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# Monthly Report

## What Can Be Done to Help Workers in the Poorest Countries in Europe?

## The Impact of Global Robot Adoption on Employment Growth in CESEE

## Digitisation as a Future Growth Engine for CESEE


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

# What Can Be Done to Help Workers in the Poorest Countries in Europe?

# The Impact of Global Robot Adoption on Employment Growth in CESEE

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VASILY ASTROV
MAHDI GHODSI
MARIO HOLZNER
DAVID PICHLER
LEON PODKAMINER

# Announcement: New wiiw Handbook of Statistics

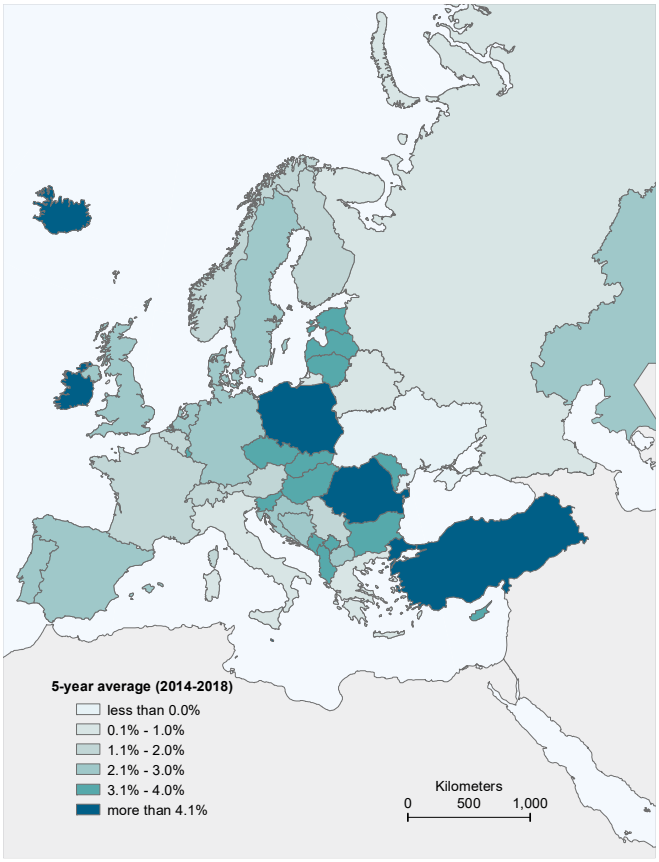
As a wiiw Member you will soon receive your free copy of the *wiiw Handbook of Statistics* (including a CD-ROM with PDF files of the book). In case you have opted for receiving just the PDF version without the hardcopy, we will send you an e-mail upon publication providing the link for downloading the PDF. Thank you for helping us to contribute to climate-friendly policies at wiiw!

The **electronic version** of the book offers **MS-Excel tables** (on USB drive or to be downloaded online) **with longer time series**, from 1990 onwards, permitting a wide range of own analyses according to your needs. (A PDF file with the content of the hardcopy is included.) For subscribers to the Premium Membership, the electronic version is included in their package.

You may place your order via the internet, https://wiiw.ac.at/wiiw-handbook-of-statistics-ps-12.html, where you will find a detailed description of the Handbook of Statistics, illustrated by sample tables.

Sample figure from the *wiiw Handbook of Statistics 2019*:

**Gross domestic product, real growth in %**



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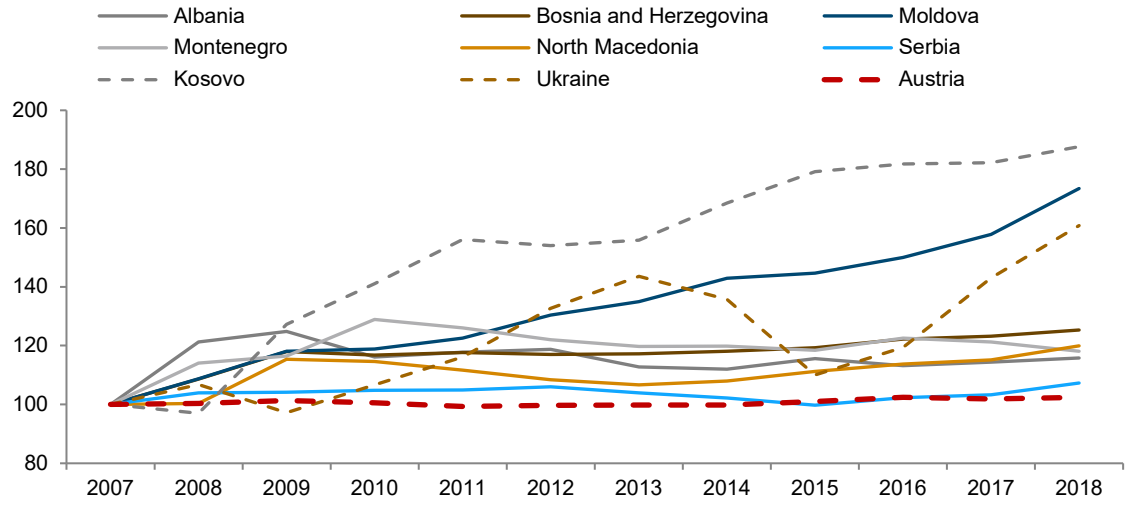
# Chart of the month: No convergence despite higher growth

BY VASILY ASTROV AND LEON PODKAMINER

It seems like a paradox. Gross wages adjusted for consumer prices in the Western Balkan countries: Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia and Serbia, as well as Moldova and Ukraine have risen much more strongly during the last decade than in Austria, where they picked up by a mere 2% (Figure 1). And yet, measured in terms of purchasing power in euros, there was little convergence with Austrian wage levels. One exception is Kosovo where there has been a significant catching-up to around 40% of the Austrian level which means that the wage level in Kosovo is now roughly in line with the regional average. In Montenegro and Serbia, wages in euros adjusted for purchasing power have even fallen compared to Austria over the past ten years (Figure 2).

**Figure 1 / Real gross monthly wages, 2007=100**

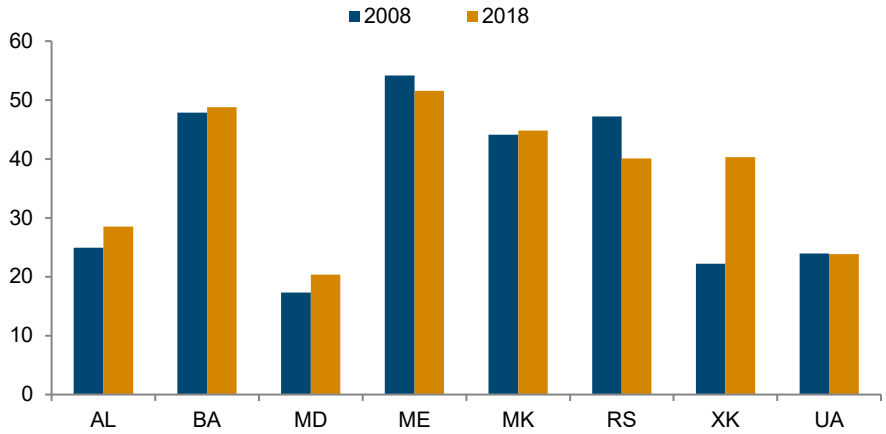



Note: deflated with CPI; for Kosovo only net public sector wages until 2011.
Source: Own calculations based on wiiw Annual Database.

This paradox has a statistical explanation.[1] One should not be surprised by the discrepancies between the differentials in domestic growth rates and the relative PPP positions of countries at very different income levels. Such discrepancies are likely to appear because countries at different income levels are also different *structurally*, i.e. with respect to the domestic price and quantity structures. Using price deflators whose structure is vastly different may lead to paradoxical conclusions when cross-country comparisons are made.

[1] For detailed explanation, see Astrov V. et al., „Die Lohnentwicklung in den Westbalkanländern, Moldau und der Ukraine“, Research Report in German language, Nr 15, September 2019, pp 7-10.

**Figure 2 / Average gross monthly wage at purchasing power parities (PPP), Austria=100**




Note: For Kosovo in 2008 only net wages in the public sector.
Source: Own calculations based on wiiw Annual Database and Statistics Austria.

For instance, Austria and the countries in question differ radically with respect to the share of food in consumer expenditure: in Moldova and Ukraine around half of income is spent on food - much more than in Austria. This is not only due to the differences in consumer preferences (many households in Moldova and Ukraine simply cannot afford spending on more luxurious items, such as travel), but also to the fact that food – or tradable goods in general for that matter – is also relatively more expensive in poor countries in comparison with services. Therefore, food items enter the calculation of CPI in the former two countries with a much larger weight than in Austria, and the price deflator underlying cross-country PPP comparisons (which is effectively in-between the two CPIs).

The above example demonstrates that above-average growth in poorer countries is by no means a sufficient guarantee of catching-up. This puts in question the wisdom of ‘mechanical’ projections of convergence based entirely on growth differentials which are customary in transition and development economics.

# Opinion Corner*: What can be done to help workers in the poorest countries in Europe?[1]

BY VASILY ASTROV AND MARIO HOLZNER

*The situation for workers in the Western Balkans, Moldova and Ukraine remains difficult. Unless domestic conditions improve, the region will continue to record strong outward migration in the foreseeable future. A turnaround of this situation will require a credible EU accession anchor for the Western Balkans, better EU-Russia relations (important for Moldova and Ukraine), and more socially-oriented policies in the countries in question.*

## HIGH UNEMPLOYMENT AND THE DWINDLING BARGAINING POWER OF WORKERS

Most recently, the countries of the Western Balkans, as well as Moldova and Ukraine, have drawn attention primarily through their political problems and the sluggish process of European integration. It is not surprising that the general economic situation – and particularly that of workers – in these countries is not ideal either. Although the unemployment rate has recently fallen noticeably on the back of economic recovery, it is still in the double-digits in the Western Balkan countries.[2]

Accordingly, the bargaining power of workers has improved only slightly. A recent wiiw study[3] showed that the decline in unemployment in these countries has not led, on average, to higher wage settlements, but the opposite has been the case: wage increases (partly as a result of steep hikes in the minimum wage) have tended to reduce unemployment through positive demand-side effects. The gradual decentralisation of wage-setting mechanisms has also slowed wage growth. The collective bargaining mechanisms in the countries of the region are generally less developed than in Western Europe. In addition, their scope is limited by the low share of formal employees in total employment, which is a reflection not only of the structure of their economies (high reliance on agriculture) but also of the high incidence of the shadow economy.

## THE MASS MIGRATION OF YOUNG PEOPLE TO THE WEST WILL CONTINUE

The populations have been declining for years in most countries of the region. This is due to both natural population decline and high outward migration driven by high unemployment and large wage differentials, especially in comparison with Western Europe. Emigration is dominated above all by young people and those with above-average education. In relative terms, Bosnia and Herzegovina and Albania have the highest shares of emigrants in the total population (40-50%), while Ukraine is the leader in absolute terms with around six million Ukrainians currently working abroad.

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* Disclaimer: The views expressed in the Opinion Corner section of the Monthly Report are exclusively those of the authors and do not necessarily represent the official view of wiiw.

1 An earlier version of this text (in German) was published in the blog of the Vienna Chamber of Labour.

2 See https://wiiw.ac.at/western-balkans-labor-market-trends-2019-n-368.html.

3 See Astrov et al. (2019).

This trend is expected to continue in the future. The current forecasts of the United Nations foresee shrinkage especially of the working-age population of these countries by between 15% and 35% by the middle of the 21st century. In the short term, this leads to an easing of tensions in the labour markets and high inflows of remittances. However, it can become a serious problem for Europe's poorest countries in the long term including in terms of social stability. At best, the shrinking of the working-age population will lead to higher wages and thus to incentives for more automation and investment in labour-saving technologies. At worst, an important part of human capital of these countries will be lost, which will affect their prospects for growth and convergence with Western European levels, including in terms of wages.

## EU ACCESSION ANCHOR IS CRUCIAL FOR THE WESTERN BALKANS…

For Europe's poorest countries, suffering from chronic capital and technology shortages, foreign direct investment is the only hope of being integrated into international value chains.

In the case of Western Balkan countries, the credible prospect of EU accession is crucial in this respect. It offers an anchor for foreign direct investment and the development of competitive export capacities – the long-standing weakness of many Western Balkan countries. The EU accession of the most advanced West Balkan countries, namely Serbia and Montenegro, is now officially planned for 2025.[4] However, compliance with this deadline appears utterly unrealistic in view of the many (including political) problems. There have recently been a number of positive developments in the region such as the final resolution of the question of the name of the country in North Macedonia or the ratification of the border agreement with Montenegro by the Kosovo Parliament. However, the lack of progress in Serbia's recognition of Kosovo as an independent state, the newly erected trade barriers between the two countries and the likely further setback in bilateral relations following the recent victory of hardliners in Kosovo parliamentary elections remain the main obstacles to their accession to the EU.

The decision to open EU accession negotiations with North Macedonia and Albania has been postponed again – despite the recommendation of the EU Commission.[5] Above all, France's sceptical attitude has been the decisive factor for this (although with respect to Albania, France's position has been shared by a number of other countries, such as the Netherlands and Denmark). We think this is a grave mistake which may weaken or even turn around the fragile reform momentum in the region. The EU governments are called upon, even if out of their own interests, to actively support the Western Balkan countries in their EU accession process, not least with higher investment subsidies.[6]

## … AS WELL AS BETTER EU-RUSSIA RELATIONS FOR MOLDOVA AND UKRAINE

The prospects of Ukraine and Moldova joining the EU are scarce. Both countries (along with Georgia) have concluded a Deep and Comprehensive Free Trade Agreement (DCFTA) with the EU which requires gradual alignment of standards and regulations with EU norms but offers no prospect of EU accession. In addition, the EU market for important export goods from these countries, primarily agricultural goods and foodstuffs, remains partly protected by tariff quotas.[7]

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4 See Grieveson et al. (2018).

5 See https://wiiw.ac.at/honouring-promises-n-385.html

6 See Grieveson and Holzner (2018).

7 See Adarov and Havlik (2017).

The political risks in this region should not be underestimated. On the one hand, the persistence of unresolved territorial conflicts (Transnistria in Moldova and Donbas in Ukraine[8]) represents a permanent security risk. However, the geopolitical and cultural divisions in both countries go far beyond the breakaway regions and have a broader regional dimension (with, for instance, Gagauzia in Moldova and large parts of eastern and south eastern Ukraine also having a relatively pro-Russian orientation). In combination with other political and institutional risks, such as high corruption and the uncertainty of property rights, these factors may continue to hamper the large-scale inflow of foreign direct investment into both countries.

Here, too, the governments of the EU Member States must be urged to work for political stabilisation in the region. The latter will require most notably better EU-Russia relations. This would reduce the geopolitical rivalry between the two regional superpowers for influence in the shared neighbourhood and deprive these countries of the painful dilemma with respect to their vector of integration. The rare example of EU-Russia collaboration in Moldova, where the new government is being supported by both Russia and the EU, could become a blueprint for other countries as well.

## SUPPORT SOCIAL PARTNERSHIP AND WELFARE STATE

Apart from the major international political issues, the European Commission, international organisations and EU Member States should aim at helping the societies in the Western Balkans, Moldova and Ukraine to strengthen their institutions. In particular, wages and employment must be increased in order to curb mass emigration from the region. This would require a turnaround in the development of social dialogue in these countries which has been undermined for decades. In addition, social safety nets should be upgraded in order to give the young people a longer-term perspective in their home countries.

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[8] See https://wiiw.ac.at/war-in-the-donbass-five-years-on-is-there-any-hope-of-a-durable-peace-n-394.html

# The impact of global robot adoption on employment growth in CESEE

BY MAHDI GHODSI

*The global economy is currently facing a new wave of technological change especially in (but not limited to) the realm of artificial intelligence and robotics. Taking into account higher robotisation in a given sector, higher robotisation in domestic and international suppliers of a given sector and higher robotisation in domestic and international customers of a given sector, we find a positive impact on employment growth in CESEE.*

## INTRODUCTION

There is a general view that robots steal jobs. The main idea behind this view stems from the fact that robots are considered to be part of the physical capital that can substitute human beings by performing their tasks via pre-defined and programmed algorithms. However, this view is challenged due to several reasons.

First, robots in most cases will require some human involvement to operate them. In this sense, they are similar to any other physical capital and machineries that have existed since the first industrial revolution (see Stöllinger, 2018). These machineries have never replaced labour completely as they have required some other new tasks that employ labour. Maintaining and controlling a machine that is producing cement blocks, t-shirts, tyres or various other types of goods requires at least one technician to be employed.

Second, industrial robots are also produced in the same way as other goods and this creates jobs. Industrial robots are categorised under many product classifications like the International Standard Industrial Classification (ISIC) or the Harmonized System (HS) under the group of machineries. Therefore, these products need to be designed, produced and programmed by highly-skilled labour and, after their sale, they need to be maintained and debugged by customer services when not functioning efficiently. For instance, a recent news article by Reuters reports[1] that robotisation and automatisation by Amazon will eventually lead to the sacking of thousands of its employees. However, these robots are produced by Italian manufacturers. Therefore, value added is generated by labour for producing those robots in another upstream sector. These issues essentially require more investigations into the role of robots in employment.

Third, robots have an impact on productivity and efficiency as do their spillovers through backward and forward linkages of production and value chains. Backward linkages are the linkages through which a

[1] 'Amazon rolls out machines that pack orders and replace jobs'; 13 May 2019, found at: https://www.reuters.com/article/us-amazon-com-automation-exclusive/exclusive-amazon-rolls-out-machines-that-pack-orders-and-replace-jobs-idUSKCN1SJ0X1

sector demands and uses intermediate inputs of production from its upstream sectors that are in previous stages of global value chains (GVC) or supply chains. In contrast, forward linkages are the linkages through which a sector supplies its product as an intermediate input of production to the downstream sectors that are in the next stage of GVC or supply chains. When robots are installed in sectors that provide intermediate inputs of production to a focal industry, the impact could come through the price and quality of the intermediate inputs provided by that automatised sector. Moreover, the industrial robots installed in the sectors that are buyers of products from a focal industry as their intermediate inputs could also affect that industry if the automatisation process of buyers could contribute to a lower or higher intensity of those inputs of production from that focal industry.

Multipurpose industrial robots are performing in much more complex procedures of production with wider diversity of functions than those simple-tasked machineries producing a few products like tiles. These robots are defined by the International Organization for Standardization as “automatically controlled, reprogrammable multipurpose manipulator programmable in three or more axes”. Therefore, multipurpose robots can operate in production procedures for a very long time without any labour used in that production procedure. While this might lead to job losses in the automatised factory, the aggregate impact in the sector might still need further scrutiny.

## METHODOLOGY AND DATA

This article analyses how growth in stocks of industrial multipurpose robots affects the growth of sectoral employment in 55 service and non-service sectors[2] across 13 Central, East and Southeast European (CESEE) countries based on the World Input-Output Database (WIOD) during the period 2000-2014. The results are borrowed from the econometrics model that is used in Ghodsi et al. (forthcoming). A distributed lag regression model proposed by Autor and Salomons (2018) is used covering all 43 WIOD countries[3]. Furthermore, growth in total factor productivity (TFP) at the sector level is additionally included in the model to control for technological advancements that are not due to robot adoption. The paper takes into account the stocks of robots in the focal industry, domestic and foreign suppliers to the focal industry and domestic and foreign customers of the focal industry. The sample of the estimation includes agriculture, mining, manufacturing and services. Although no industrial robots are installed in many services sectors, it is interesting to see how the robots in other (non-services) sectors could impact services via global value chains.

The econometric model draws on two major data sources. The first one is the 2016 version of the WIOD (Timmer et al., 2015) including data from accompanying Socio-Economic Accounts (SEA)[4]. The second is the stocks of industrial multipurpose robot database collected from the International Federation of Robotics (IFR, 2018)[5]. As the IFR provides data for more aggregated industries than the WIOD, the latter are adjusted to match the industry structure of the IFR database. For this, the WIOD-SEA data are in national currency units and they are converted into US dollars using the yearly-averaged exchange

[2] The industry structure is based on the NACE Rev. 2 industry classification and the SNA2008/ESA2010 methodology.

[3] CESEE WIOD countries are listed in Table 1. The remaining WIOD countries are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, South Korea, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, United Kingdom, United States, Brazil, China, India, Indonesia, Mexico, Cyprus, Malta, Switzerland, and Taiwan.

[4] Data available at: http://www.wiod.org/database/wiots16

[5] See: https://ifr.org/worldrobotics

rates obtained from the World Development Indicators (WDI) database of the World Bank and augmented by the Penn World Tables (Feenstra et al., 2015).

## ESTIMATION RESULTS

The results of estimations are presented in the paper by Ghodsi et al. (forthcoming) and they are briefly explained here. The main variable of interest is the sectoral growth in stocks of industrial robots. The econometrics results suggest that a 1 percentage point (pp) increase in robot stock in a given sector increases employment in this sector by about 0.011 pp.

Growth in stock of robots in upstream domestic sectors, upstream international sectors and downstream international sectors does not have any statistically significant impact on employment growth. However, growth in stock of robots in the domestic downstream sector contributes negatively to the growth of employment in the focal industry. The intuition behind this negative impact through domestic forward linkages could be twofold. First, it could be that because of automation, robots might produce some parts of intermediate inputs automatically, which may result in lower demand for products in an upstream focal sector leading to lower employment in that focal sector. Second, it could be that due to digitalisation, robots might now automatically undertake some tasks that were previously done in an upstream focal sector. Therefore, due to robot adoption, some tasks and employment in the upstream focal sector may shrink. As mentioned above, this mechanism is not evident for the robot adoption in downstream international sectors but rather only in downstream domestic sectors where substitutability of inputs and tasks is more likely due to the common technological benchmark within a country.

The combination of all the above-mentioned five effects (i.e. robots effects through direct own-industry channel, domestic backward, international backward, domestic forward and international forward channels) could tell us the aggregate impact of robot adoption globally on employment in a given country and sector. The interesting point is that this aggregate impact through all five channels is about 0.01 pp of employment growth for a 1% increase in the stocks of robots. Therefore, global robot adoption contributes positively and statistically significantly to employment growth. As mentioned above, the direct own-industry effect was 0.011 pp. The impact of robot adoption in all other sectors – domestically and internationally, upstream and downstream – makes the aggregate effect equal to 0.01 pp.

One of the other available channels through which this aggregate impact is transmitted is through backward linkages from upstream sectors. As was mentioned above, although robot adoption in upstream sectors does not affect employment growth in a focal industry directly, it still contributes positively to the aggregate effect. This channel could be interpreted in such a way that robot adoption in upstream sectors may result in products with better quality or lower price. Then, such products are used as intermediate inputs in a focal industry. Either higher quality or lower price of the intermediate inputs from the upstream sector could have positive spillovers to the focal industry such that it employs more labour *in the presence of all other channels*, even if their direct impact on employment growth in the focal industry may not be big enough.

**Table 1 / Impact of robot adoption on employment in selected CESEE countries, 2000-2014**

| Country | Actual average annual employment growth | Contribution to actual world average annual employment growth | Total effect of global robot adoption on country's annual average employment growth | Total effect of robot adoption in the country on global employment growth (contribution to world) |
|---|---|---|---|---|
| Bulgaria | 0.580% | 0.001 pp | 0.156 pp | 0.0003 pp |
| Croatia | -0.125% | 0.000 pp | 0.155 pp | 0.0001 pp |
| Czech Republic | 0.358% | 0.001 pp | 0.391 pp | 0.0009 pp |
| Estonia | 0.352% | 0.000 pp | 0.199 pp | 0.0001 pp |
| Hungary | -0.005% | 0.000 pp | 0.339 pp | 0.0006 pp |
| Latvia | -0.205% | 0.000 pp | 0.159 pp | 0.0001 pp |
| Lithuania | -0.433% | 0.000 pp | 0.154 pp | 0.0001 pp |
| Poland | 0.374% | 0.003 pp | 0.300 pp | 0.0021 pp |
| Romania | -1.397% | -0.006 pp | 0.183 pp | 0.0008 pp |
| Russian Federation | 0.006% | 0.000 pp | 0.227 pp | 0.0081 pp |
| Slovak Republic | 0.709% | 0.001 pp | 0.300 pp | 0.0003 pp |
| Slovenia | 0.267% | 0.000 pp | 0.285 pp | 0.0001 pp |
| Turkey | 2.513% | 0.028 pp | 0.224 pp | 0.0025 pp |
| | **Average 0.23%** | **Total 0.027 pp** | **Average 0.236 pp** | **Total 0.0161 pp** |

Source: Ghodsi et al. (forthcoming), own elaboration.

Table 1 summarises the effects of global robot adoption on employment growth through direct and indirect channels of global value chains (GVC) in selected CESEE countries. The first column on the left shows the actual average annual employment growth in each country during the period 2000-2014 using the WIOD data. Employment has been shrinking in some countries while it is only in Turkey that employment was strongly positive during the period of analysis. The second column shows the same but weighted by average annual share of the country's employment in global employment. Therefore, it is the direct contribution of the country to the global average annual employment growth.

The third column shows the predicted impact of robot adoption globally (through the aforementioned five channels) on the total employment growth in each country. As can be seen from the last row in the third column, robot adoption globally accounted for an average of 0.236 pp of employment growth in the CESEE countries. This is more than the actual annual average growth in employment (0.23% - see the last row of the first column) recorded during the period of observation. The reason is simply because robots total impact has been positive even for countries which have experienced a reduction in employment. For instance, if there was no positive impact of robots, the reduction in employment in Croatia would have been even stronger than 0.125%. Thus, robot adoption globally and in Croatia contributed positively to employment growth.

The fourth column shows how much robot adoption in CESEE countries contributed to the global employment growth. It is important to note that the average annual employment growth globally during 2000-2014 was about 1.7%, mostly driven by emerging economies. The share of CESEE countries analysed here in global employment is only about 6.8%. Thus, the contribution of the generated employment by these countries due to robot adoption was only 0.016 pp of the aggregate actual 1.7%, which is however not negligible.

## CONCLUSION

This article analysed the impact of robotisation in the global economy on employment growth in selected CESEE countries taking account of the indirect spillover effects of robotisation across GVCs compatible with the WIOD data. Thus, five channels of such impact were taken into consideration: growth in stocks of robots in own-industry, domestic upstream sectors, international upstream sectors, domestic downstream sectors and international downstream sectors.

The conclusions can be summarised as follows. First, growth in stocks of robots in a particular sector contributes positively to employment growth in the same sector. Second, a rise in the stock of robots in domestic users of a sector translates into negative employment growth for the sector that is supplying. Third, the combined impact of robot adoption through the five aforementioned channels on sectoral employment growth is positive. The positive impact of robot adoption globally on employment growth in the selected CESEE countries has been quite large, accounting for an average of 0.24 pp of employment growth per year between 2000 and 2014.

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# Digitisation as a future growth engine for CESEE

BY DAVID PICHLER

*The speed of economic convergence of CESEE with Western European countries has decelerated and even EU Member States in the region have failed to break through the middle-income ceiling. This article argues that digitisation provides a window of opportunities to diversify economies and enable them to become less dependent on international investors and knowledge transfer and to generate high-income jobs. Policies in education, infrastructure and business climate for fostering the digitisation process would not only boost convergence but may also partly alleviate the region's demographic challenges.*

In the post-WWII period Paul Samuelson, who won the Nobel Memorial Prize in Economic Sciences in 1970, predicted that the Soviet Union would eventually (probably before the turn of the millennium) topple the US as the leading global economy thanks to its persistently high economic growth rates. Its rapid convergence progress was driven by moving workers from less productive sectors (mostly agriculture) towards the more productive industry sector. The lack of both innovation and adoption of new technologies, with the exception of the military sector, however, contributed to the Soviet Union's growth deceleration.

Most economies in Central, East and Southeast Europe (CESEE) are currently growing faster than Western European economies and are thus on a convergence path. History, as in the case of the Soviet Union, and research show however that it is very difficult for economies to maintain a sustainable catch-up process. Since the post-war period, only a few countries such as Italy, Japan and South Korea managed to join the high-income club after a sustained convergence path.

Digitisation has been hailed as an opportunity for economic laggards to accelerate convergence (e.g. Rodrik, 2018). Access to digital technologies in rural areas in developing countries, for example, has the ability to transform local societal and economic structures. The phone-based money transfer system m-pesa which mainly operates in Kenya and Tanzania is a good example where technology has delivered new opportunities. In this article, however, I refer to digitisation as a process where firms adopt and/or develop digital technologies either to provide IT-related goods and services or to integrate them into existing operations. Thus, digitisation has the potential to boost productivity and create high-income jobs which could set CESEE countries on a successful path towards achieving high-income economies.

This article argues that first, the CESEE countries catch-up process has slowed down and its current economic models are unlikely to lift them to high-income ranks, and second, it suggests that digitisation offers a window of opportunities to embark on a more innovative and sustainable path to achieve high-income growth and alleviate some of the region's demographic challenges.

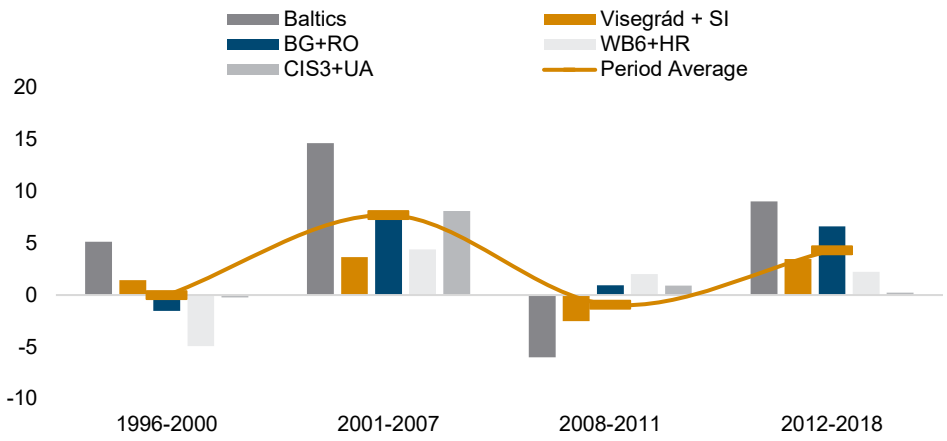
## DOES THE CESEE CONVERGENCE ENGINE RUN OUT OF STEAM?

Most countries faced periods of economic downturns during their transition towards market economies in the first years after the collapse of Yugoslavia and the Soviet Union. The repercussions were particularly severe in Ukraine and Russia whose GDP halved and decreased by more than a third respectively between 1990 and 1995. However, since 1995 all CESEE countries have experienced higher growth on average than Germany.

Figure 1 depicts the growth trajectories of the different country groups in CESEE compared to Germany. The graph shows the convergence pattern, that is higher growth rates than in Germany, for four different periods. Convergence was modest until 2000, accelerated in the period to the run-up of the financial crisis, stalled during the crisis and continued thereafter, although at a slower rate as compared to the pre-crisis period. While growth patterns across country groups vary, each of them faces lower convergence rates today than compared to pre-crisis periods.

**Figure 1 / CESEE countries grew faster than Germany, but pace is slowing down**

Average annual real GDP per capita growth differential between country group and Germany, in percentage points




Note: country group growth rates based on unweighted averages: Visegrád countries (Czech Republic, Hungary, Poland, Slovakia), WB6 = Western Balkan countries (Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, Serbia), CIS3 = Commonwealth of Independent States (Belarus, Moldova, Russian Federation).
Source: World Bank, wiiw calculations.

Between 2001 and 2007, most countries' average annual growth outpaced German rates by more than 5 percentage points. Strong pre-crisis growth can be attributed to a combination of several factors. For example, EU accession reforms and funds are likely to have had a positive impact on growth in EU-CEE countries. Furthermore, during this period most countries further opened their markets to foreign investors and international trade. The combination of mutually reinforcing factors such as substantial foreign direct investment (FDI) inflows, adoption of advanced technologies, participation in global value chains (GVC) and relatively low wages boosted the region's productivity and income growth. However, the small and open character of CESEE economies and their strong dependencies on the EU15 amplified the repercussions of the global financial crisis mostly due to the drop in demand for export

goods and turmoil in the financial sector. In addition, some CESEEs, especially the Baltics, were clearly 'overheating' in the run-up to the crisis.

Although EU transfers to EU-CEE countries remain sizeable and non-EU countries have benefitted from accession reforms and EU funds as well, convergence has decelerated compared with the pre-crisis years. The reasons for this slowdown are diverse and often region-specific and will be discussed in a forthcoming paper by Grieveson and Holzner in more detail. Growth in non-EU CESEE countries is still held back by inadequate infrastructure, the sluggish pace of economic reforms, demographic challenges and political conflicts in the Western Balkans, Moldova and Ukraine - see our reports by Holzner and Schwarzhappel (2018) on infrastructure and Leitner and Stehrer (2019) on the implications of labour supply shortages.

In a simple exercise,[1] I linearly project the average per capita income convergence rates of the last five years. Under these projections, the Visegrád states, Slovenia and the Baltics will only reach 70% of the German income level in 2050. Individuals in the Western Balkans will earn less than one third of the German level on average by then, and income in the CIS and Ukraine fails to converge at all towards German standards. Thus, the concerns that the region will fail to leap over the 'middle-income trap' should attract policy makers' attention.

In a recent paper, Stöllinger (2019) argues that one important reason why most CESEE countries fail to break through the middle-income ceiling is because they are stuck in a 'functional trap'. The functional trap describes a situation where firms engage in low value-added *functions* in GVC, usually in the production process. Large transnational companies who have offshored their production to CESEE mainly seek cheap and medium-skilled labour. They are more reluctant, however, to move functions that usually generate higher value added such as R&D or marketing away from their headquarters. Still, with generally low R&D activity in CESEE, foreign-owned firms are responsible for the lion's share of domestic R&D expenditure.[2] Due to the crucial role of foreign-owned firms, some CESEE economies are referred to as *dependent market economies* (Nölke and Vliegenthart, 2009).

## A SUSTAINABLE CONVERGENCE PATH: POSSIBLE STRATEGIES

In economic history, only a few countries which were initially considered as developing managed to join the ranks of high-income countries. While it is impossible to identify a single most important factor that facilitated such a process, 'state assisted capitalism' has been an important ingredient for the Japanese and South Korean economic miracles. This is because countries which aimed at developing a strong industry after WWI had to compete with more advanced economies in sectors that were technology and capital intensive (Thun, 2004). Therefore, Japan and South Korea, for example, put in place credit and export subsidies, market entry barriers and import tariffs for local and global competition respectively in order to actively 'incubate' a national industry. Thanks to these measures and other crucial factors, such as a relatively well-educated workforce, companies manged to adopt new technologies often through the reverse engineering of imported goods. These policies facilitated the emergence of 'national champions' such as Samsung and Mitsubishi. China's industrial policies, centrally planned and financed, were

1 Projections are based on real per capita income (constant USD) data from the World Bank.

2 For example, R&D expenditure by foreign-owned firms as share of total domestic R&D expenditure is 79% in Croatia, 75% in Slovakia, 66% in Hungary, and 45% in Poland (Source: Eurostat [egi_rd1]).

greatly inspired by Japan and South Korea in creating national and eventually global champions (Beck, 1998; Thun, 2004; Chung, 2010).

Although Japan and South Korea were actively pursuing protectionist trade policies, they were accepted as members of the General Agreement on Tariffs and Trade (GATT) without major concessions for trade liberalisation. Accession to the GATT, however, was much less rigorous as compared to its successor the World Trade Organization (WTO) which follows a more legalistic approach and has much more bite thanks to its dispute settlement procedures (Davis and Wilf, 2017; Jones, 2008). Therefore, China had to implement critical market and trade liberalisation reforms before it was accepted as a member into the WTO in 2001.

Countries which are part of multinational organisations such as the WTO are constrained in their ability to conduct active industrial policies similar to South Korea, Japan and China. Furthermore, while the European Union conducts active innovation policies, its horizontal pro-competition policies limit governments' tool kits (Stöllinger et al, 2013). Thus, the question arises, which tools are left for policy makers for fostering sustainable economic growth and income convergence in CESEE?

As highlighted by Stöllinger (2019), many firms in the CESEE countries mainly engage in the production part of GVC which generally generates less value added than pre-production functions such as R&D or post-production functions such as marketing. Thus, one potential strategy could be to support pre- and post-production activities. Furthermore, increasing the complexity of products and production processes is also considered as supporting income growth and generating positive spill-over effects thanks to the use of more advanced technology and the demand for higher skill requirements (OECD, 2019).

Another potential strategy, and not mutually exclusive, is to promote digitisation. Digitisation in this context refers to a process where firms adopt and/or develop digital technologies either to provide IT-related goods and services or to integrate them into existing operations. Thus, it is not only about setting up a large IT service industry but also about using digital technologies in order to improve, automate and/or alter the current set of tasks conducted by workers towards more productive activities. The potential for this strategy in CESEE is discussed subsequently.

## DIGITISATION AS A WINDOW OF OPPORTUNITY

ICT technology, similar to electricity, is a multi-purpose technology and its large-scale introduction into business processes is not a niche strategy that can only be implemented in a specific set of economies. It allows firms to automate and improve the efficiency of specific tasks and thus offers a large potential for productivity gains – vital for any modern economy.

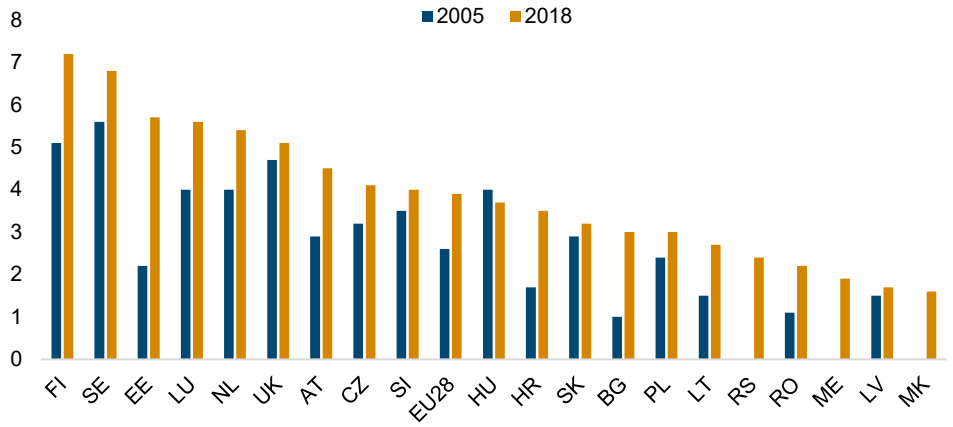
Similar to the introduction of electricity, governments are responsible for providing the basic infrastructure to facilitate the adoption of ICT technology. Jobs emerging due to digital technologies, in contrast to electricity, require an advanced skill set which can only be inefficiently provided through on-the-job training; rather its development needs to be anchored within the country's education system. Thus, there is a central role for policy makers to act.

Having argued that the adoption of ICT technology is crucial for any economy and that policy makers need to play an active role in facilitating this process, I now turn to the arguments as to why governments in CESEE should take swift actions to provide an environment that is conducive to the adoption of ICT technology in order to achieve sustainable economic convergence.

The adoption and development of digital technologies is not unchartered water for many parts of the CESEE region. Estonia, for example, is often praised as a role model in e-government, skills development and infrastructure. Estonia, however, is an exceptional case. So far, no other country in the region has implemented similar successful nationwide policies.

Although nationwide policies in the region are still largely absent, digital hubs have been established in several cities. For example, Bucharest, Vilnius and Riga have been ranked as the top three European cities for start-ups in the digital infrastructure category,[3] dwarfing major innovation hubs such as London and Amsterdam. With respect to the available skill level, EDCI ranks 7 CESEE cities among the top 26 European cities.[4] Two Ukrainian cities, Kiev and Lviv, are excluded from EDCI ranking, but have recently turned into attractive destinations for digital services outsourcing, translating into annual growth rates of Ukraine's IT services industry of around 16 per cent.[5] The available digital infrastructure and skills have certainly supported the region's reputation as a destination for IT outsourcing and offshoring with Poland, Hungary, Bulgaria and Ukraine regarded as top destinations for providing IT services. The region's reputation has partly emerged due to its qualified work force. Figure 2 highlights that Estonia, Bulgaria and Croatia witnessed particularly strong growths in employed ICT specialists between 2005 and 2018.

**Figure 2 / Employed ICT specialists, % of workforce**




Source: Eurostat [isoc_sks_itspt].

Thus, the first argument as to why CESEE is a fertile ground for digitisation is its record of emerging internationally successful firms, although spatially clustered, thanks to good infrastructure, skills and regulation policies combined with labour cost advantages.

3 European Digital City Index (EDCI), 2016.

4 Bratislava (5), Bucharest (8), Sofia (18), Ljubljana (21), Tallinn (24), Riga (25), Budapest (26).

5 https://www.ft.com/content/1a7e7ae4-91b4-11e8-9609-3d3b945e78cf

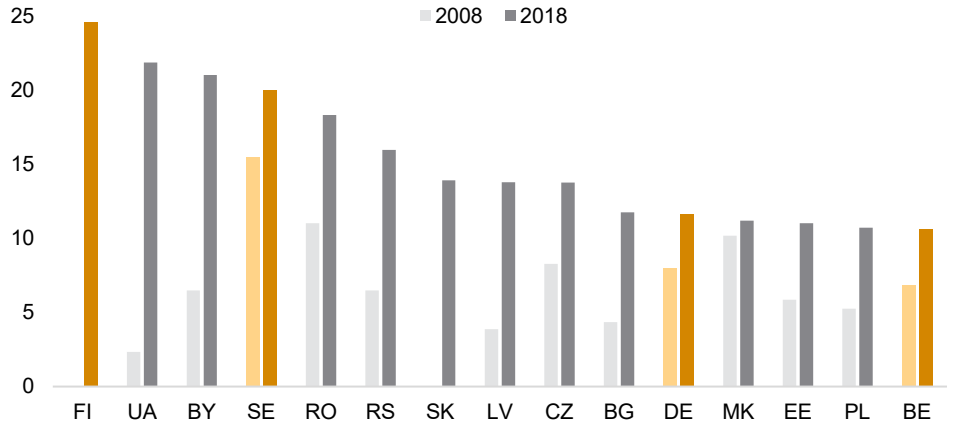
The second argument is related to the region's demographic challenges. The region currently faces dynamics that are rather unprecedented. Large emigration flows are paralleled by low fertility and mortality rates. Consequently, the countries will face substantial declines in working-age populations. In particular in Bosnia and Herzegovina, Serbia, Bulgaria and Romania the working-age populations are expected to decrease by around 30% between 2015 and 2050.[6]

The consequence of emigration is, and has been, brain drain, that is skilled workers seeking better opportunities in high-income countries which decreases human capital and consequently impedes economic growth potential. Furthermore, the demographic decline entails labour shortages and wage increases. While income hikes stimulate domestic consumption, they can deteriorate the region's cost advantage if higher wages are not offset by productivity growth or improved quality of goods and services. Digitisation could limit emigration through the creation of domestic high-skill and high-income jobs and would contribute to productivity growth and hence maintain competitiveness amid rising wages.

Third, digitisation can help to foster innovation in the region. Historically, most parts of the region have been (late) adopters of technology. Holzner, Heimberger and Kochnev (2018), for example, highlight that the railway technology arrived with a significant lag in CESEE, in particular in the Western Balkan countries. Although FDIs have fuelled large knowledge transfers since the 1990s, the creation of innovation capacities essential for sustained economic growth remains subdued.

Economic literature has identified that skilled labour, in addition to other factors such as access to finance, intellectual property rights, etc., is one of the most important ingredients in the innovation process. Thus, a labour force with strong ICT skills would initially help to adopt new technologies and consequently also facilitate innovation processes supportive for economic convergence. A shift away from currently mostly low- and medium-skilled workers engaged in export industries towards more high-skill jobs would create better incentives to achieve higher education and thus have a further positive impact on the region's economy.

**Figure 3 / ICT service exports of selected European countries, % of total service exports**




Note: 15 European countries with highest shares are shown.
Source: UNCTAD.

[6] Based on UN World Population Prospects 2019, medium fertility scenario.

Last but not least, digitisation can particularly benefit CESEE due to the regions' openness and its existing network in GVCs. While digitisation is also crucial in the industrial sector, its applications are likely to have even more potential in the service sector. Figure 3 shows that among the European countries where exports of ICT services play the most important role, 11 out of 15 countries are located in CESEE. Comparing the shares of ICT service exports in 2008 and 2018 indicates that the region's growth in ICT exports is a rather recent trend. As services become even more tradable,[7] productivity gains in the service sector can generate employment growth if it is not bounded by the domestic market (Rodrik, 2018).

## WHAT ROLE FOR POLICY MAKERS?

The historical record of countries which managed to join the high-income club is often associated with strong public intervention, mostly in capital intensive industries. Multilateral agreements such as the WTO and EU competition policies, however, have constrained the instruments governments have at hand to support domestic economies. In the context of digitisation, and in particular in the service sector where the start-up and scale-up of companies is less capital intensive, policy makers can still choose from a myriad of policy options. In particular, policies related to human capital, infrastructure and the business climate remain in domestic hands with little potential of violating international rules.

First, services based on digital technologies demand high-skill workers. This is in contrast with the region's current export-orientated sectors which mainly generated employment for a large number of low- and medium-skill workers. Basic IT-skills need to be at the centre of every education path such that the benefits of digitisation are not distributed among a small well-educated group but can be reaped by a large part of the population.

Second, ICT technology is a multi-purpose technology and, similar to electricity, governments have a crucial role in providing access for individuals and firms. This includes nationwide access to internet and IT infrastructure in education institutions. In order to promote start-ups, governments can provide infrastructure such as fast internet, office spaces and fab labs that provide facilities for experiments and prototyping.

Third, policy makers need to promote a business and investment-friendly environment to support start-ups and scale-ups and capitalists who invest in new ideas. Thus, rules to set up a company should not restrict entrepreneurial spirit. Furthermore, governments could set up institutions that help firms to navigate through administrative challenges and to connect with national and international investors and researchers.

[7] Share of EU service imports increased from 23% in 2010 to 27% in 2018; service trade between 10 Western European countries and CESEE has doubled since 2007 (Eurostat, 2019).

## CONCLUSION

The deceleration of the economic convergence of CESEE with most of its Western peers calls for new growth strategies. Currently, foreign investors crucially determine the economies' role in global value chains and account for large parts of national R&D activities, creating dependency relationships. Digitisation of services and industry could provide a window of opportunities to generate high-income jobs independently of foreign investors and thus help to return to a sustainable convergence path. Furthermore, it could alleviate the region's demographic challenges. Therefore, policy makers need to focus on modern education systems and the provision of infrastructure for society and the business sector. Furthermore, business-friendly policies could facilitate start-ups that turn into scale-ups and go on to become successful international players.

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

The monthly and quarterly statistics cover **22 countries** of the CESEE region. The graphical form of presenting statistical data is intended to facilitate the **analysis of short-term macroeconomic developments**. The set of indicators captures trends in the real and monetary sectors of the economy, in the labour market, as well as in the financial and external sectors.

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: **https://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 |
| ER | exchange rate |
| GDP | Gross Domestic Product |
| HICP | Harmonized Index of Consumer Prices (for new EU Member States) |
| LFS | Labour Force Survey |
| NPISHs | Non-profit institutions serving households |
| p.a. | per annum |
| PPI | Producer Price Index |
| reg. | registered |

The following national currencies are used:

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

EUR euro – national currency for Montenegro, Kosovo 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.

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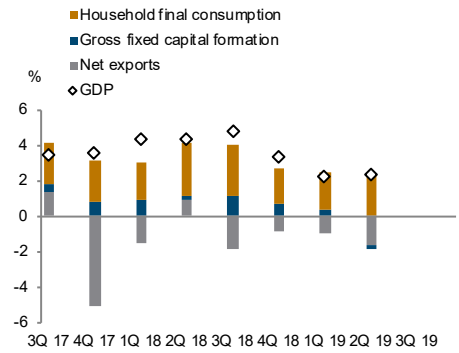
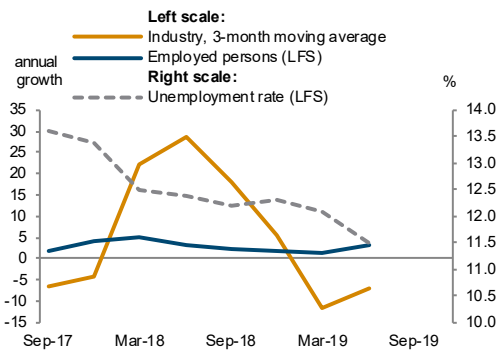
# Albania

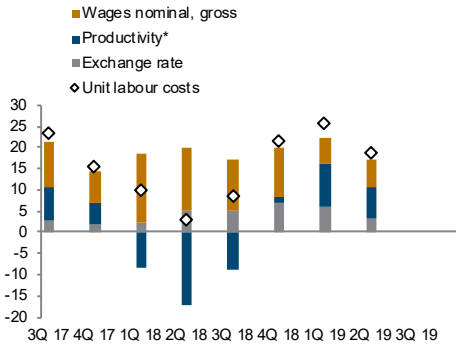
**Real GDP growth and contributions**
year-on-year



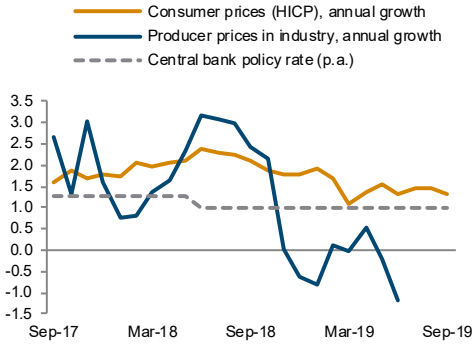

**Real sector development**
in %



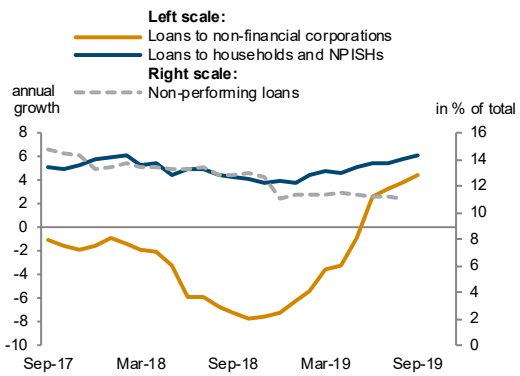

**Unit labour costs in industry**
annual growth rate in %



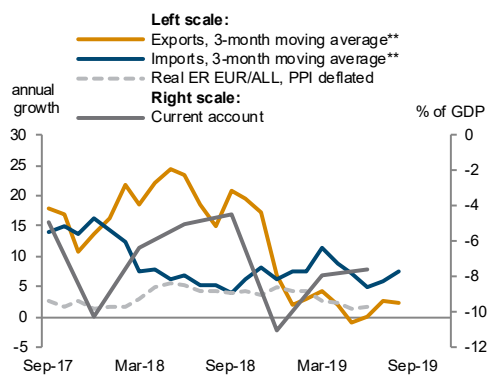

**Inflation and policy rate**
in %




**Financial indicators**
in %




**External sector development**
in %




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

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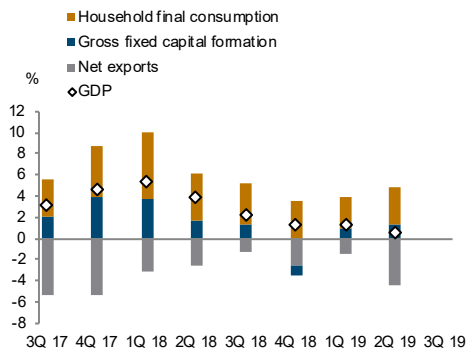
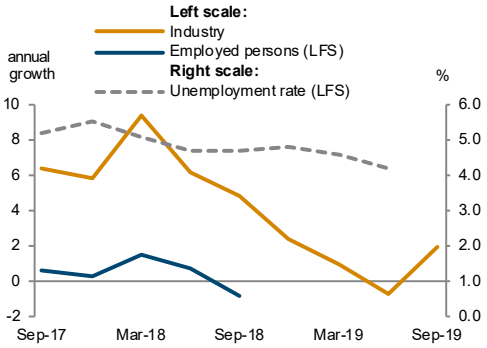
# Belarus

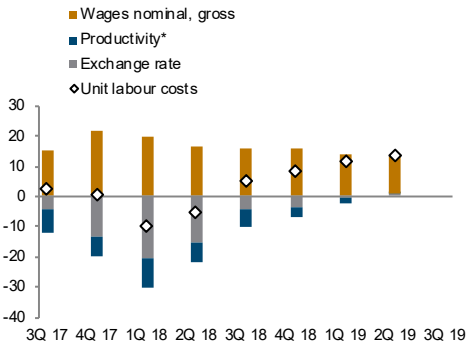
**Real GDP growth and contributions**
year-on-year



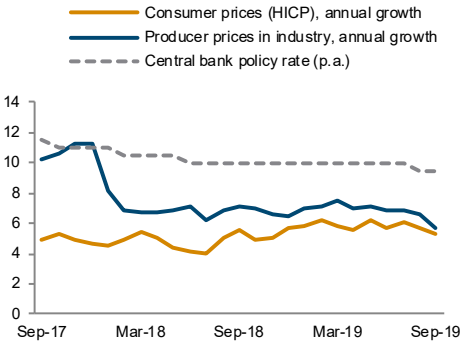

**Real sector development**
in %



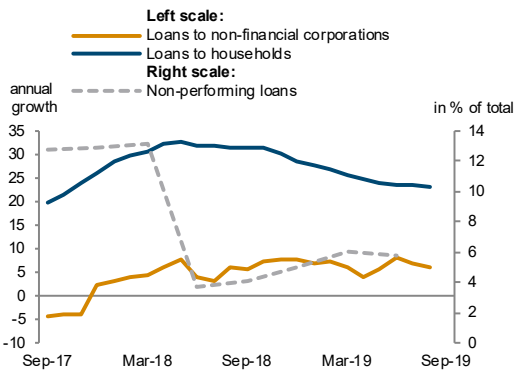

**Unit labour costs in industry**
annual growth rate in %



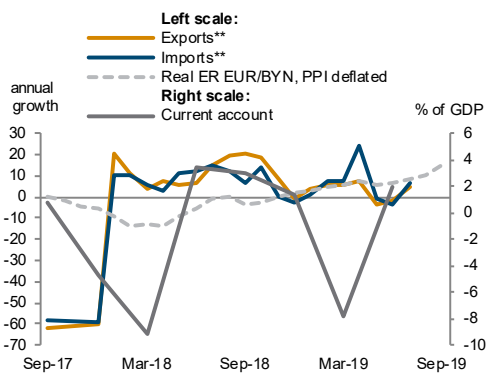

**Inflation and policy rate**
in %




**Financial indicators**
in %




**External sector development**
in %

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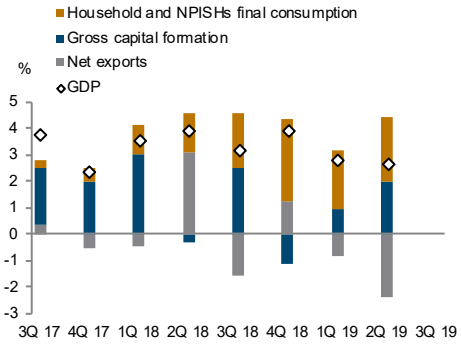
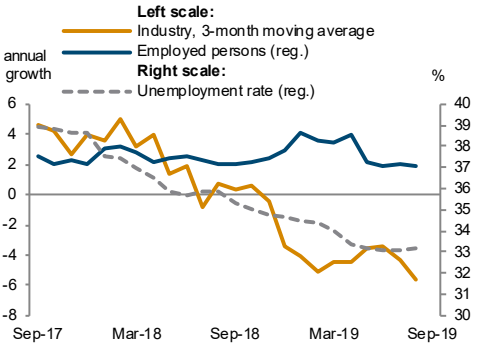
# Bosnia and Herzegovina

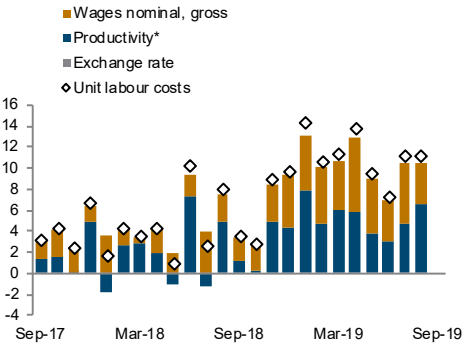
**Real GDP growth and contributions**
year-on-year



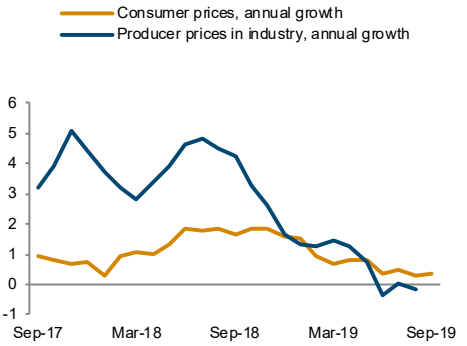

**Real sector development**
in %



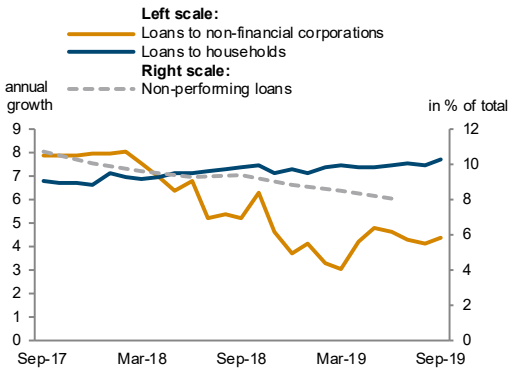

**Unit labour costs in industry**
annual growth rate in %



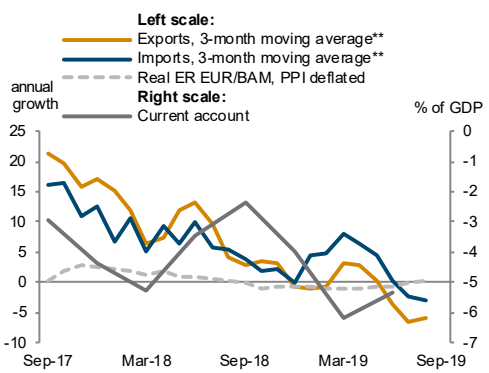

**Inflation**
in %




**Financial indicators**
in %




**External sector development**
in %

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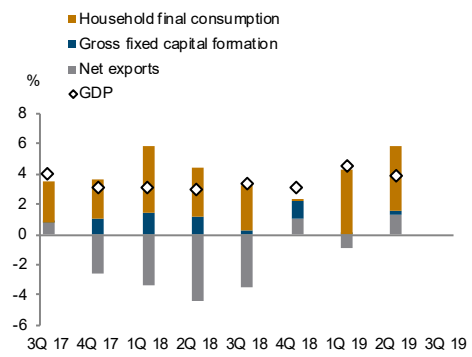
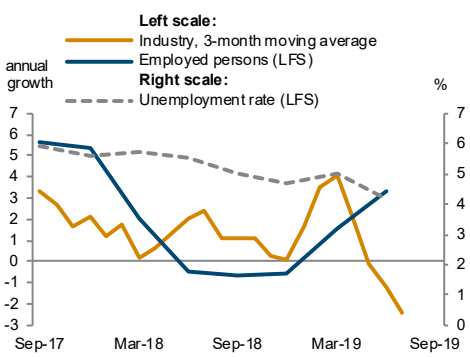
# Bulgaria

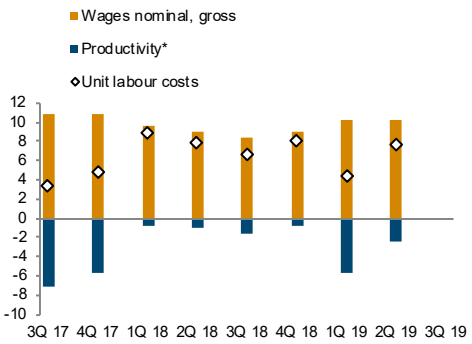
**Real GDP growth and contributions**
year-on-year



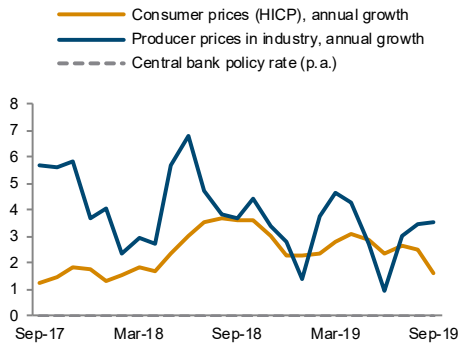

**Real sector development**
in %



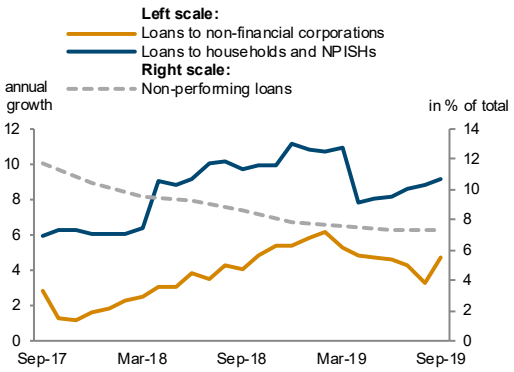

**Unit labour costs in industry**
annual growth rate in %



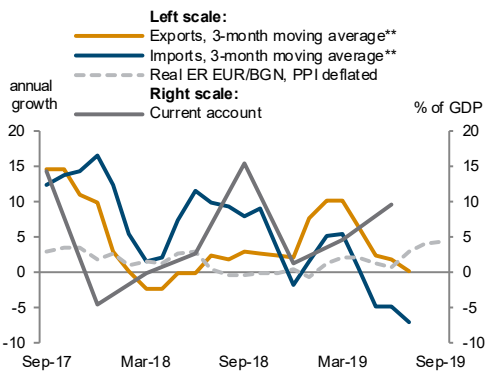

**Inflation and policy rate**
in %




**Financial indicators**
in %




**External sector development**
in %

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**EUR based.

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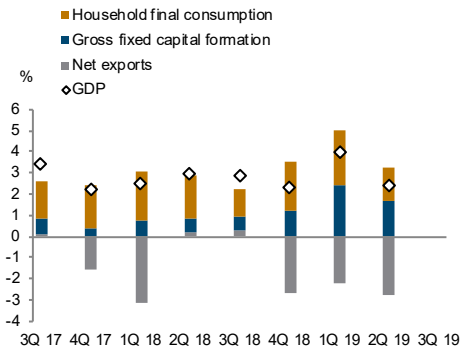
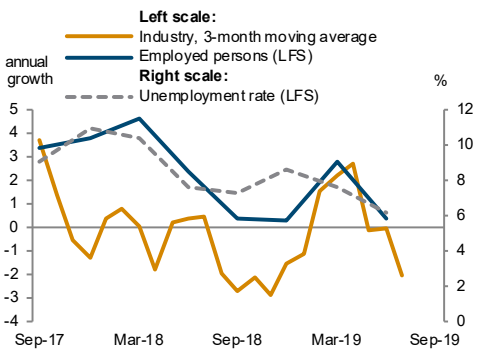
# Croatia

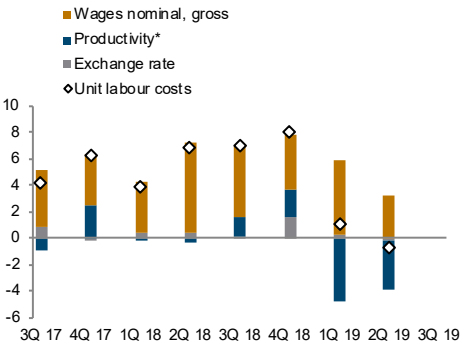
**Real GDP growth and contributions**
year-on-year



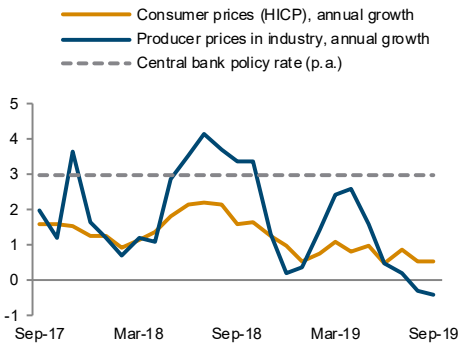

**Real sector development**
in %



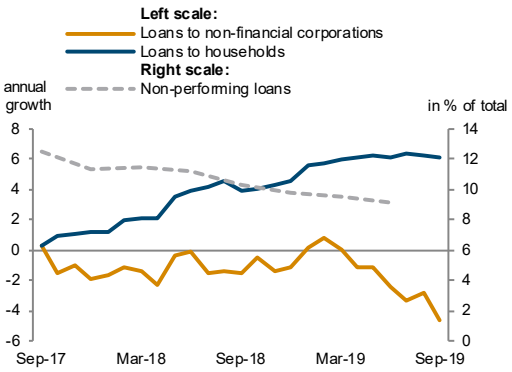

**Unit labour costs in industry**
annual growth rate in %



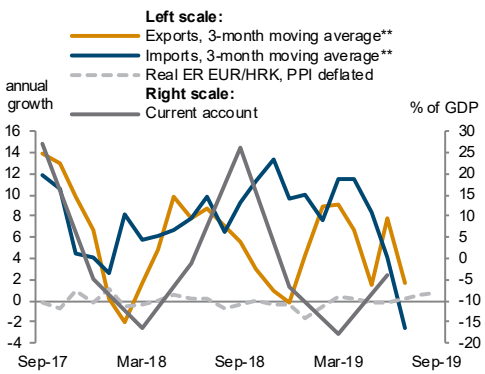

**Inflation and policy rate**
in %




**Financial indicators**
in %




**External sector development**
in %

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**EUR based.

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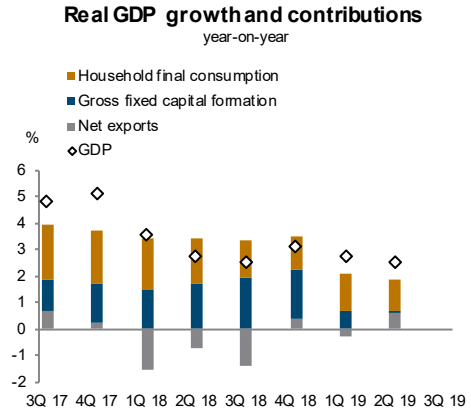
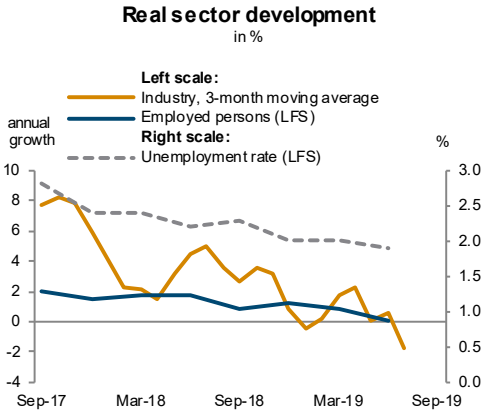
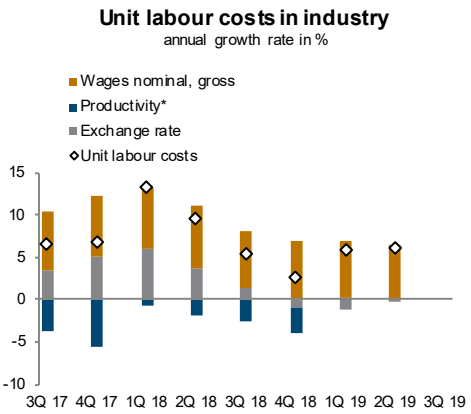
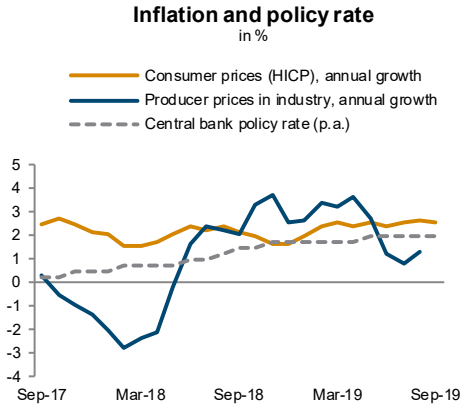
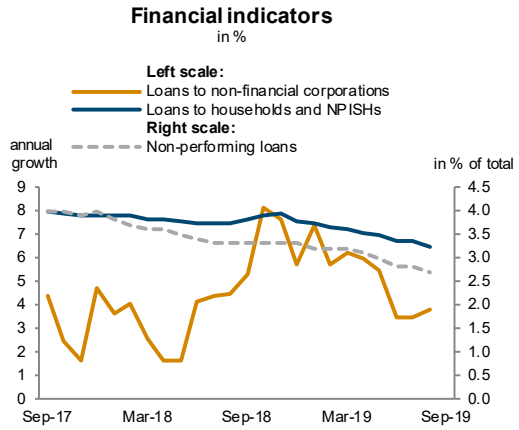
# Czech Republic

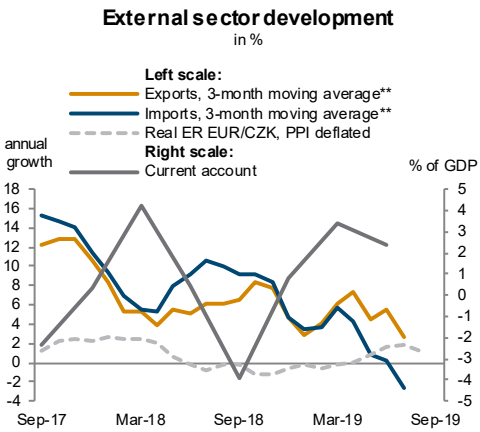
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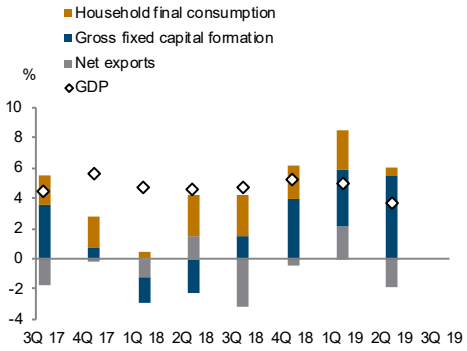
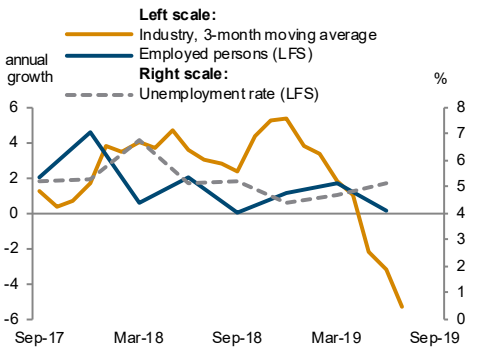
# Estonia

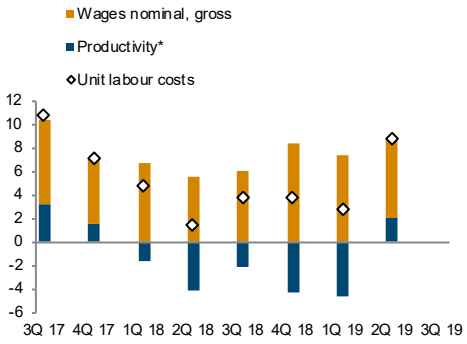
**Real GDP growth and contributions**
year-on-year



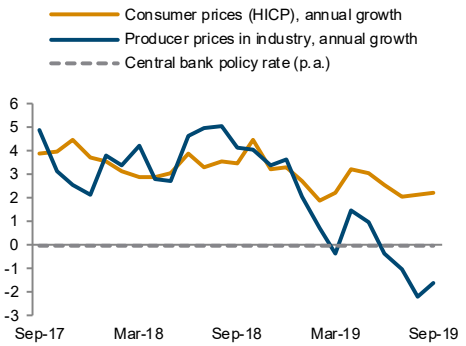

**Real sector development**
in %



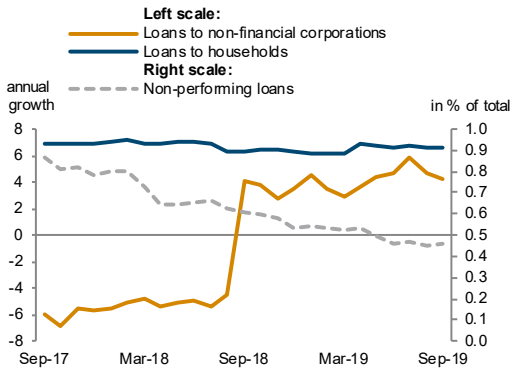

**Unit labour costs in industry**
annual growth rate in %



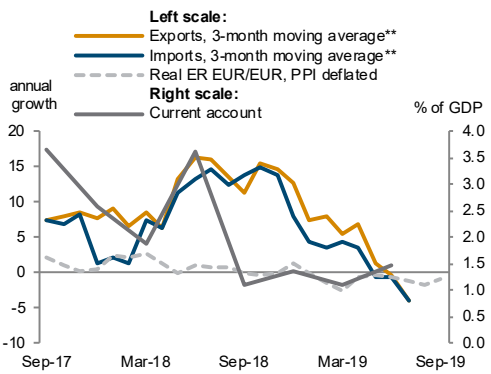

**Inflation and policy rate**
in %




**Financial indicators**
in %




**External sector development**
in %

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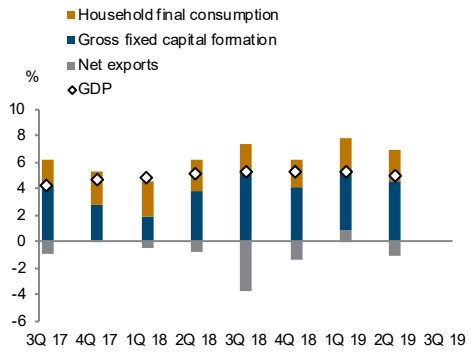
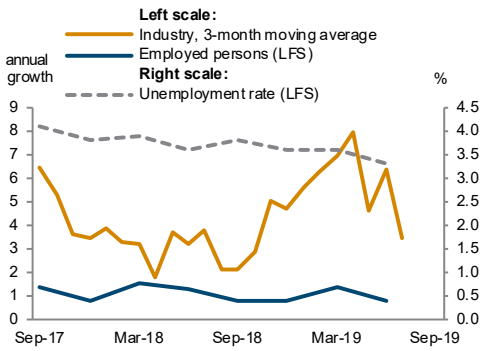
# Hungary

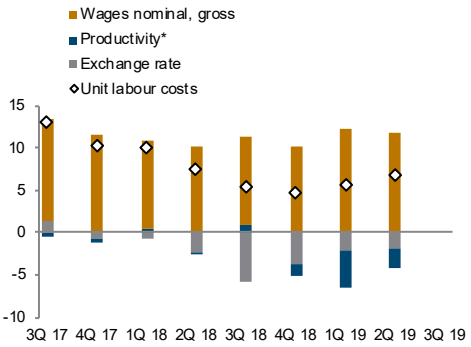
**Real GDP growth and contributions**
year-on-year



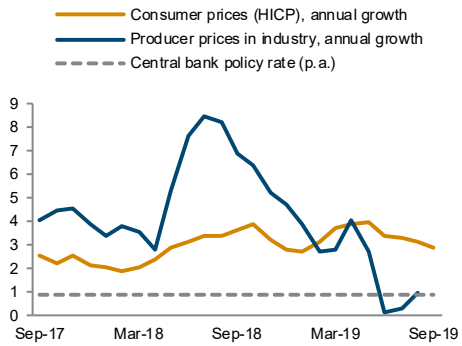

**Real sector development**
in %



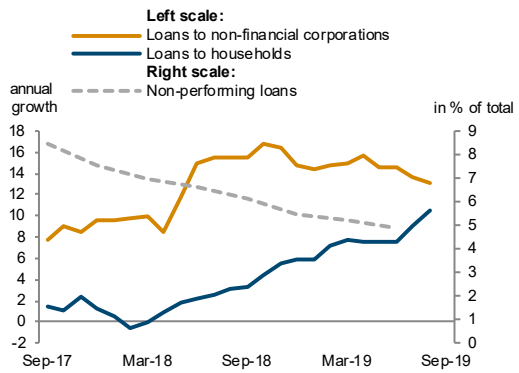

**Unit labour costs in industry**
annual growth rate in %



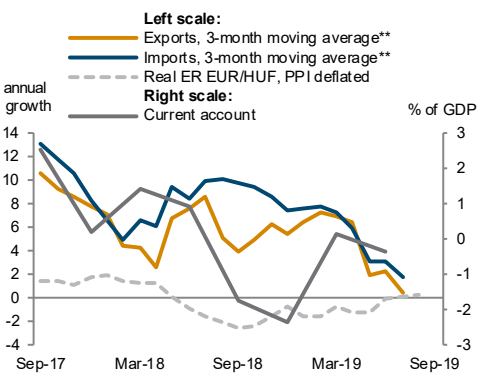

**Inflation and policy rate**
in %




**Financial indicators**
in %




**External sector development**
in %

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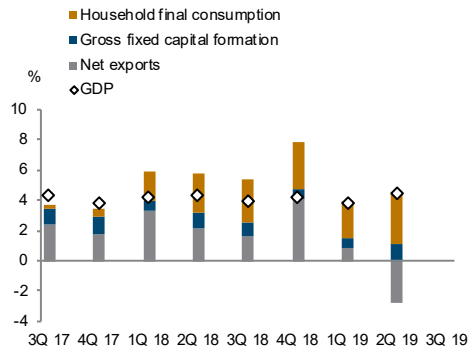
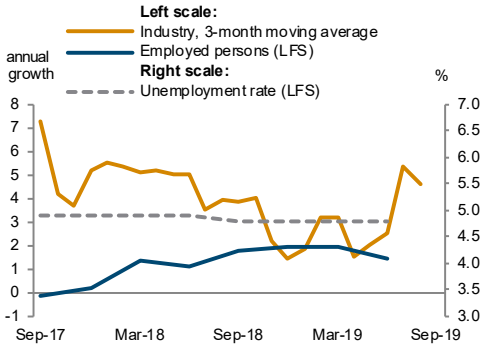
# Kazakhstan

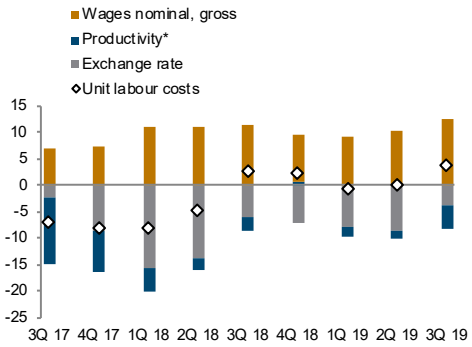
**Real GDP growth and contributions**
year-on-year



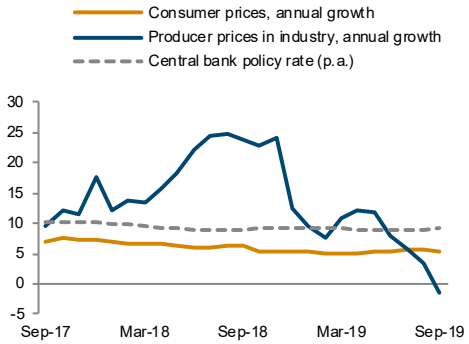

**Real sector development**
in %



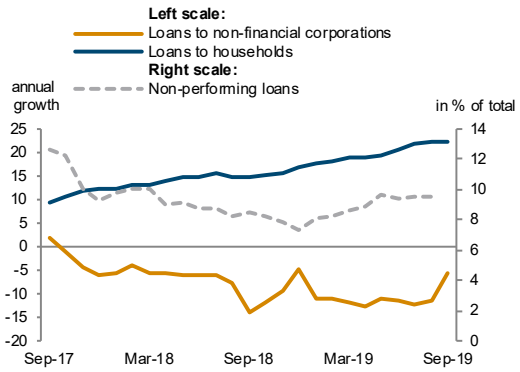

**Unit labour costs in industry**
annual growth rate in %



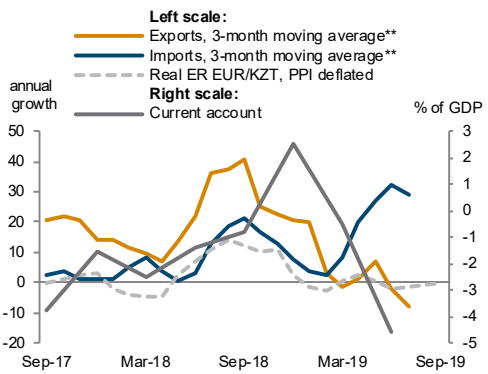

**Inflation and policy rate**
in %




**Financial indicators**
in %




**External sector development**
in %

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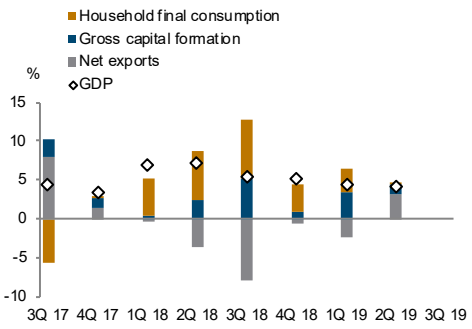
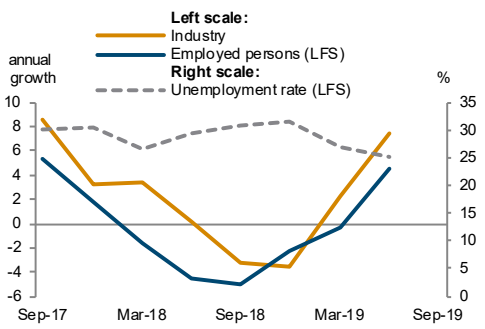
# Kosovo

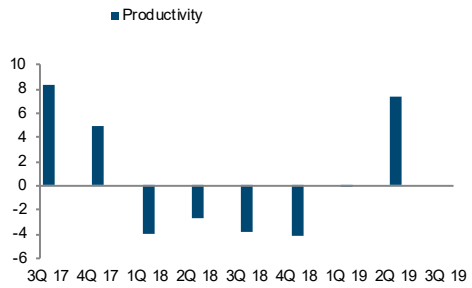
**Real GDP growth and contributions**
year-on-year



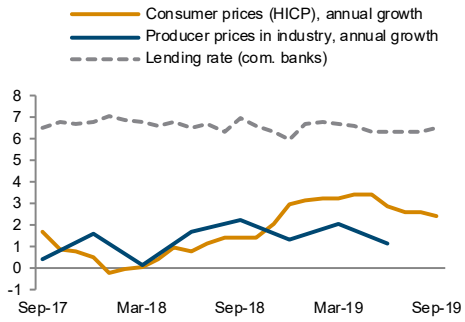

**Real sector development**
in %



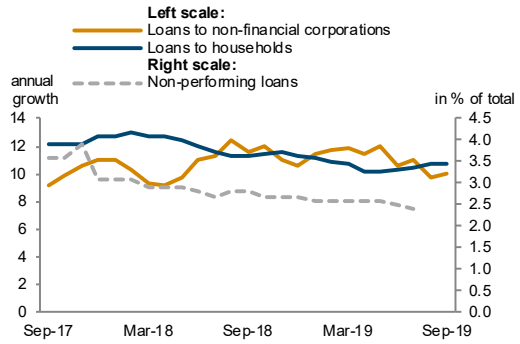

**Productivity in industry**
annual growth rate in %



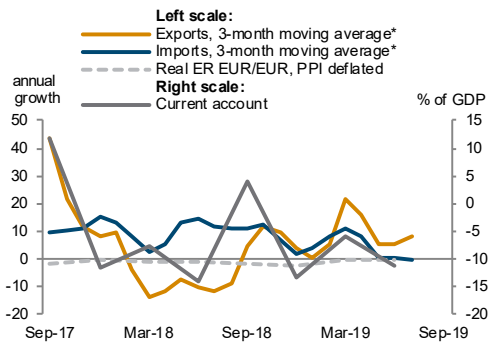

**Inflation and lending rate**
in %




**Financial indicators**
in %




**External sector development**
in %

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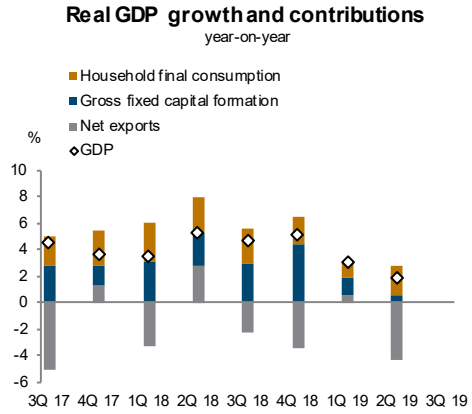
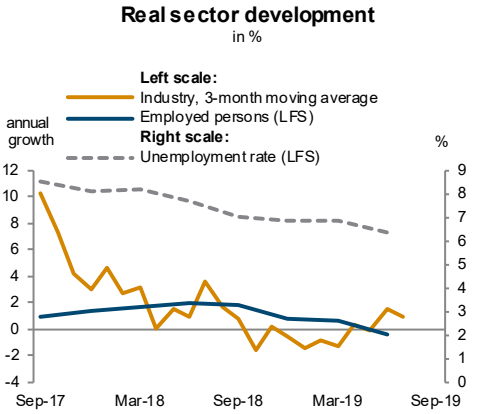
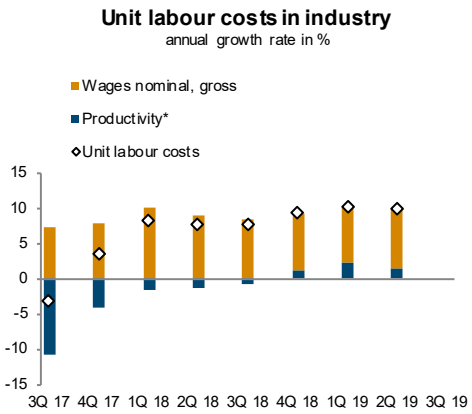
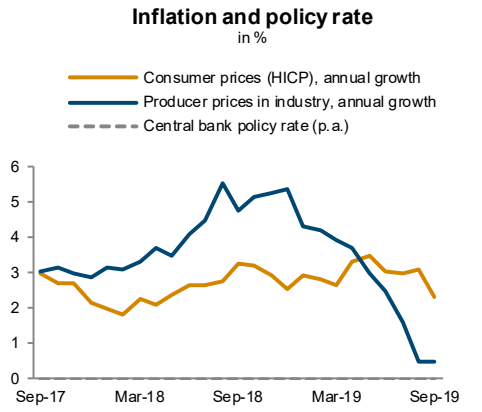
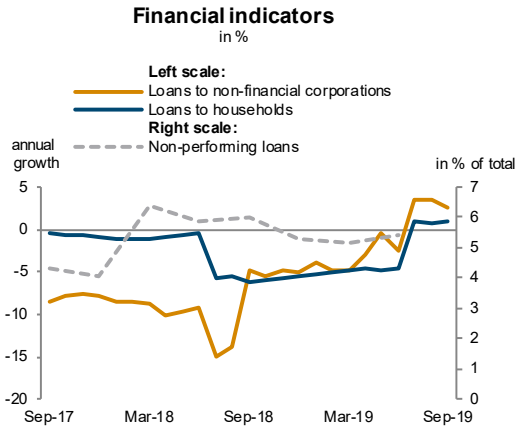
# Latvia

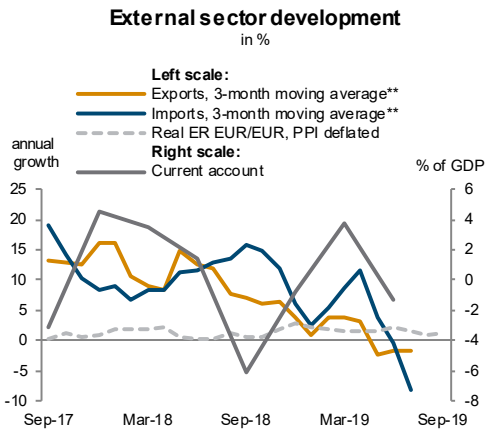
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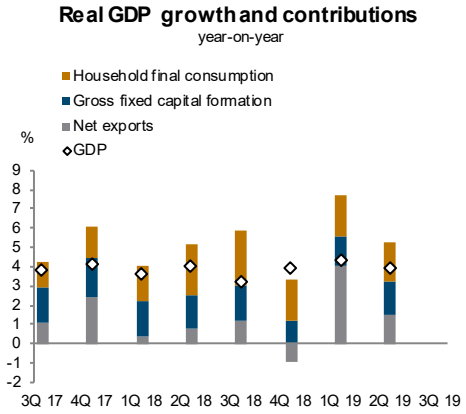
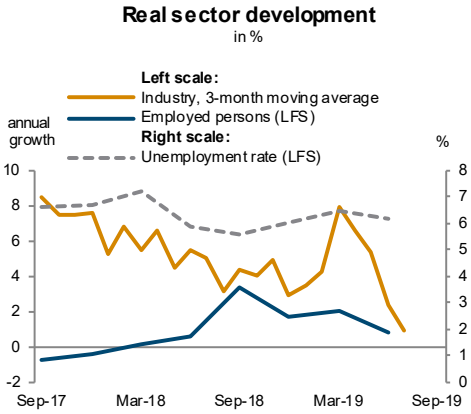
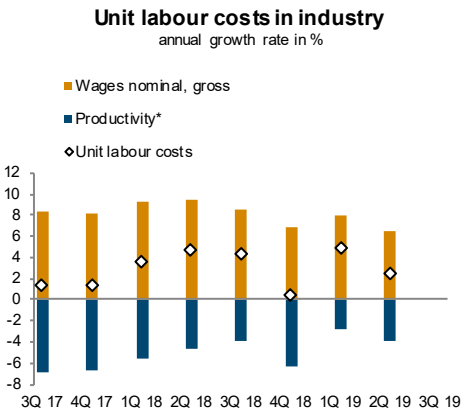
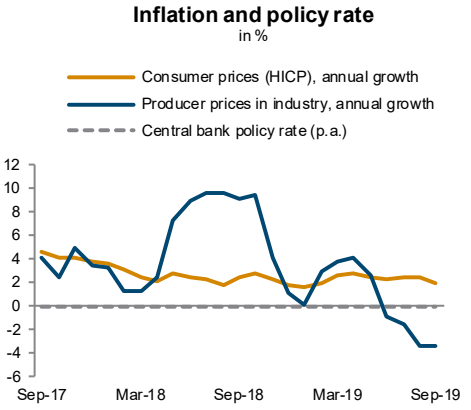
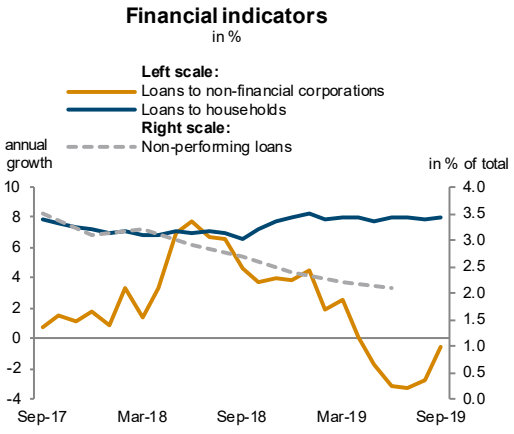
# Lithuania

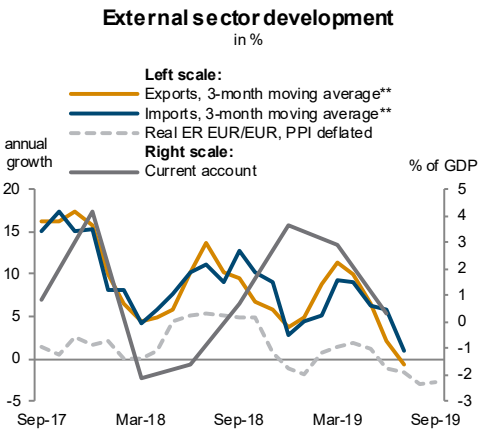
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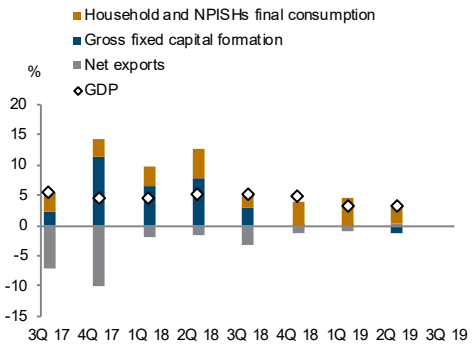
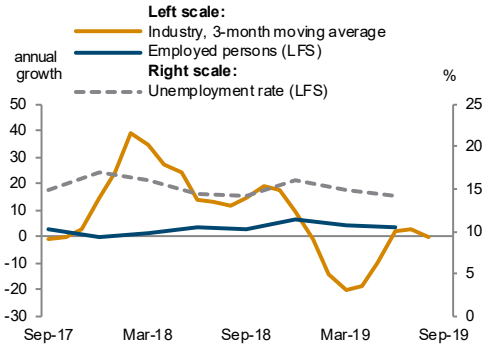
# Montenegro

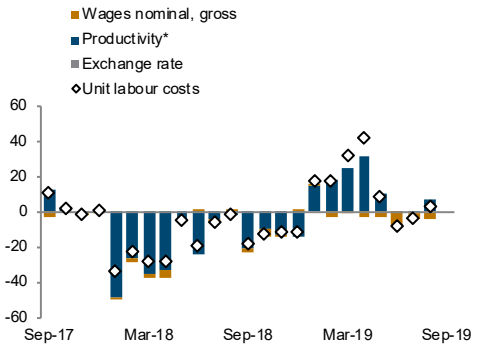
**Real GDP growth and contributions**
year-on-year



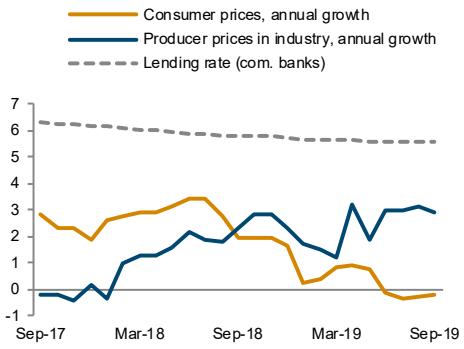

**Real sector development**
in %



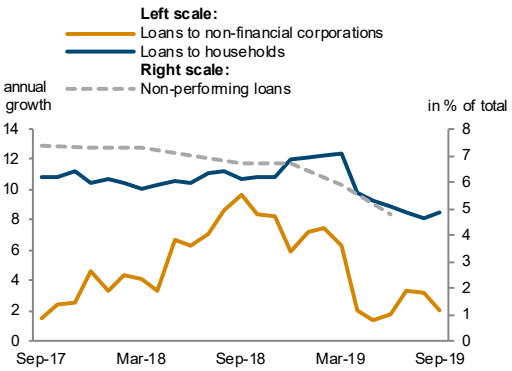

**Unit labour costs in industry**
annual growth rate in %



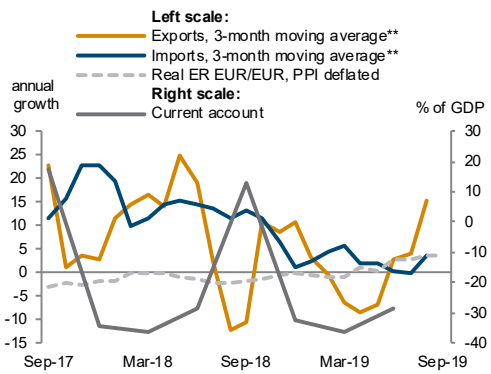

**Inflation and lending rate**
in %




**Financial indicators**
in %




**External sector development**
in %




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

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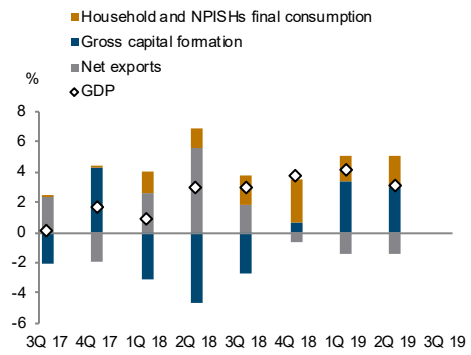
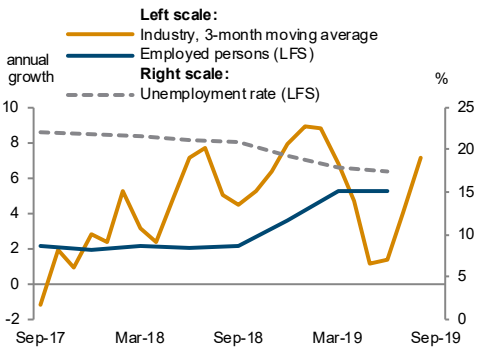
# North Macedonia

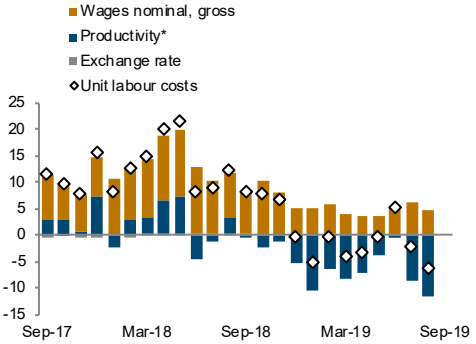
**Real GDP growth and contributions**
year-on-year



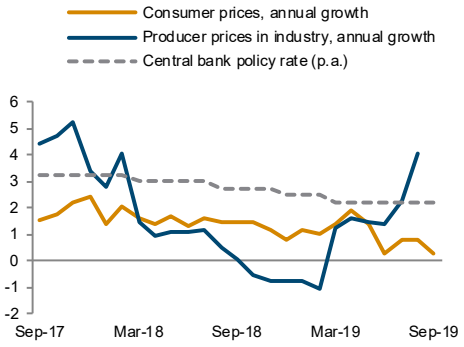

**Real sector development**
in %



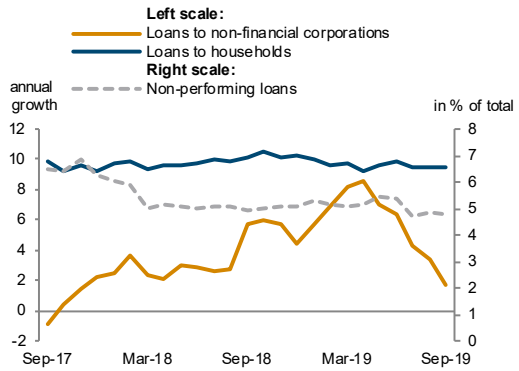

**Unit labour costs in industry**
annual growth rate in %



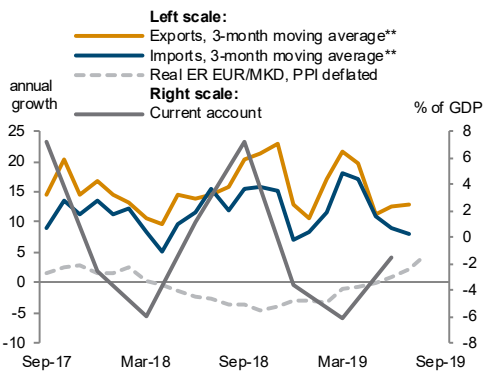

**Inflation and policy rate**
in %




**Financial indicators**
in %




**External sector development**
in %

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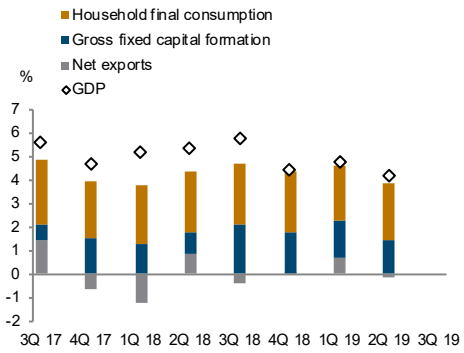
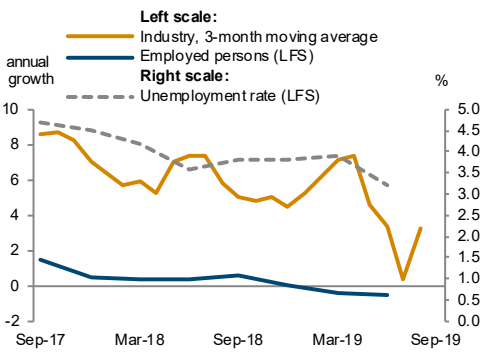
# Poland

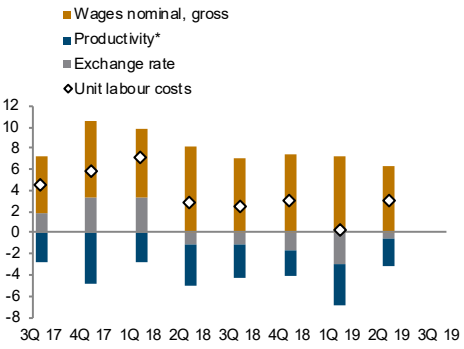
**Real GDP growth and contributions**
year-on-year



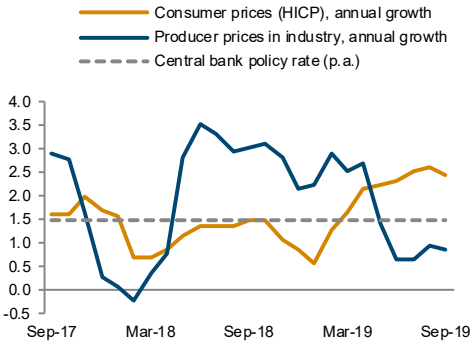

**Real sector development**
in %



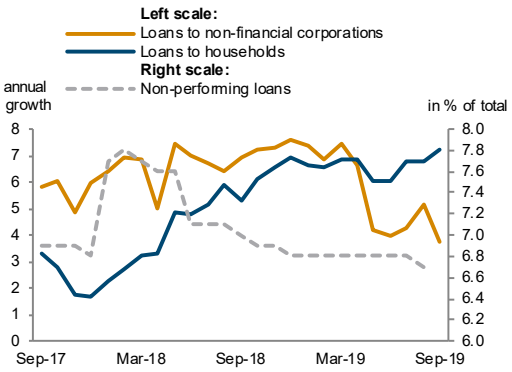

**Unit labour costs in industry**
annual growth rate in %



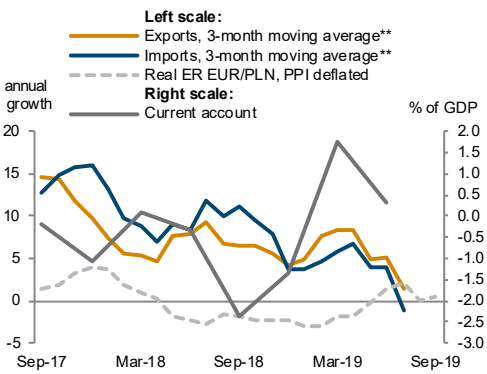

**Inflation and policy rate**
in %




**Financial indicators**
in %




**External sector development**
in %

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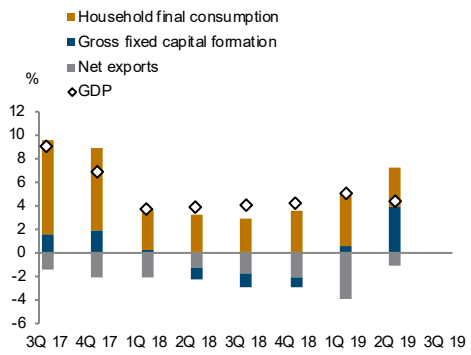
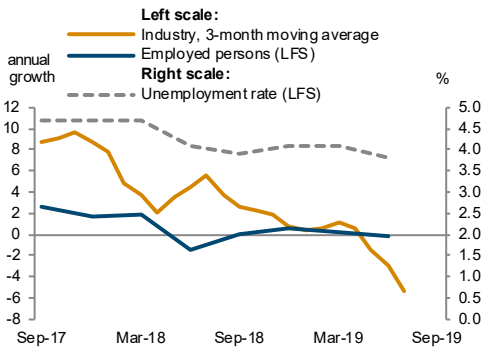
# Romania

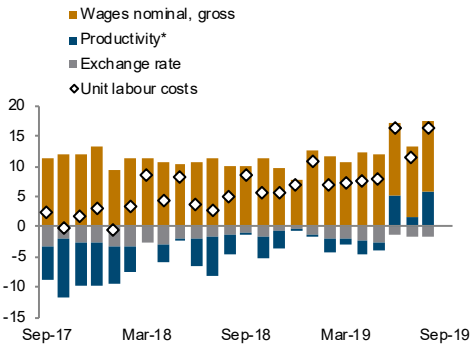
**Real GDP growth and contributions**
year-on-year



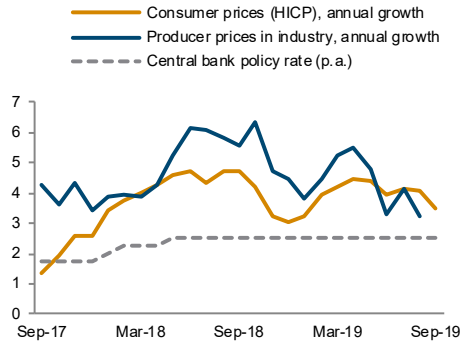

**Real sector development**
in %



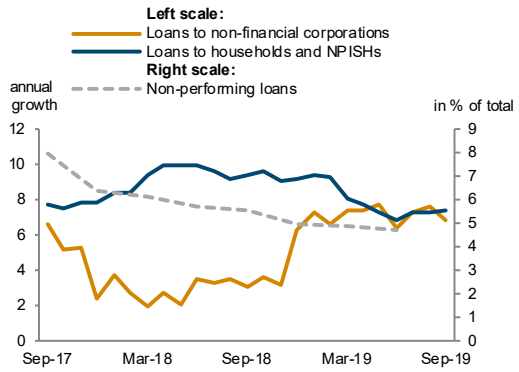

**Unit labour costs in industry**
annual growth rate in %



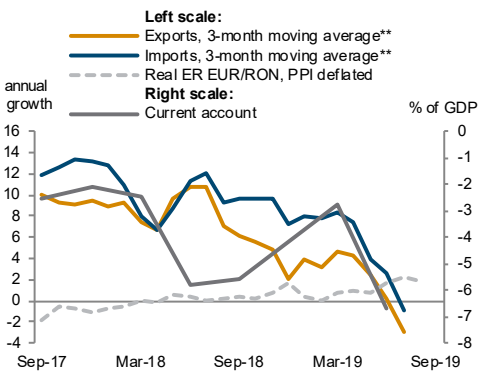

**Inflation and policy rate**
in %




**Financial indicators**
in %




**External sector development**
in %

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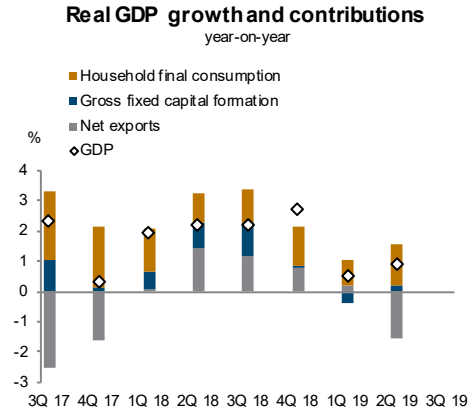
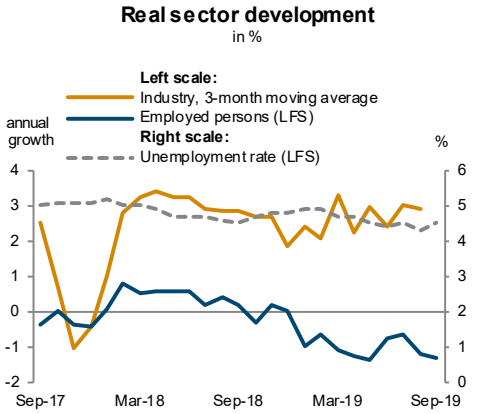
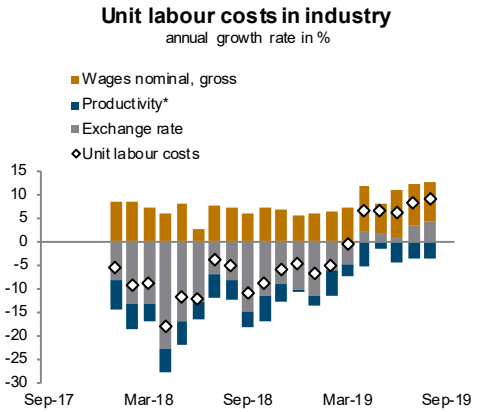
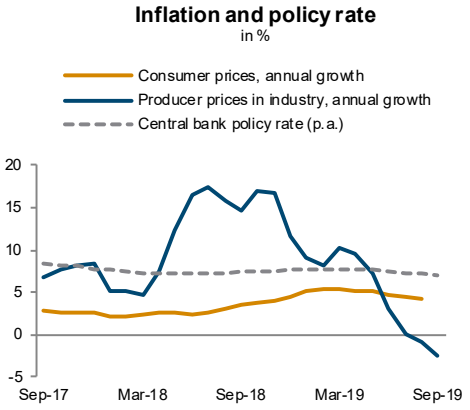
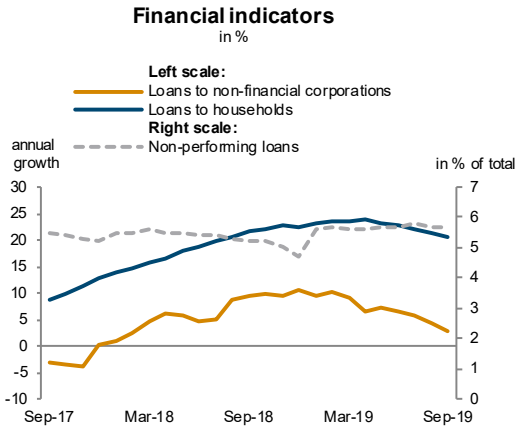
# Russia

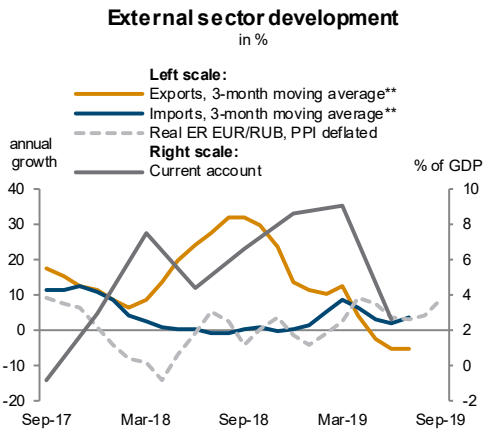
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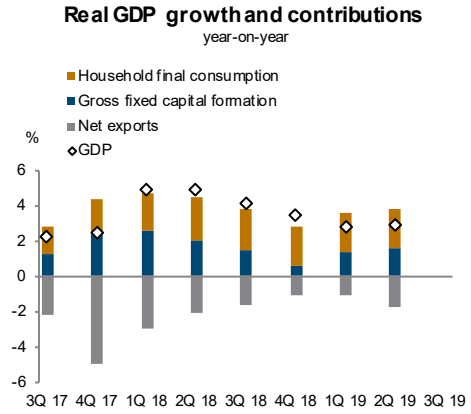
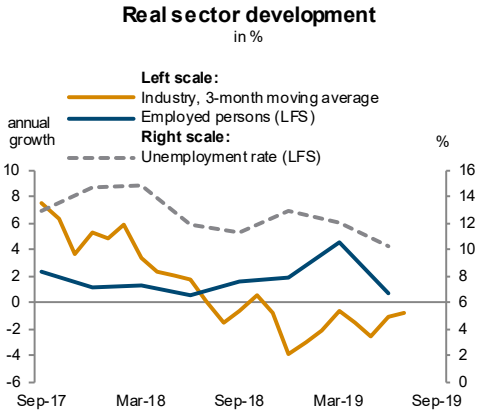
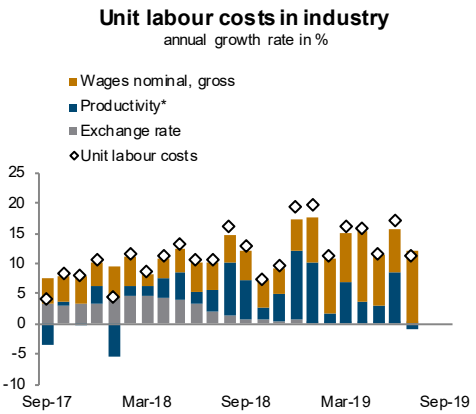
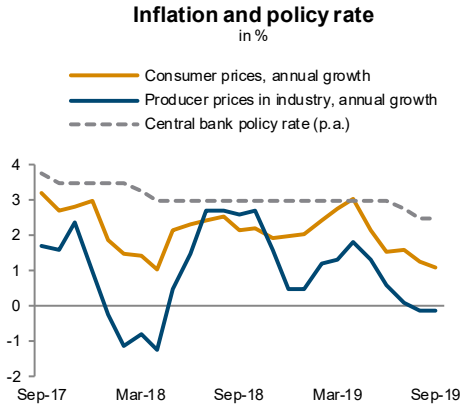
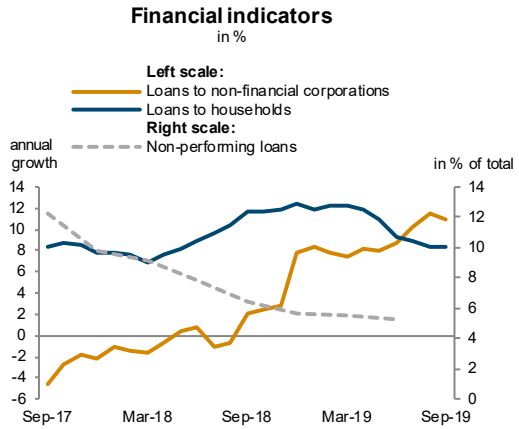
# Serbia

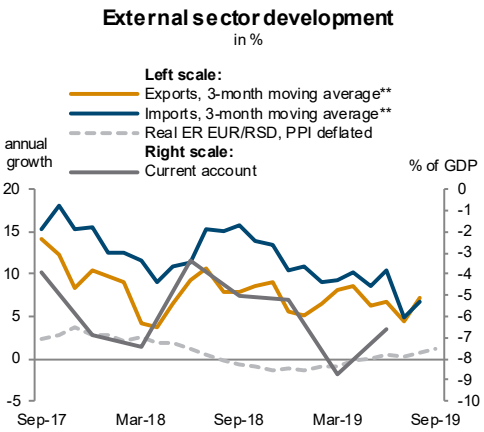
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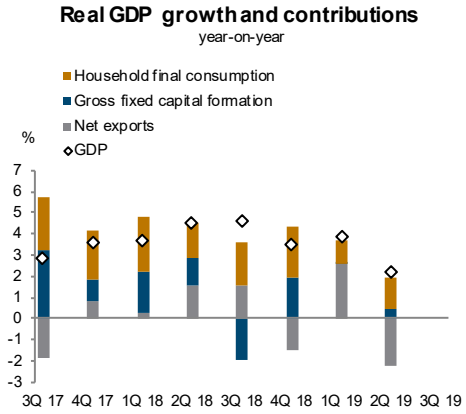
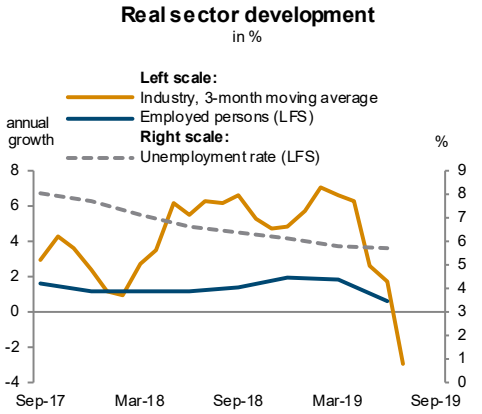
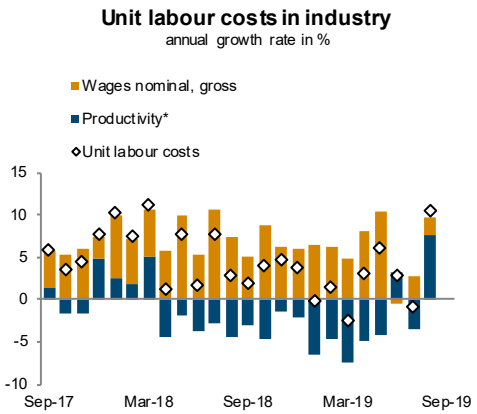
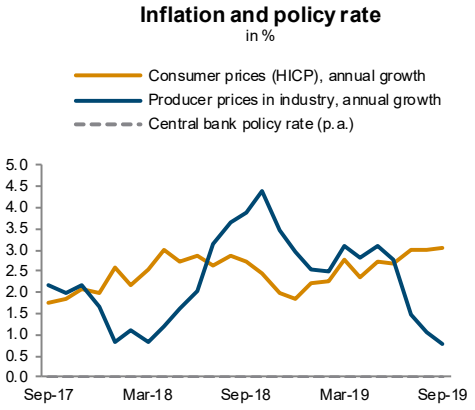
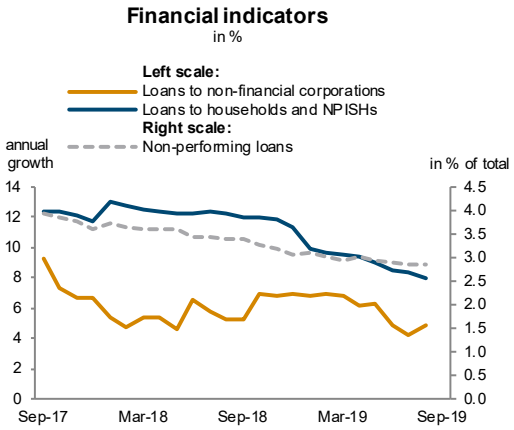
# Slovakia

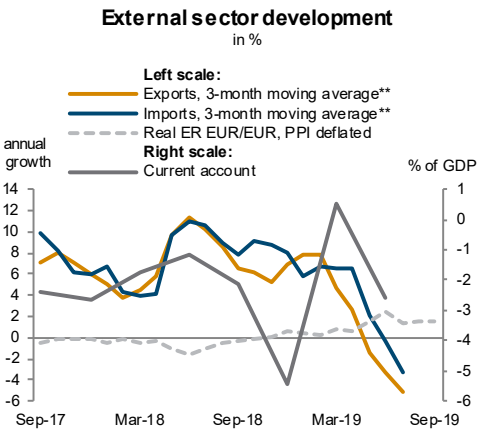
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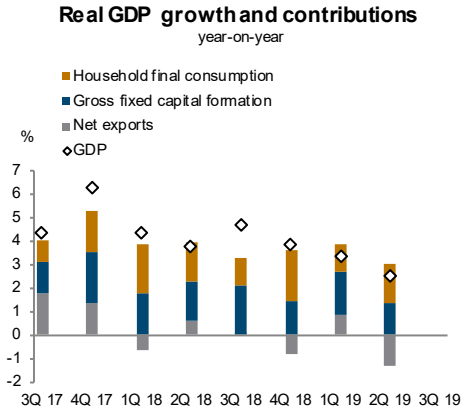
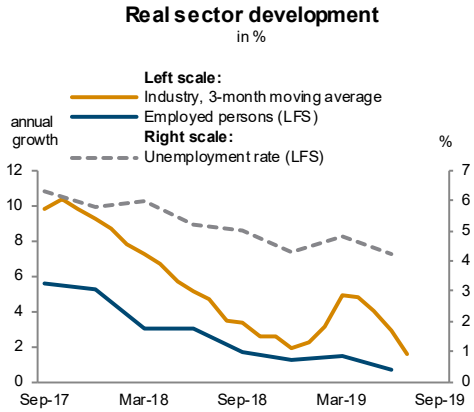
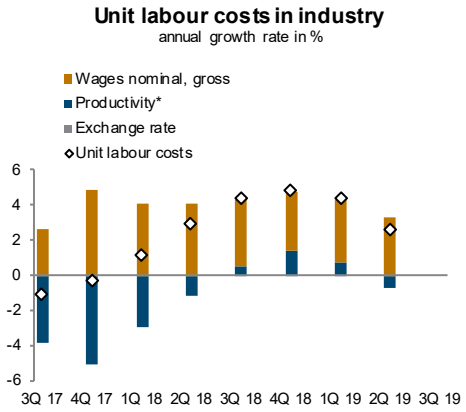
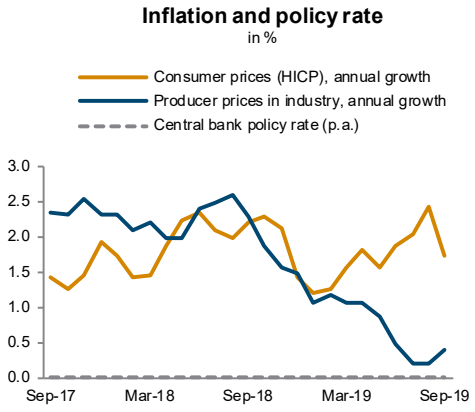
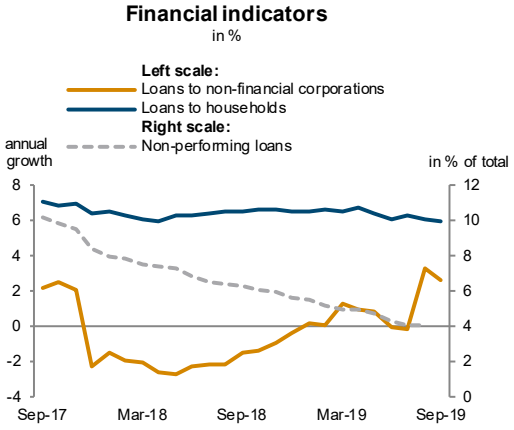
# Slovenia

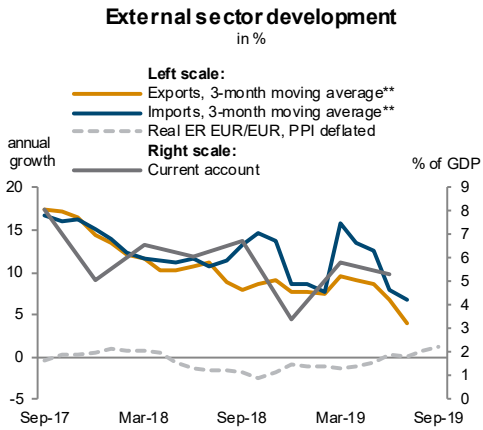
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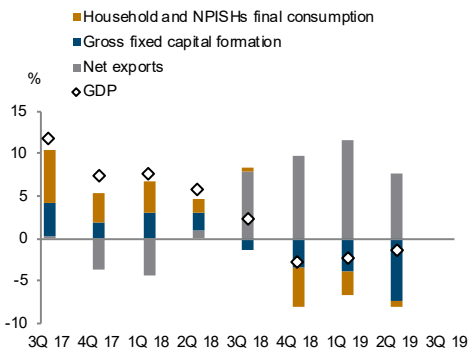
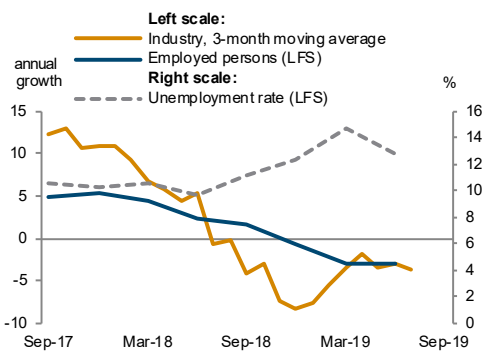
# Turkey

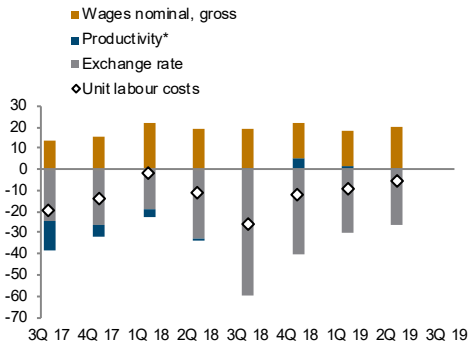
**Real GDP growth and contributions**
year-on-year



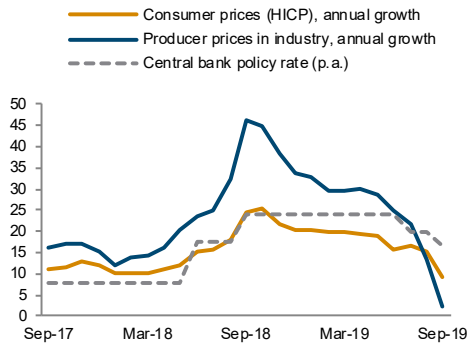

**Real sector development**
in %



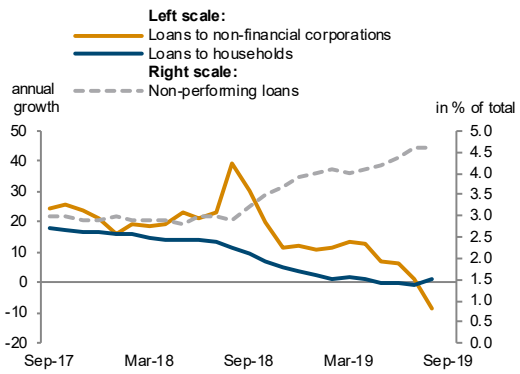

**Unit labour costs in industry**
annual growth rate in %



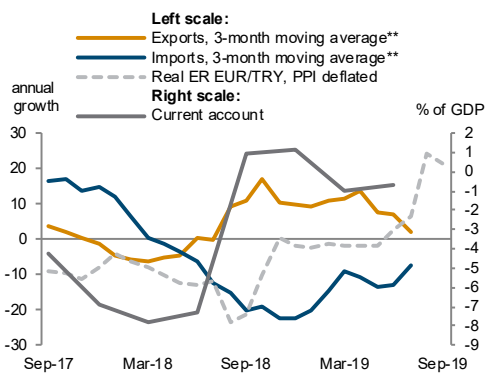

**Inflation and policy rate**
in %




**Financial indicators**
in %




**External sector development**
in %

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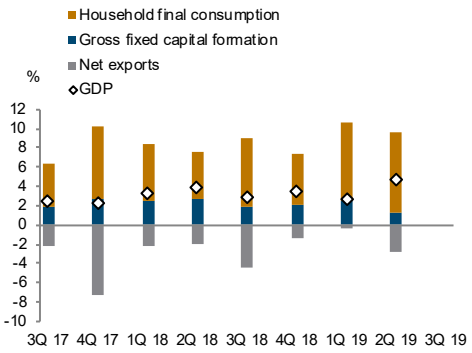
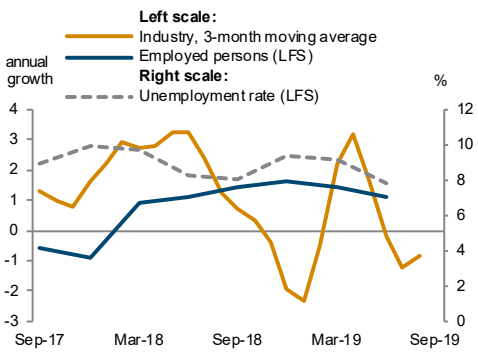
# Ukraine

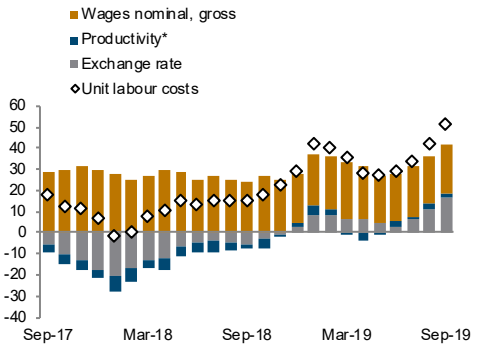
**Real GDP growth and contributions**
year-on-year



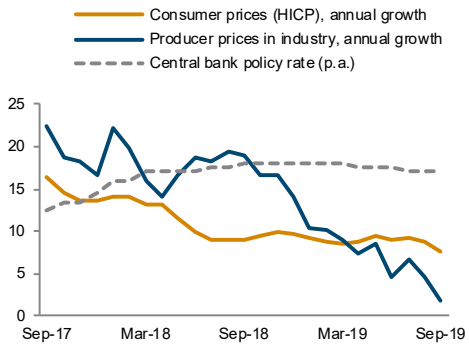

**Real sector development**
in %



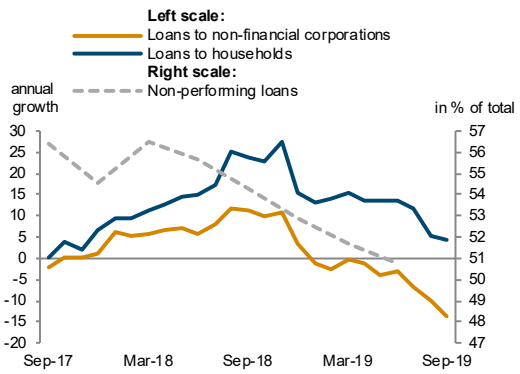

**Unit labour costs in industry**
annual growth rate in %



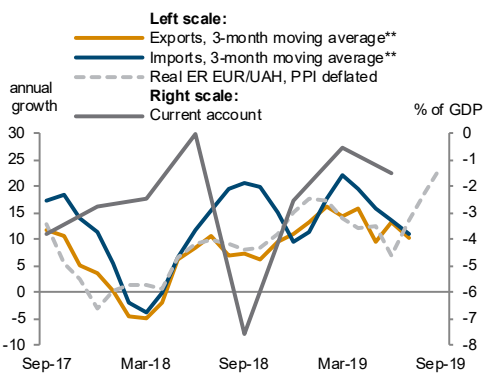

**Inflation and policy rate**
in %




**Financial indicators**
in %




**External sector development**
in %




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

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

# Index of subjects – November 2018 to November 2019



(continued on the next page)

**multi-country articles and statistical overviews**

IMPRESSUM

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