamson disagrees with Krugman on Volcker and the Keynesians: http://newmonetarism.blogspot.co.at/2015/01/historical-fiction.html

Cowen thinks that most nobody completely understands Heckscher-Ohlin theory, including himself: http://marginalrevolution.com/marginalrevolution/2015/01/i-liked-noah-smiths-piece-and-i-really-dont-mean-to-pick-on-him-but.html

A sober view of the European integration project: http://www.realclearworld.com/articles/2015/01/29/europe_sits_on_the_verge_of_regime_collapse_110943.html

Wolf on ECB and joint liability: http://www.bruegel.org/nc/blog/detail/article/1540-sovereign-qe-and-national-central-banks/

Here is one analysis on how ECB's QE will lead to less credit from the commercial banks: http://stellarconsultllc.com/blog/wp-content/uploads/2015/01/ECB-QE-and-the-impending-implosion-of-the-European-Banking-System.pdf

De Grauwe and Ji on QE having no fiscal implications: http://www.voxeu.org/article/quantitative-easing-eurozone-its-possible-without-fiscal-transfers

Ramey and Zubairy on fiscal multipliers not depending either on unemployment or on monetary policy in the US: http://www.voxeu.org/article/us-fiscal-multiplier-historical-evidence

Christopher Sims' paper found useful to understanding fiscal-monetary issues in the euro area: http://sims.princeton.edu/yftp/EuroGaps/EuroGaps.pdf

Paolo Manasse on new fiscal guidelines: http://www.voxeu.org/article/eu-new-fiscal-flexibility-guidelines-assessment

McKinsey on lack of deleveraging: http://www.mckinsey.com/insights/economic_studies/debt_and_not_much_deleveraging

* Recommendation is not necessarily endorsement. The editors are grateful to Vladimir Gligorov for his valuable contribution to this section.

# Monthly and quarterly statistics for Central, East and Southeast Europe

**NEW: Data for Turkey included.**
**Euro introduction in Lithuania.**

The annex now covers **20 countries** of the CESEE region. The new graphical form of presenting statistical data is intended to facilitate the **analysis of short-term macroeconomic developments**. The set of indicators captures tendencies in the real sector, pictures the situation in the labour market and inflation, reflects fiscal and monetary policy changes, and depicts external sector development.

Baseline data and a variety of other monthly and quarterly statistics, **country-specific** definitions of indicators and **methodological information** on particular time series are **available in the wiiw Monthly Database** under: **http://data.wiiw.ac.at/monthly-database.html.** Users regularly interested in a certain set of indicators may create a personalised query which can then be quickly downloaded for updates each month.

### Conventional signs and abbreviations used

| | |
|---|---|
| % | per cent |
| LFS | Labour Force Survey |
| HICP | Harmonized Index of Consumer Prices (for new EU Member States) |
| PPI | Producer Price Index |
| M1 | Currency outside banks + demand deposits / narrow money (ECB definition) |
| M2 | M1 + quasi-money / intermediate money (ECB definition) |
| p.a. | per annum |
| mn | million ($10^6$) |
| bn | billion ($10^9$) |

The following national currencies are used:

| | | | | | |
|---|---|---|---|---|---|
| ALL | Albanian lek | HUF | Hungarian forint | RSD | Serbian dinar |
| BAM | Bosnian convertible mark | KZT | Kazakh tenge | RUB | Russian rouble |
| BGN | Bulgarian lev | MKD | Macedonian denar | TRY | Turkish lira |
| CZK | Czech koruna | PLN | Polish zloty | UAH | Ukrainian hryvnia |
| HRK | Croatian kuna | RON | Romanian leu | | |

EUR euro – national currency for Montenegro and for the euro-area countries Estonia (from January 2011, euro-fixed before), Latvia (from January 2014, euro-fixed before), Lithuania (from January 2015, euro-fixed before), Slovakia (from January 2009, euro-fixed before) and Slovenia (from January 2007, euro-fixed before).

Sources of statistical data: Eurostat, National Statistical Offices, Central Banks and Public Employment Services; wiiw estimates.

Access: New online database access! (see overleaf)

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**wiiw Annual Database**


**wiiw Monthly Database**


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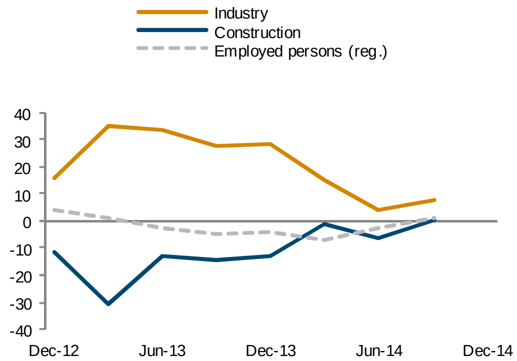
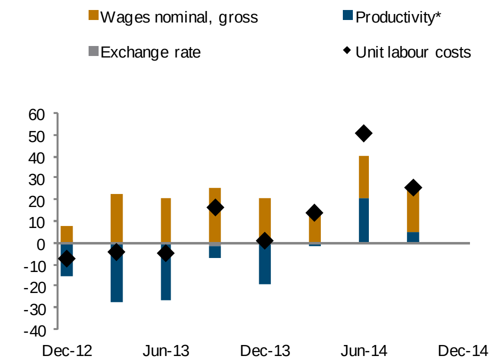
# Albania

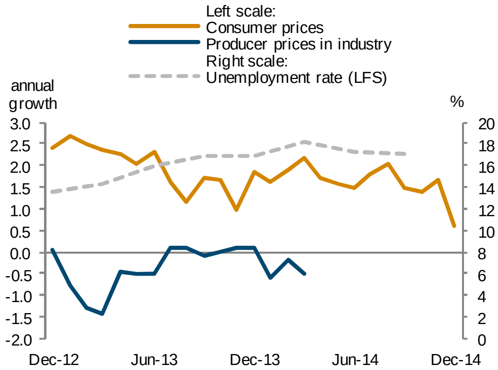
**Real sector development**
cumulated annual growth rate in %



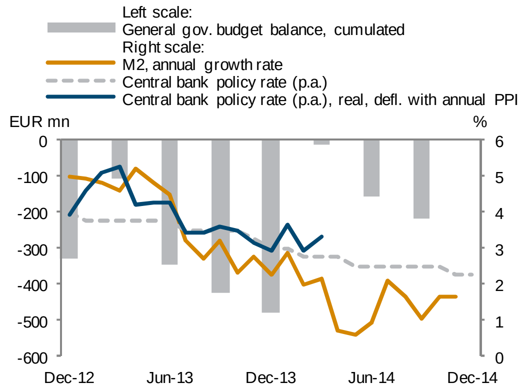

**Unit labour costs in industry**
annual growth rate in %



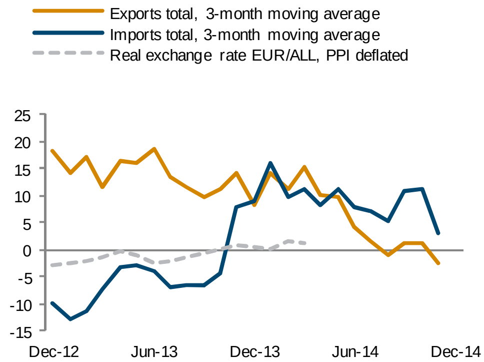

**Inflation and unemployment**
in %



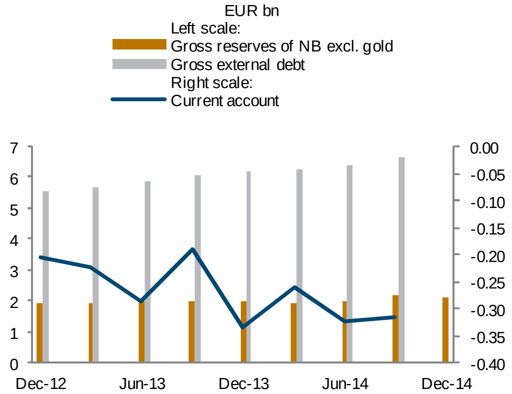

**Fiscal and monetary policy**




**External sector development**
annual growth rate in %




**External finance**
EUR bn

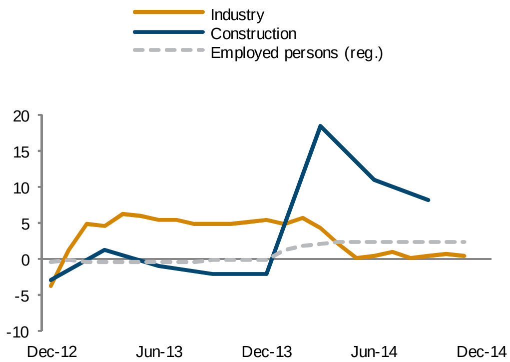



*Positive values of the productivity component on the graph reflect decline in productivity and vice versa.

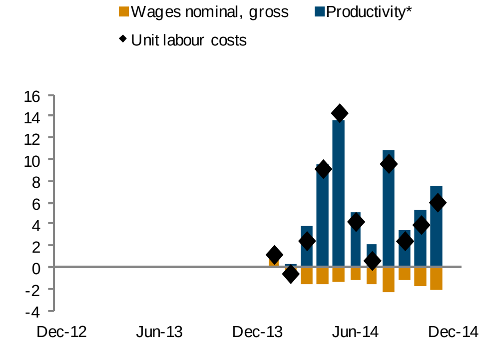
Source: wiiw Monthly Database incorporating Eurostat and national statistics.
Baseline data, country-specific definitions and methodological breaks in time series are available under:
http://data.wiiw.ac.at/monthly-database.html

# Bosnia and Herzegovina

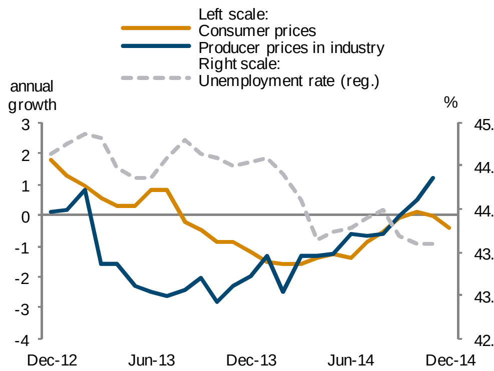
**Real sector development**
cumulated annual growth rate in %



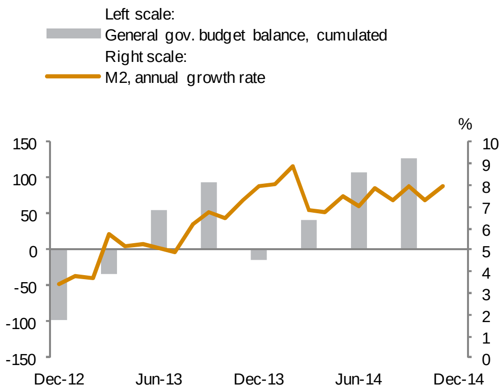

**Unit labour costs in industry**
annual growth rate in %



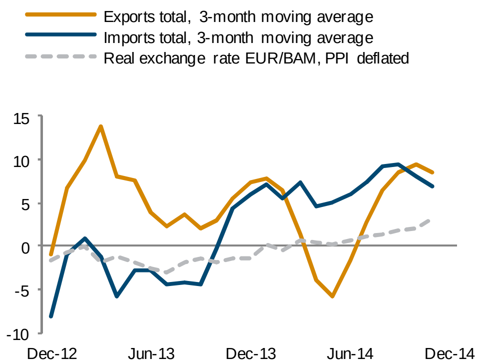

**Inflation and unemployment**
in %



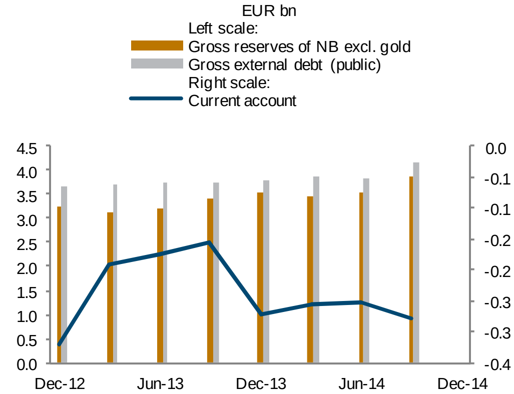

**Fiscal and monetary policy**




**External sector development**
annual growth rate in %




**External finance**
EUR bn




*Positive values of the productivity component on the graph reflect decline in productivity and vice versa.

Source: wiiw Monthly Database incorporating Eurostat and national statistics.
Baseline data, country-specific definitions and methodological breaks in time series are available under:
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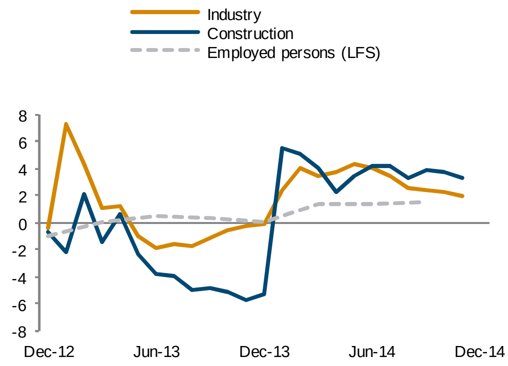
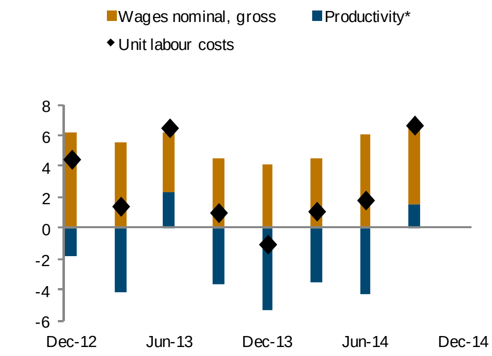
# Bulgaria

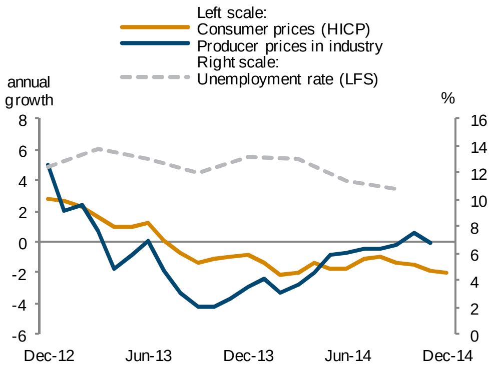
**Real sector development**
cumulated annual growth rate in %



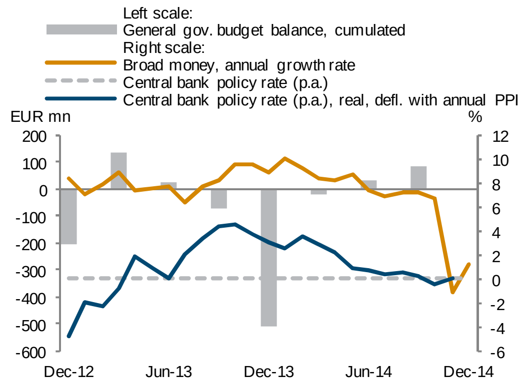

**Unit labour costs in industry**
annual growth rate in %



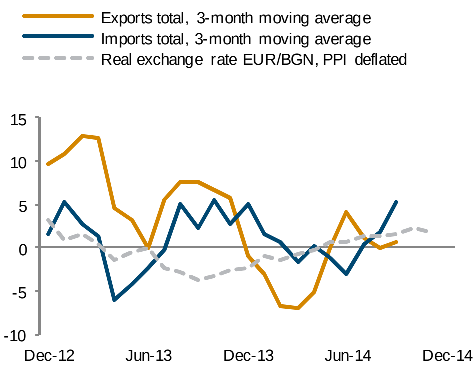

**Inflation and unemployment**
in %



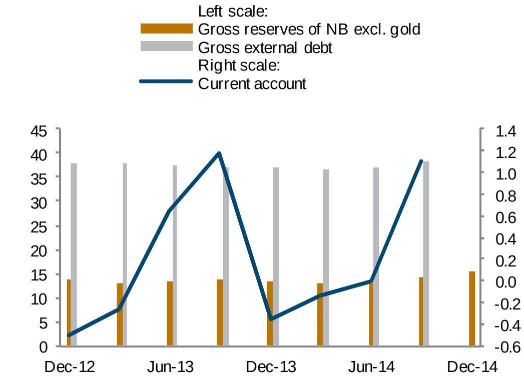

**Fiscal and monetary policy**




**External sector development**
annual growth rate in %




**External finance**
EUR bn




*Positive values of the productivity component on the graph reflect decline in productivity and vice versa.

Source: wiiw Monthly Database incorporating Eurostat and national statistics.
Baseline data, country-specific definitions and methodological breaks in time series are available under:
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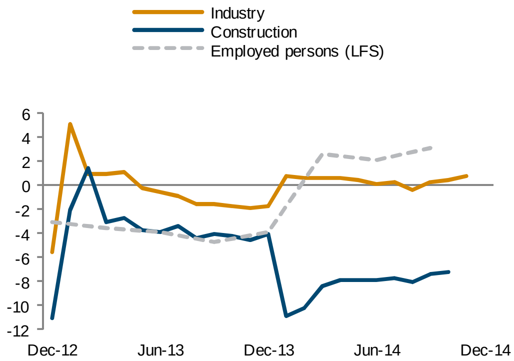
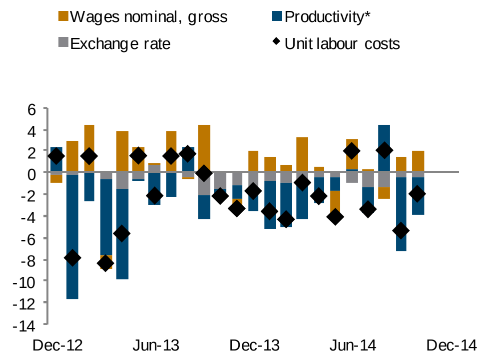
# Croatia

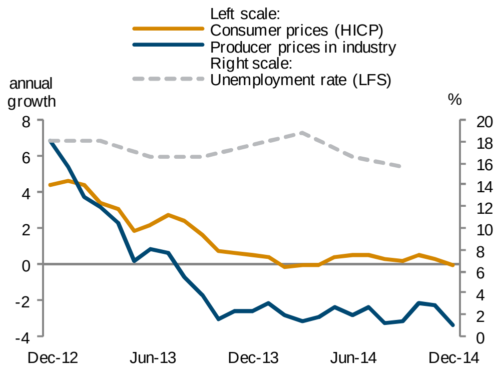
**Real sector development**
cumulated annual growth rate in %



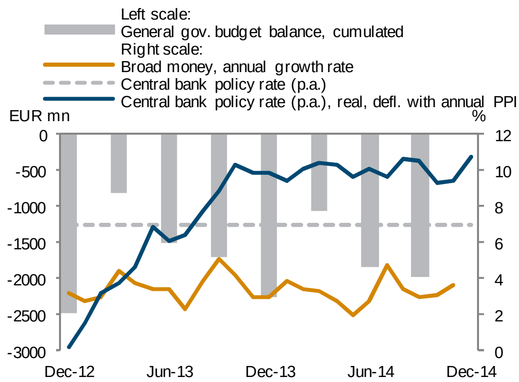

**Unit labour costs in industry**
annual growth rate in %



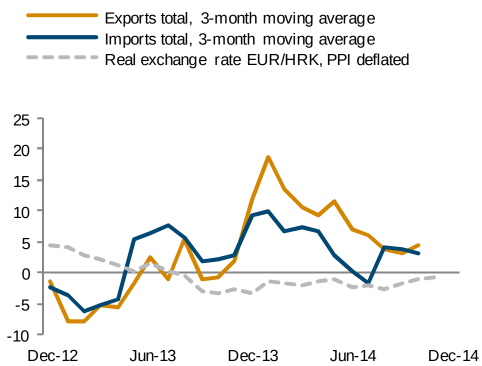

**Inflation and unemployment**
in %



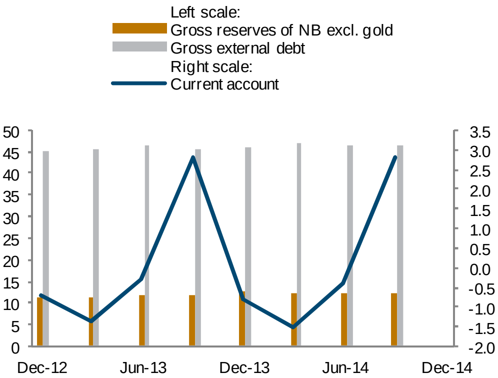

**Fiscal and monetary policy**




**External sector development**
annual growth rate in %




**External finance**
EUR bn

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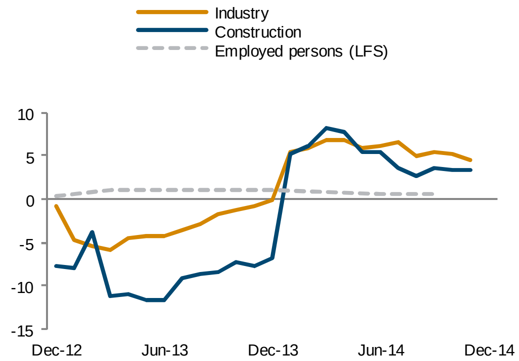
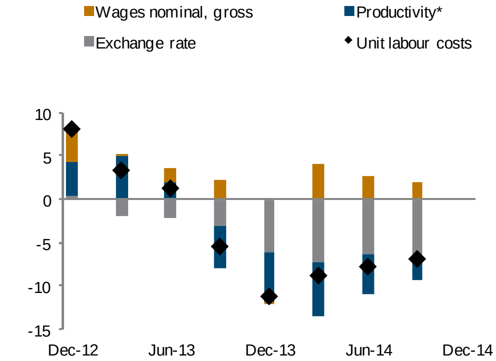
# Czech Republic

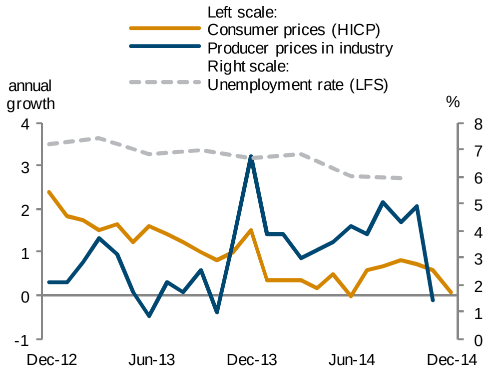
**Real sector development**
cumulated annual growth rate in %



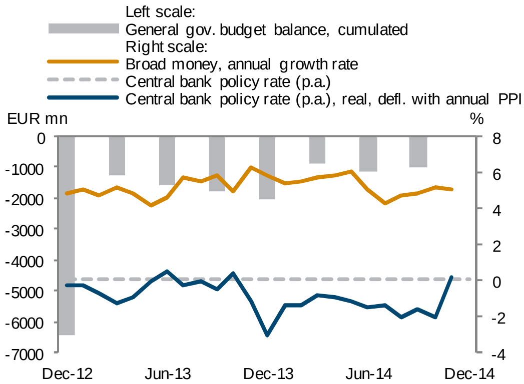

**Unit labour costs in industry**
annual growth rate in %



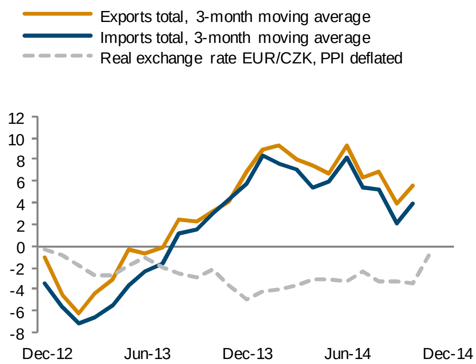

**Inflation and unemployment**
in %



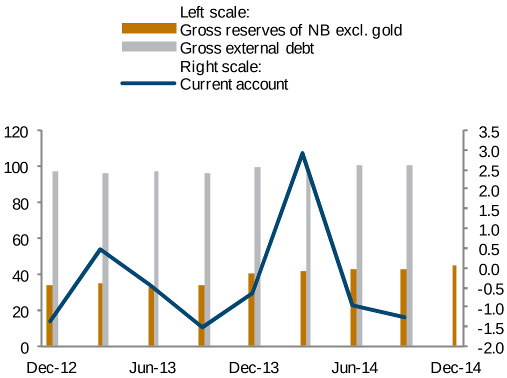

**Fiscal and monetary policy**




**External sector development**
annual growth rate in %




**External finance**
EUR bn

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Source: wiiw Monthly Database incorporating Eurostat and national statistics.
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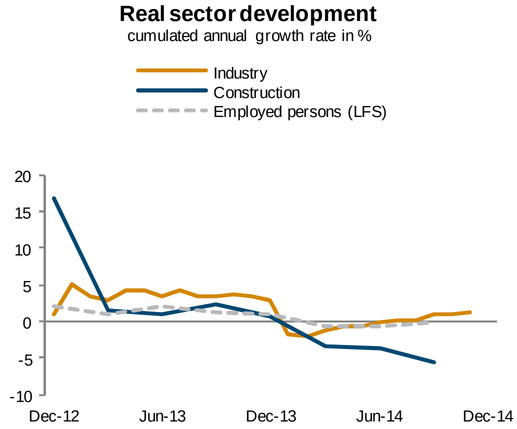
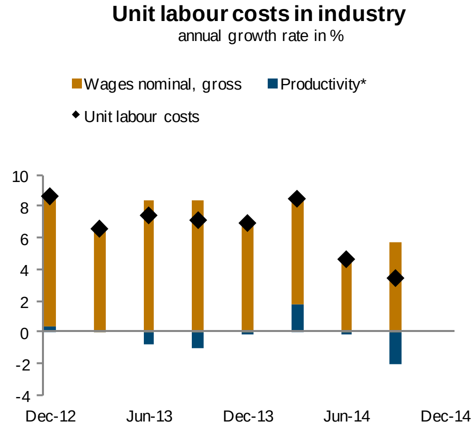
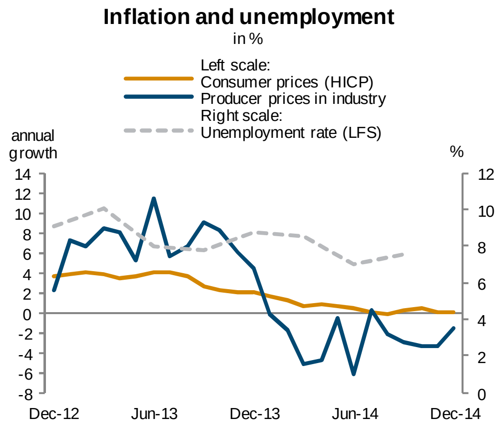
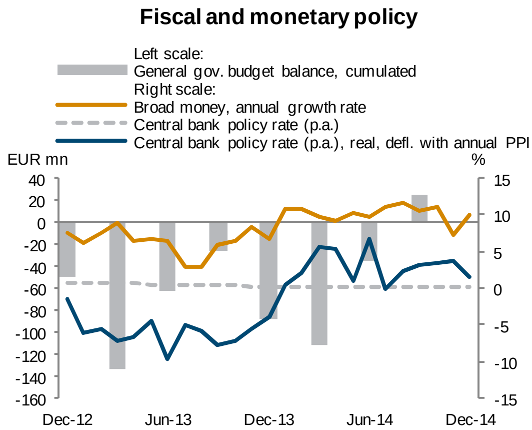
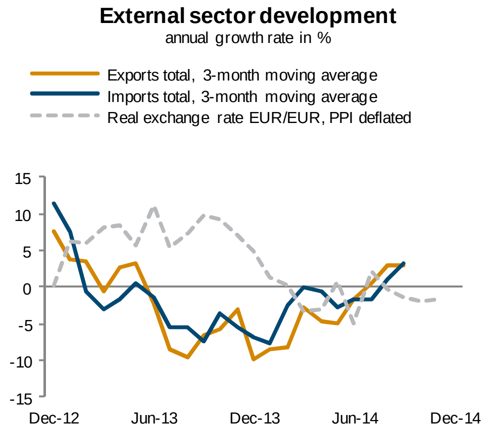
# Estonia

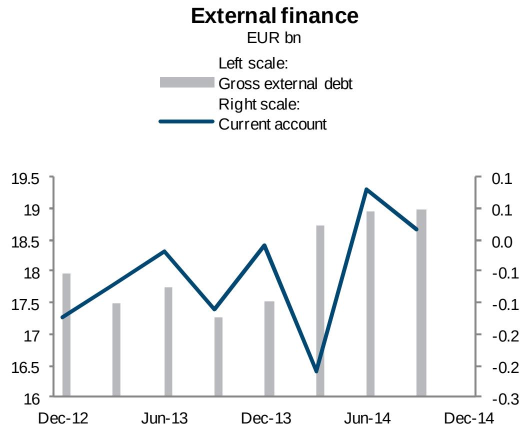
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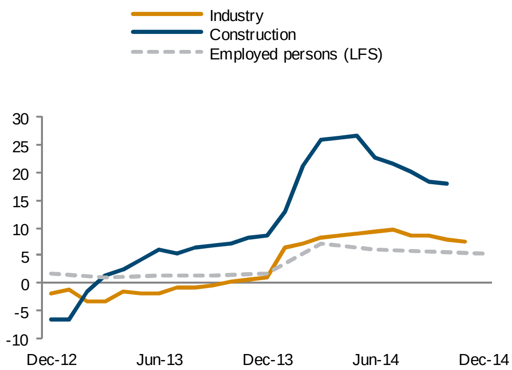
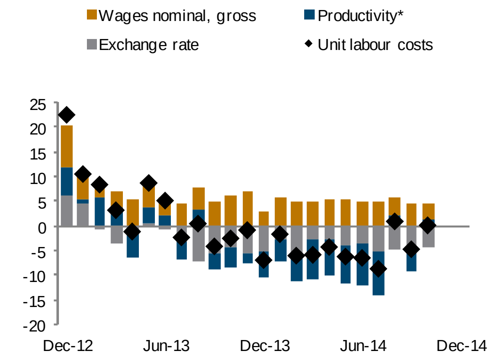
# Hungary

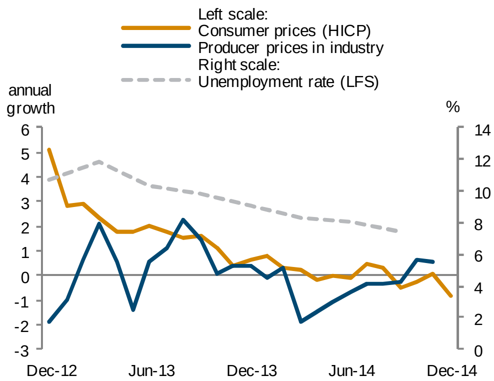
### Real sector development
cumulated annual growth rate in %



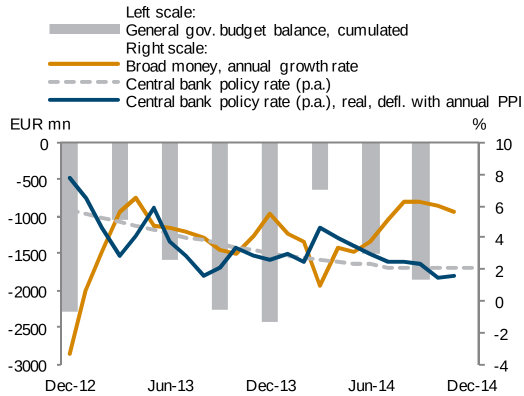

### Unit labour costs in industry
annual growth rate in %



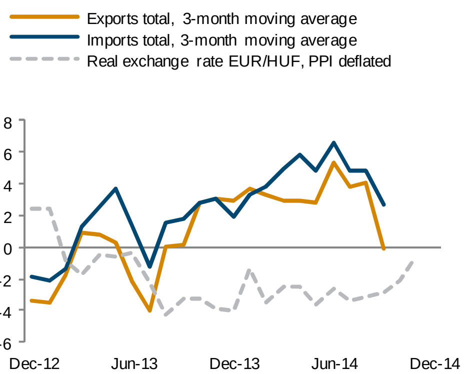

### Inflation and unemployment
in %



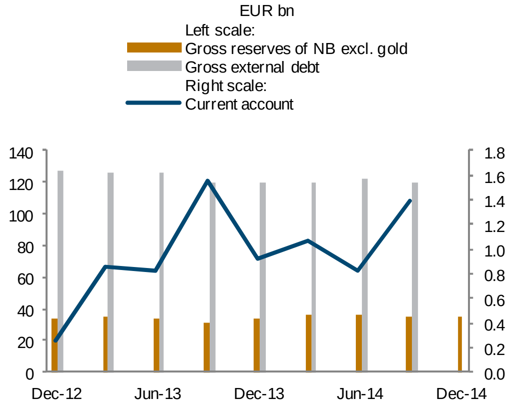

### Fiscal and monetary policy




### External sector development
annual growth rate in %




### External finance
EUR bn

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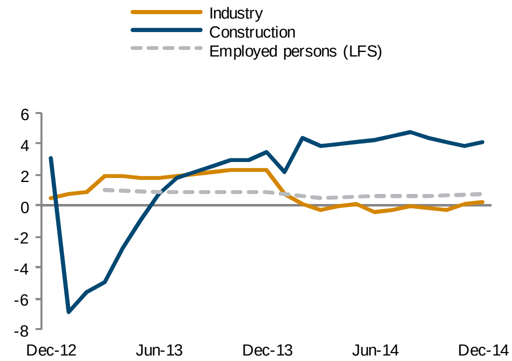
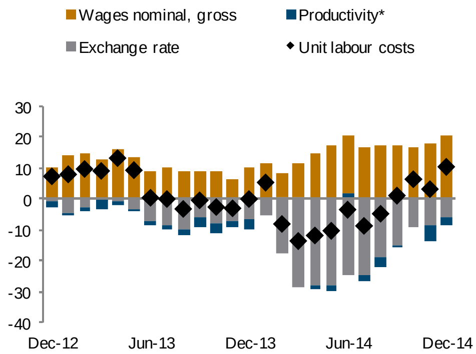
# Kazakhstan

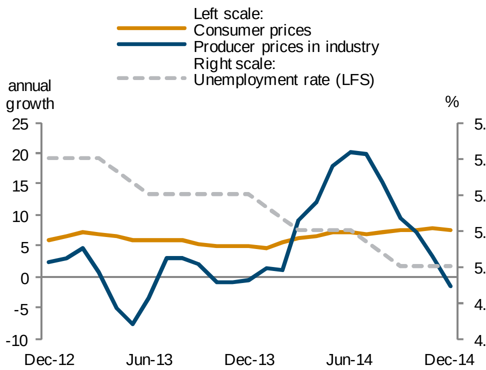
**Real sector development**
cumulated annual growth rate in %



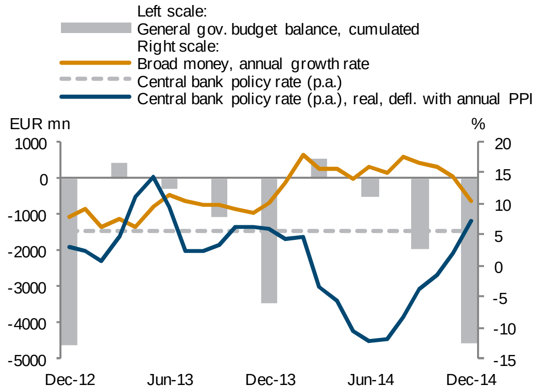

**Unit labour costs in industry**
annual growth rate in %



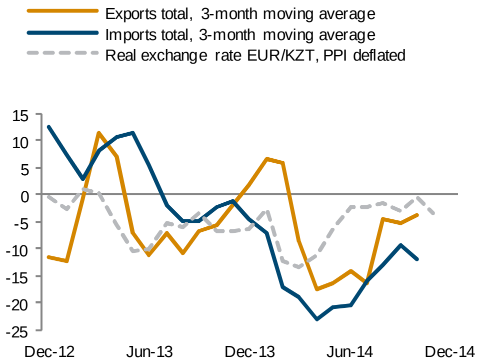

**Inflation and unemployment**
in %



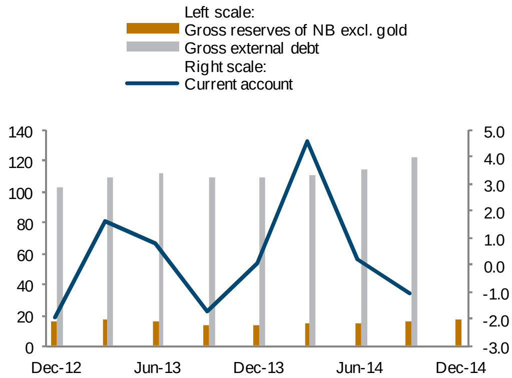

**Fiscal and monetary policy**




**External sector development**
annual growth rate in %




**External finance**
EUR bn

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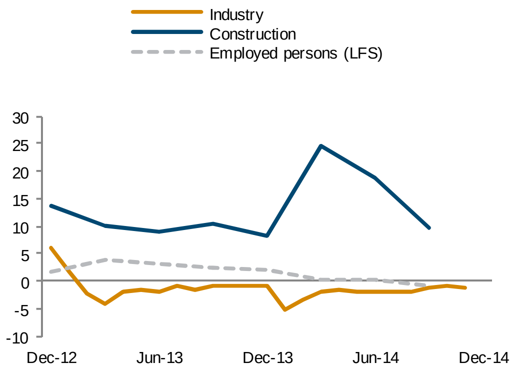
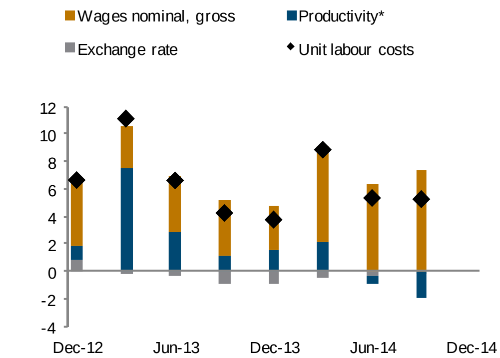
# Latvia

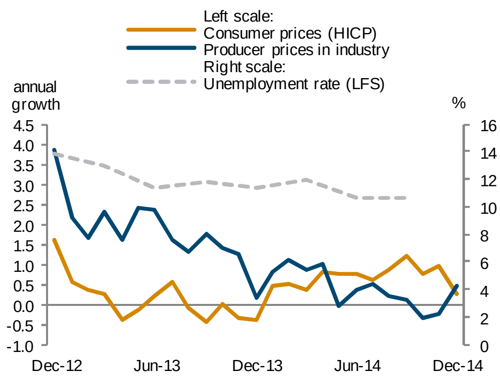
**Real sector development**
cumulated annual growth rate in %



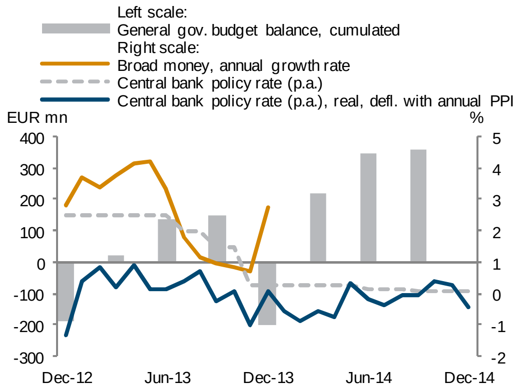

**Unit labour costs in industry**
annual growth rate in %



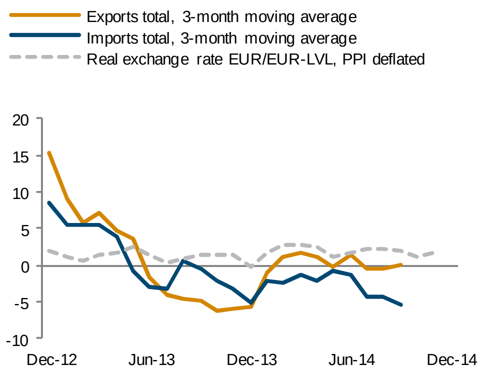

**Inflation and unemployment**
in %



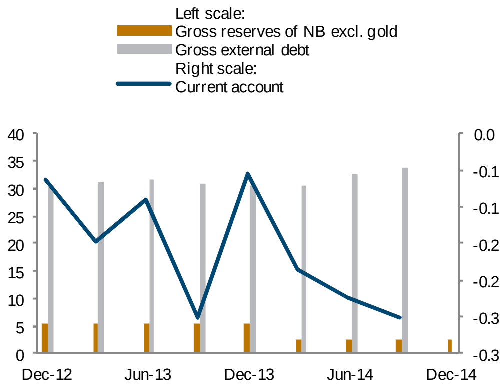

**Fiscal and monetary policy**




**External sector development**
annual growth rate in %




**External finance**
EUR bn

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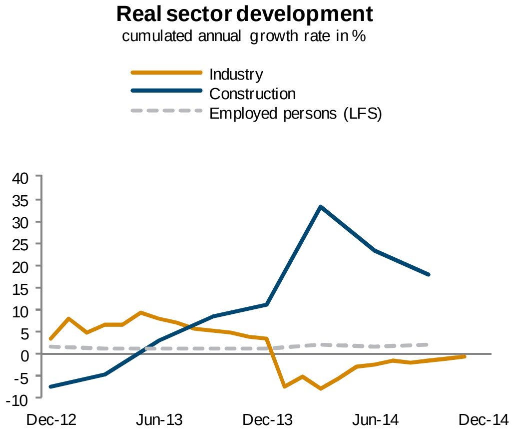
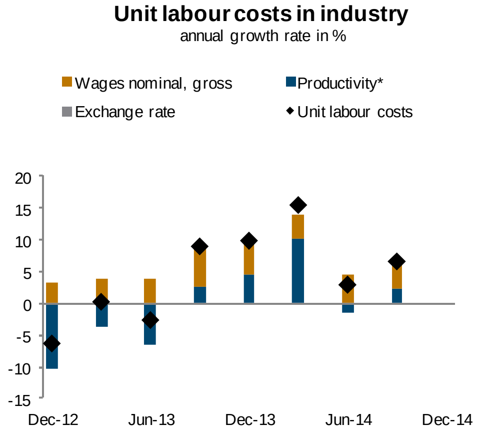
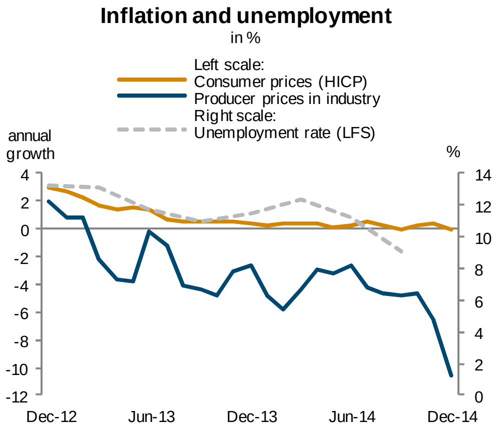
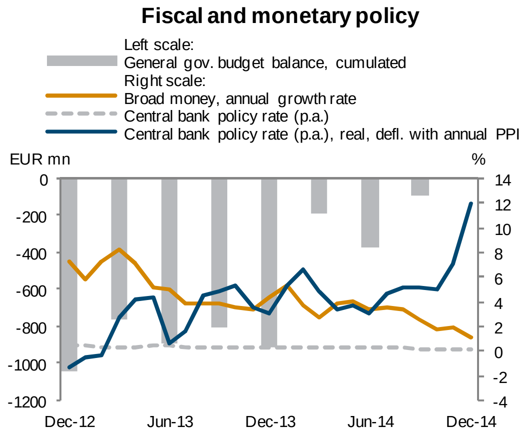
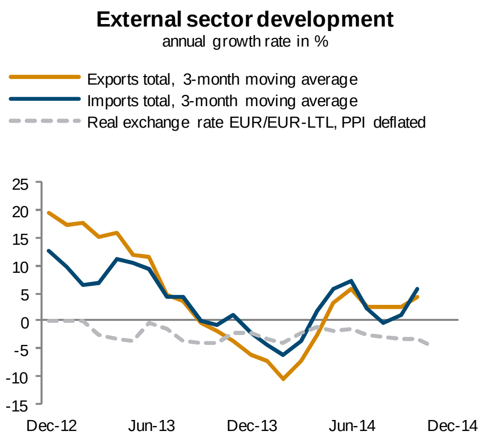
# Lithuania

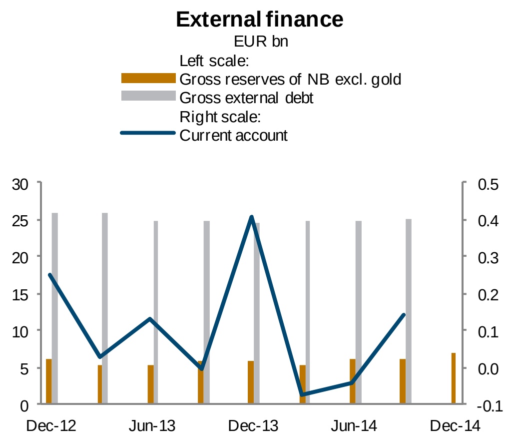
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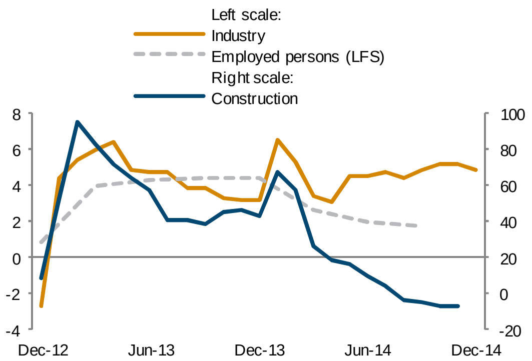
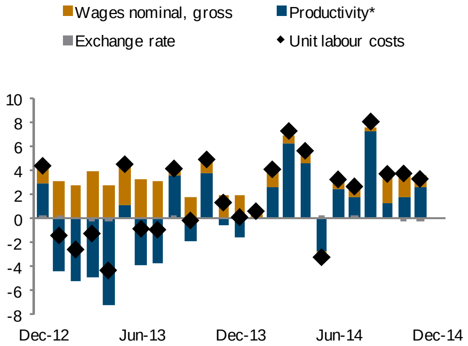
# Macedonia

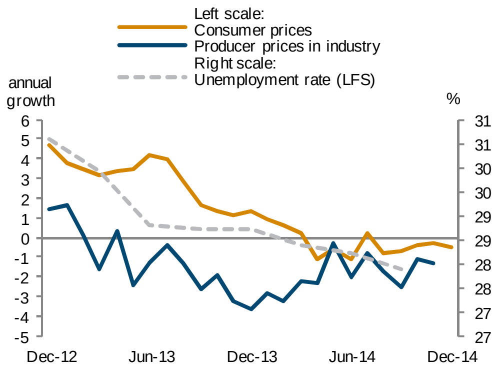
**Real sector development**
cumulated annual growth rate in %



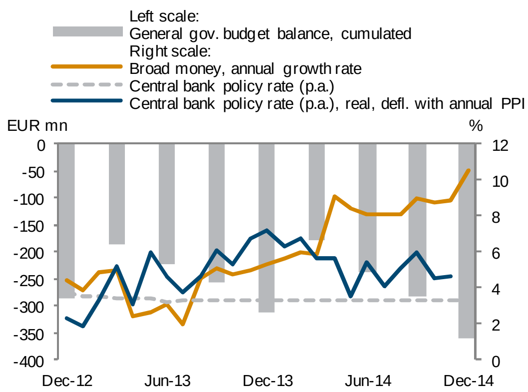

**Unit labour costs in industry**
annual growth rate in %



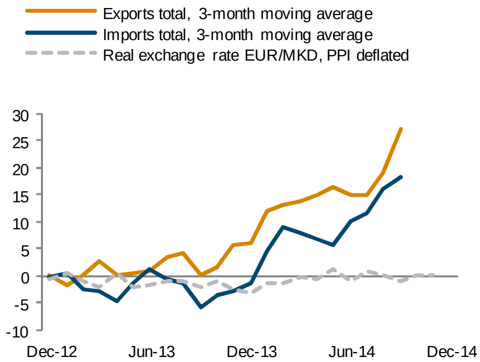

**Inflation and unemployment**
in %



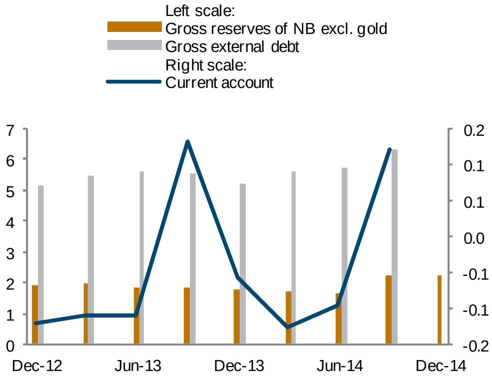

**Fiscal and monetary policy**




**External sector development**
annual growth rate in %




**External finance**
EUR bn

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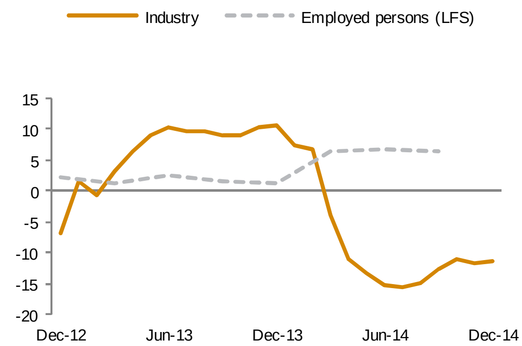
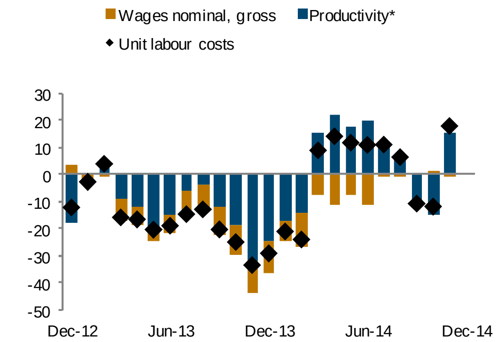
# Montenegro

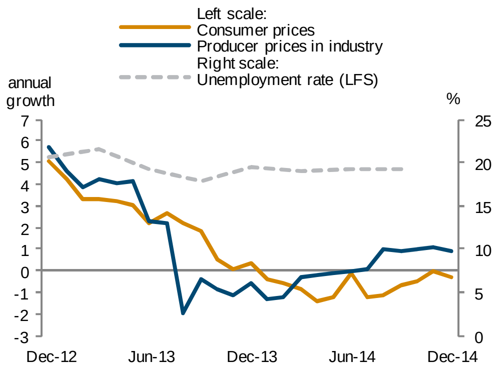
**Real sector development**
cumulated annual growth rate in %



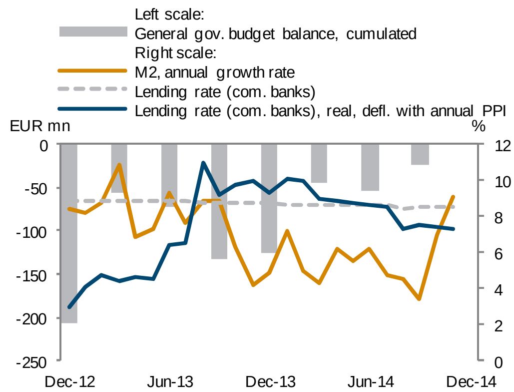

**Unit labour costs in industry**
annual growth rate in %



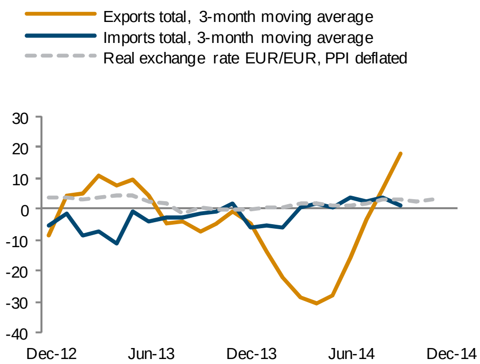

**Inflation and unemployment**
in %



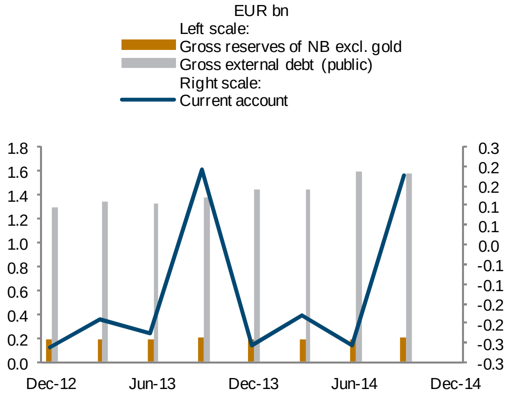

**Fiscal and monetary policy**




**External sector development**
annual growth rate in %




**External finance**
EUR bn

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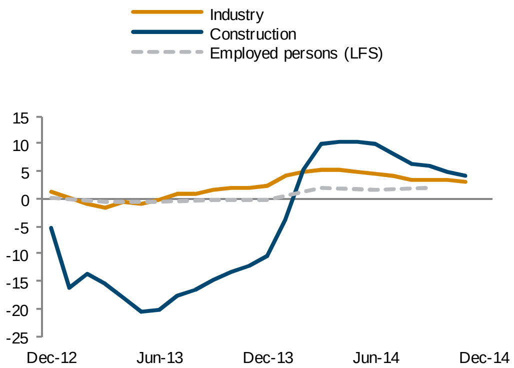
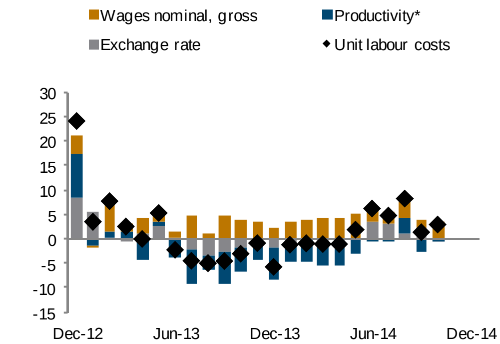
# Poland

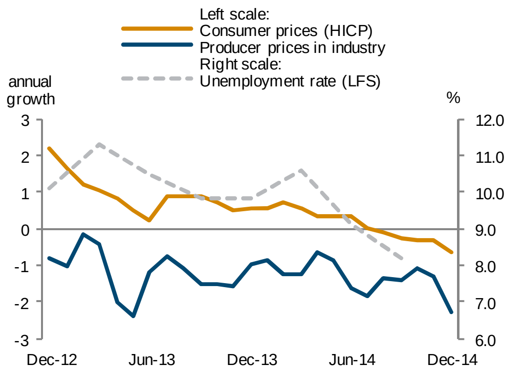
### Real sector development
cumulated annual growth rate in %



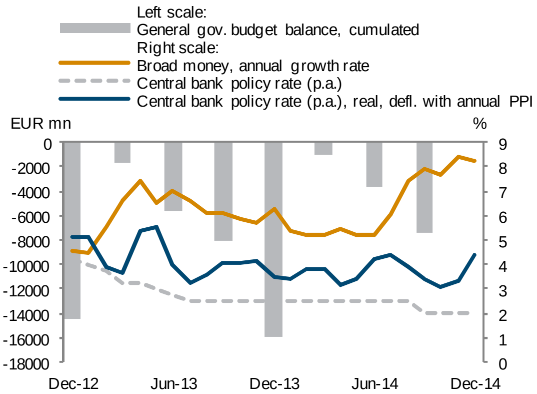

### Unit labour costs in industry
annual growth rate in %



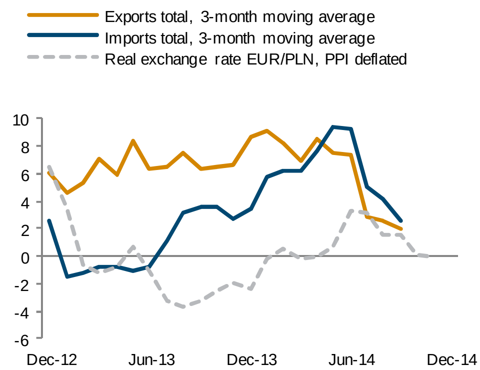

### Inflation and unemployment
in %



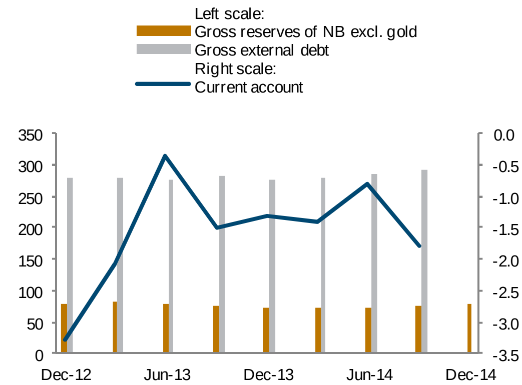

### Fiscal and monetary policy




### External sector development
annual growth rate in %




### External finance




*Positive values of the productivity component on the graph reflect decline in productivity and vice versa.

Source: wiiw Monthly Database incorporating Eurostat and national statistics.
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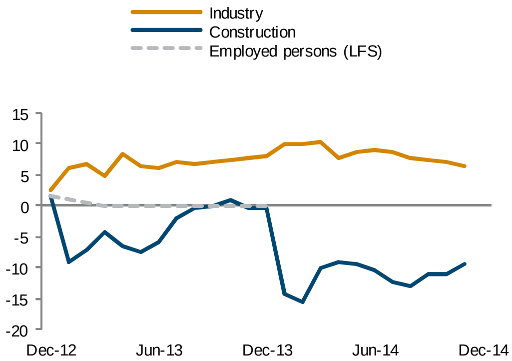
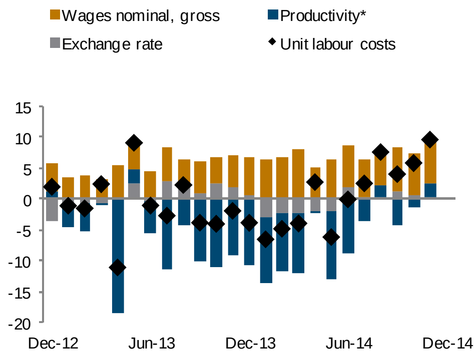
# Romania

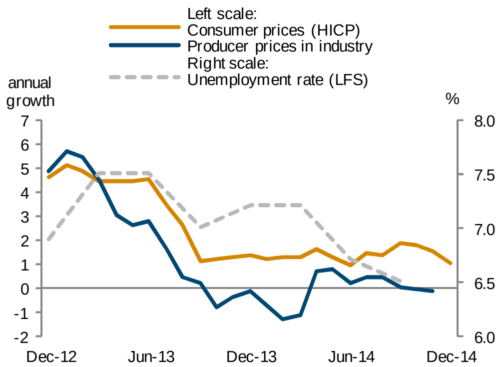
**Real sector development**
cumulated annual growth rate in %



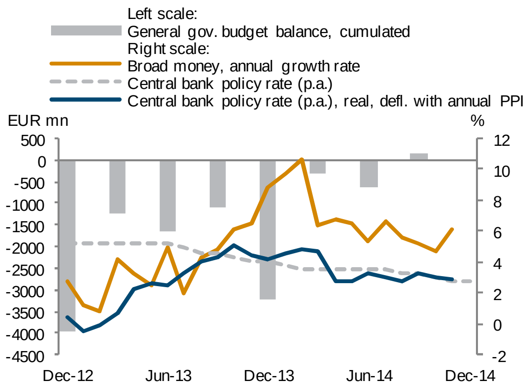

**Unit labour costs in industry**
annual growth rate in %



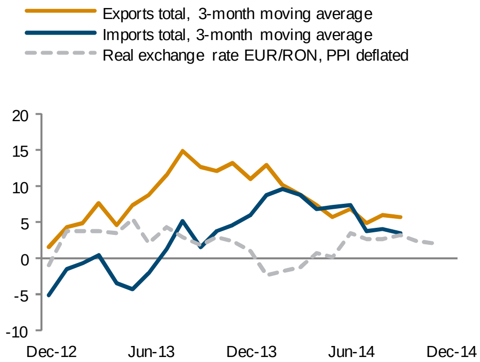

**Inflation and unemployment**
in %



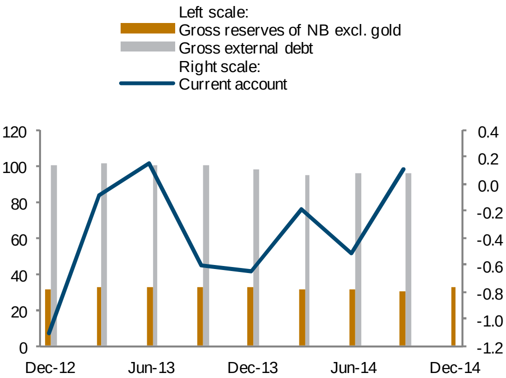

**Fiscal and monetary policy**




**External sector development**
annual growth rate in %




**External finance**
EUR bn

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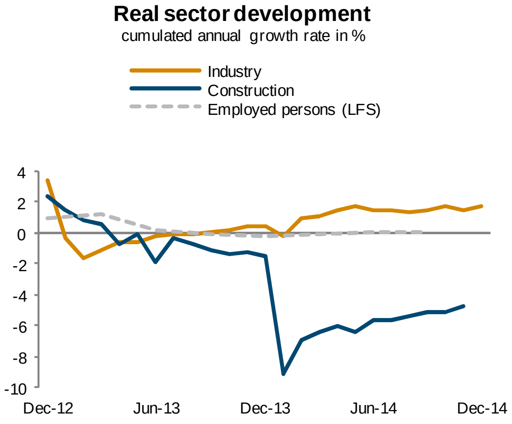
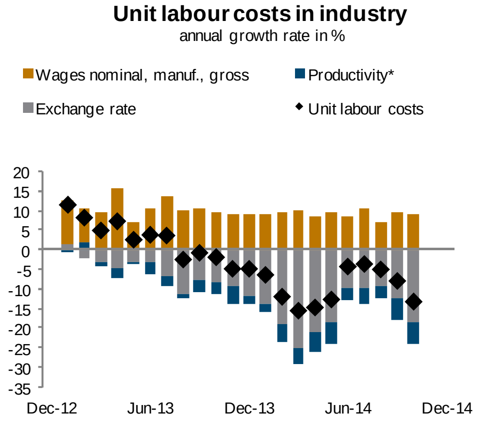
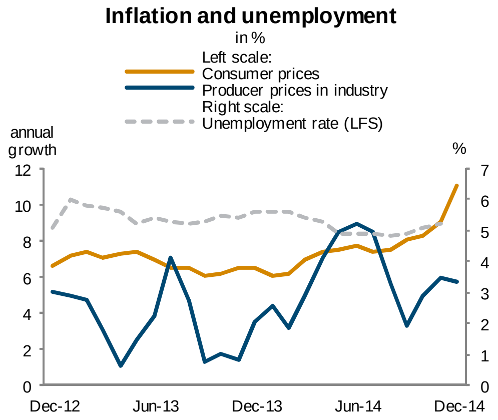
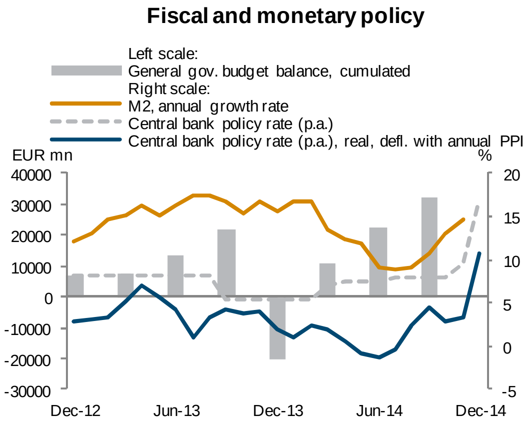
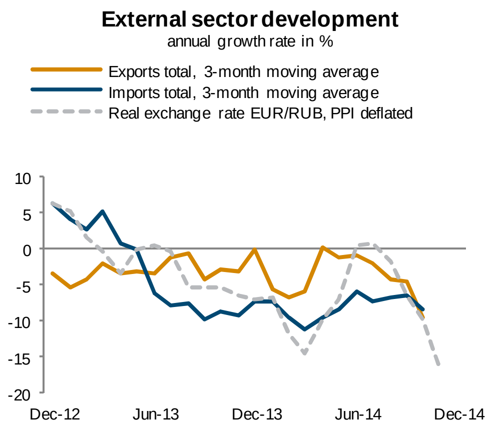
# Russia

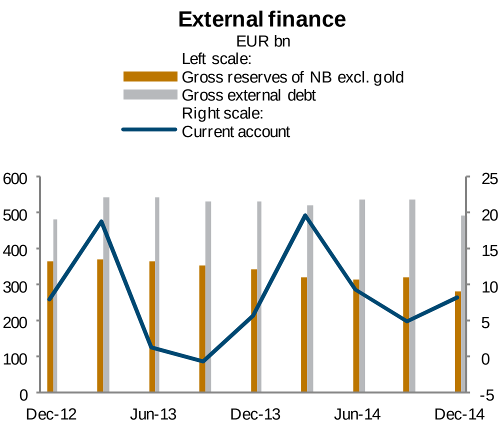
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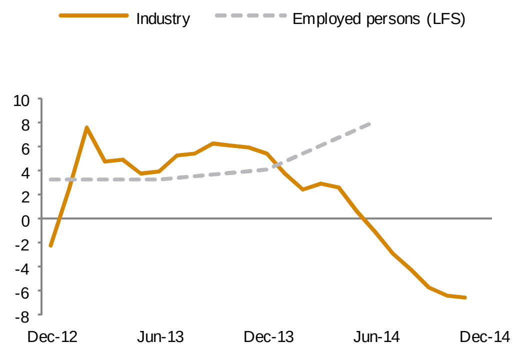
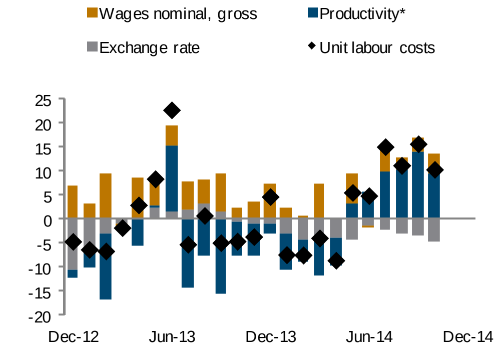
# Serbia

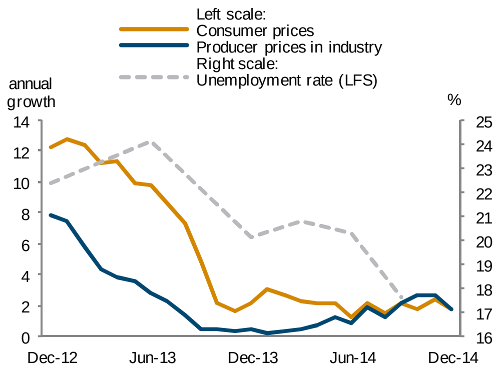
**Real sector development**
cumulated annual growth rate in %



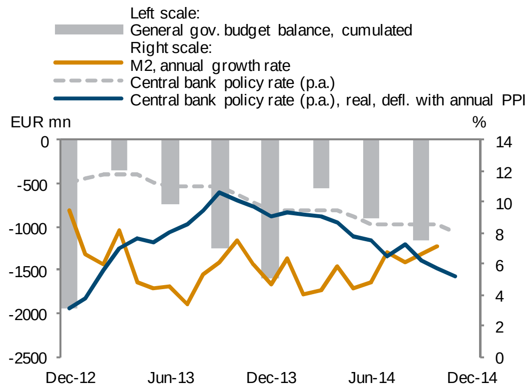

**Unit labour costs in industry**
annual growth rate in %



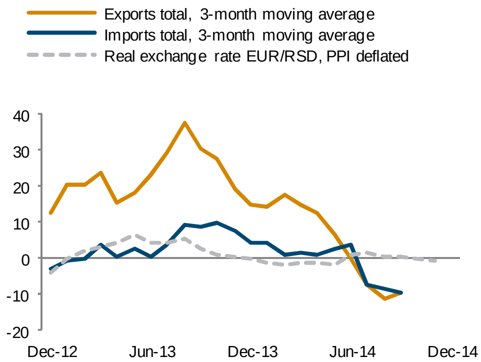

**Inflation and unemployment**
in %



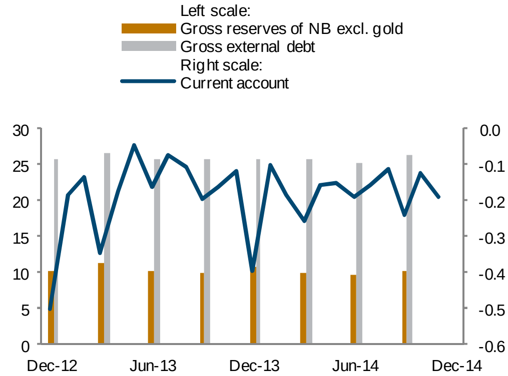

**Fiscal and monetary policy**




**External sector development**
annual growth rate in %




**External finance**
EUR bn

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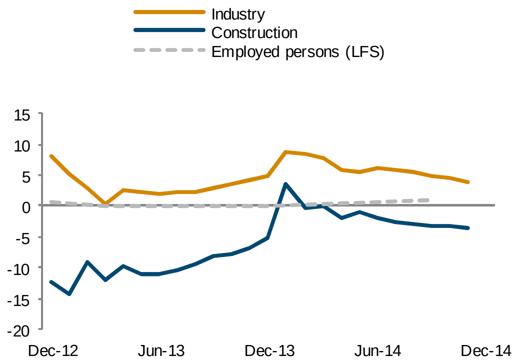
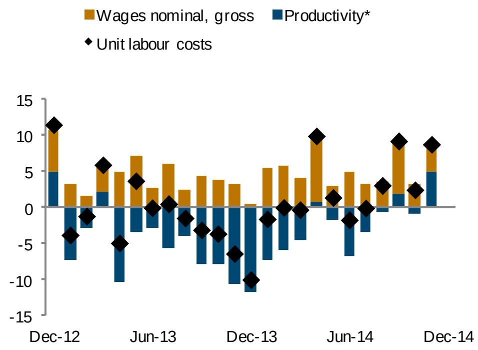
# Slovakia

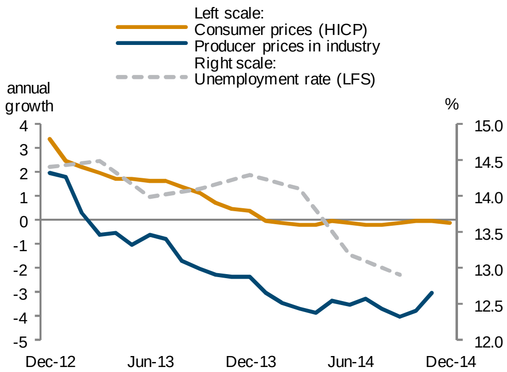
### Real sector development
cumulated annual growth rate in %



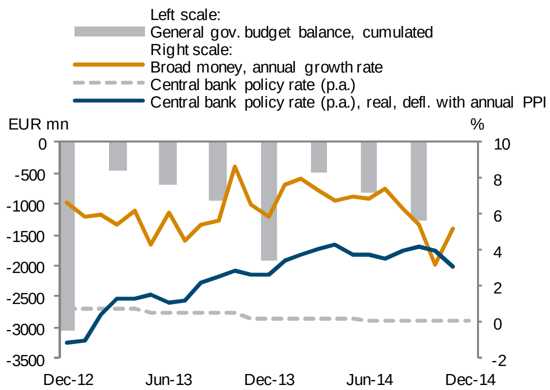

### Unit labour costs in industry
annual growth rate in %



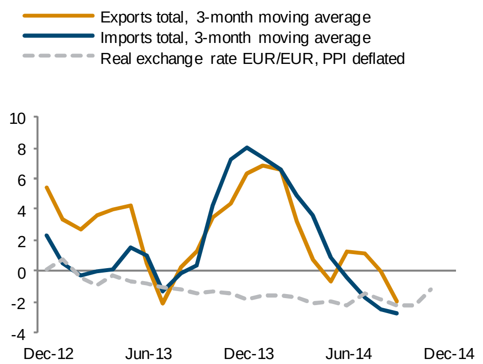

### Inflation and unemployment
in %



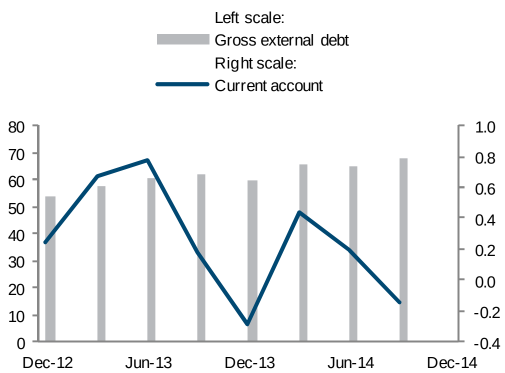

### Fiscal and monetary policy




### External sector development
annual growth rate in %




### External finance
EUR bn

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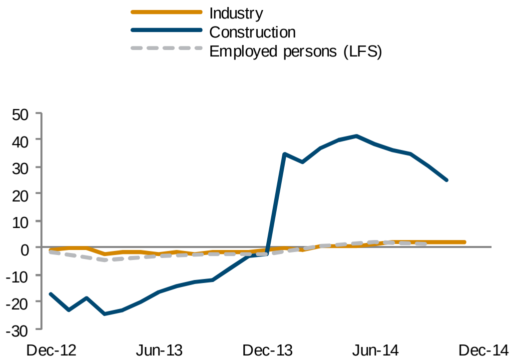
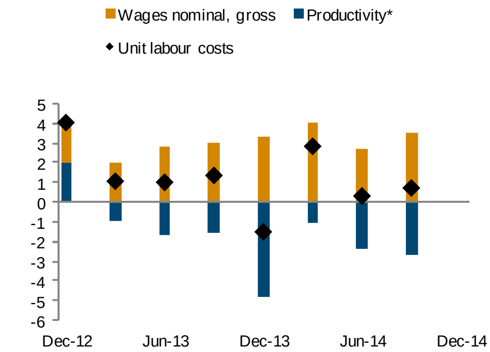
# Slovenia

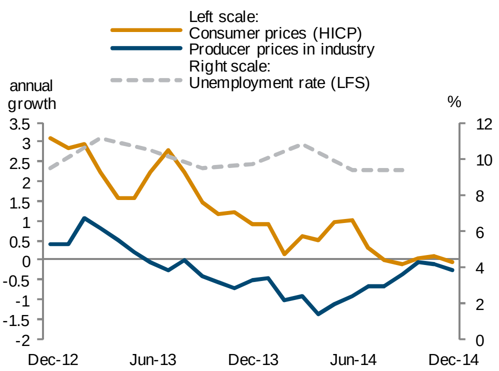
**Real sector development**
cumulated annual growth rate in %



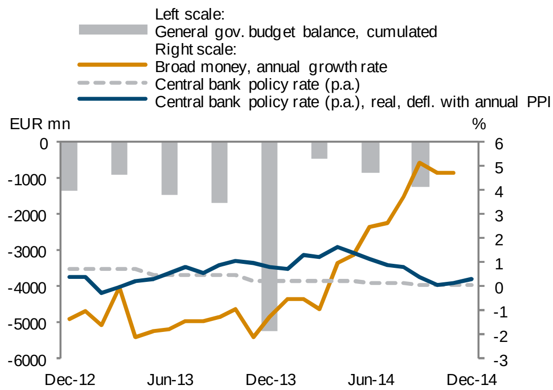

**Unit labour costs in industry**
annual growth rate in %



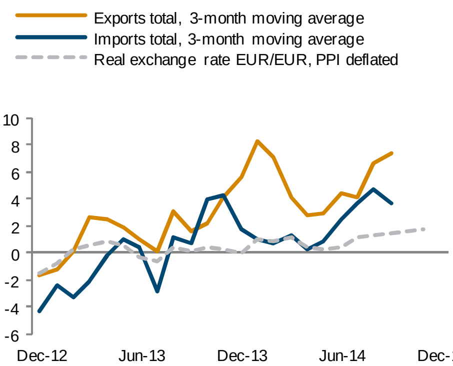

**Inflation and unemployment**
in %



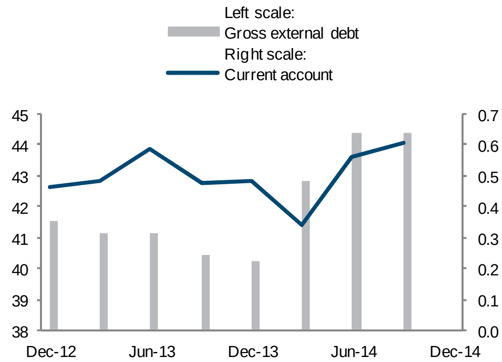

**Fiscal and monetary policy**




**External sector development**
annual growth rate in %




**External finance**
EUR bn

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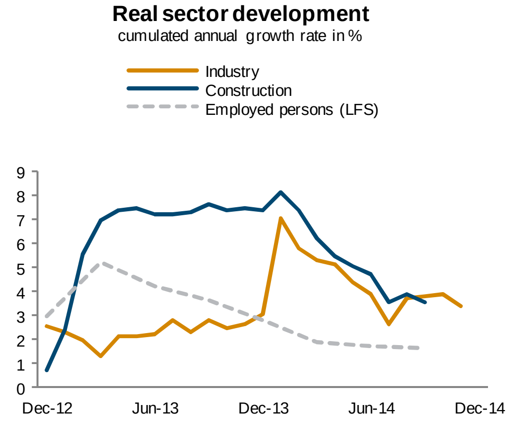
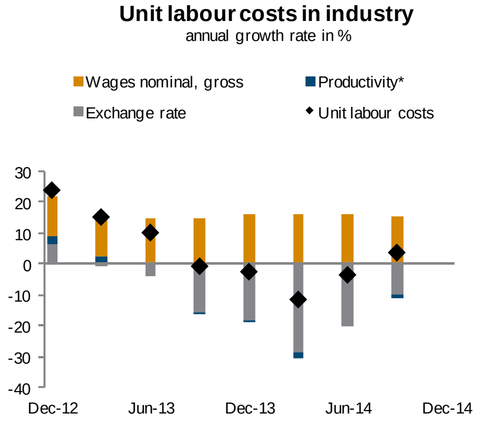
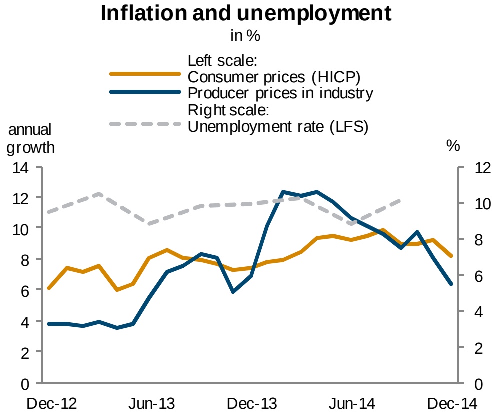
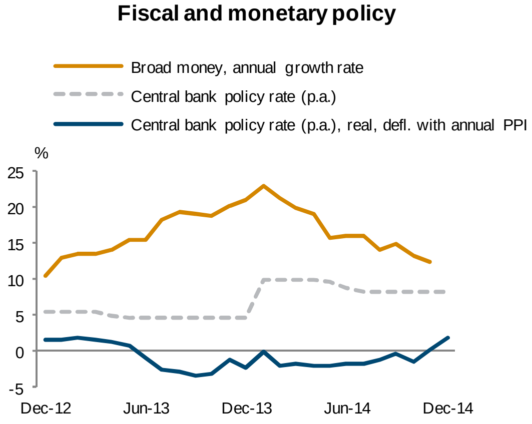
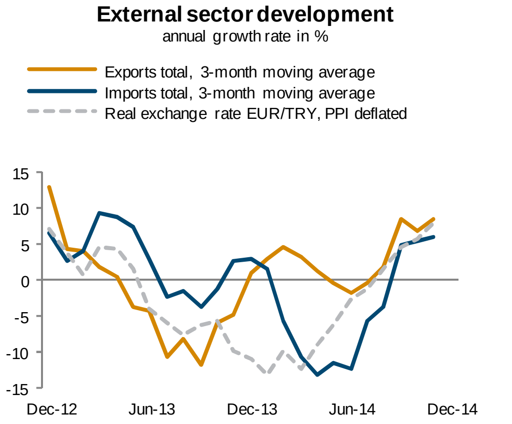
# Turkey

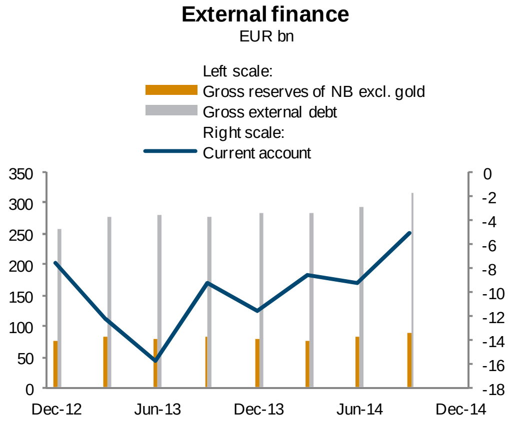
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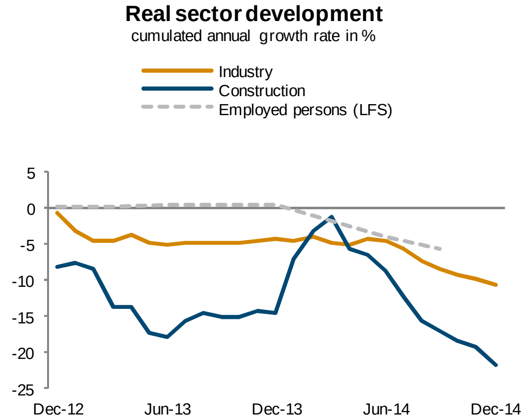
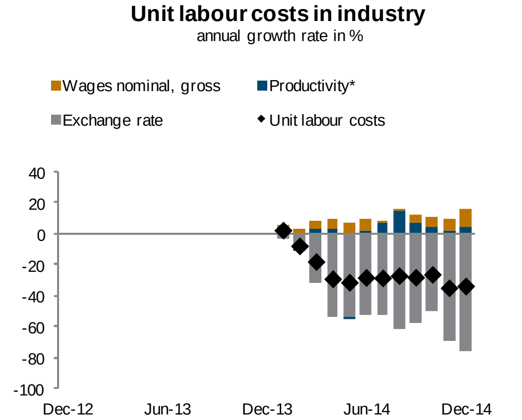
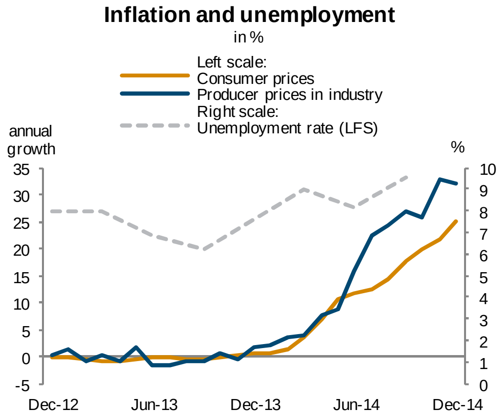
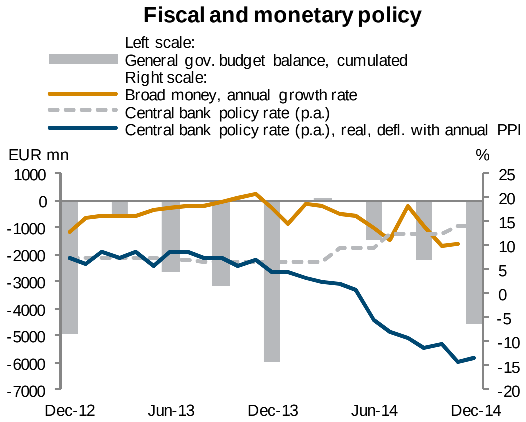
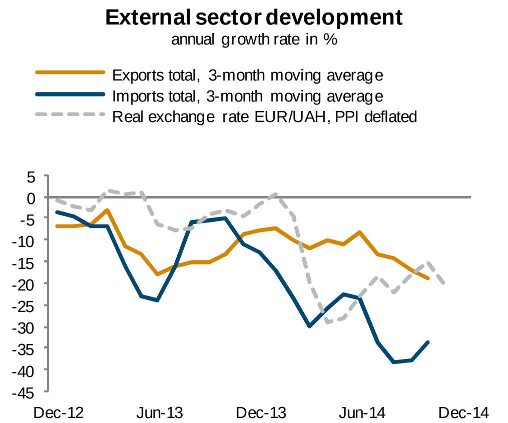
# Ukraine

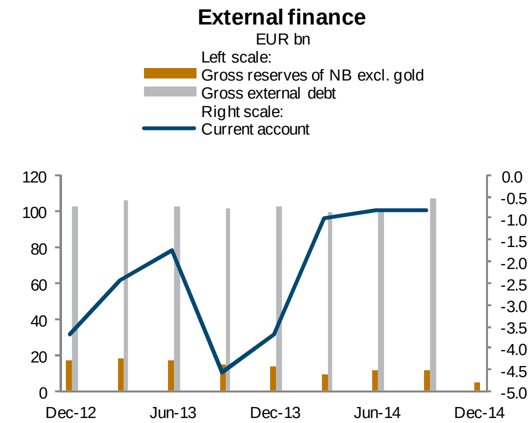
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