

Monthly Report

Forty-five Years of wiiw: A Look at the Founding History of the Vienna Institute for International Economic Studies

Exploring the Separatist-controlled Areas of Ukraine from Outer Space

The Drivers and Effects of Eco-innovations: What Is the Role of Public Policy Intervention?

European Innovation Partnerships: How Efficient Have They Been in Promoting Innovation in the EU?



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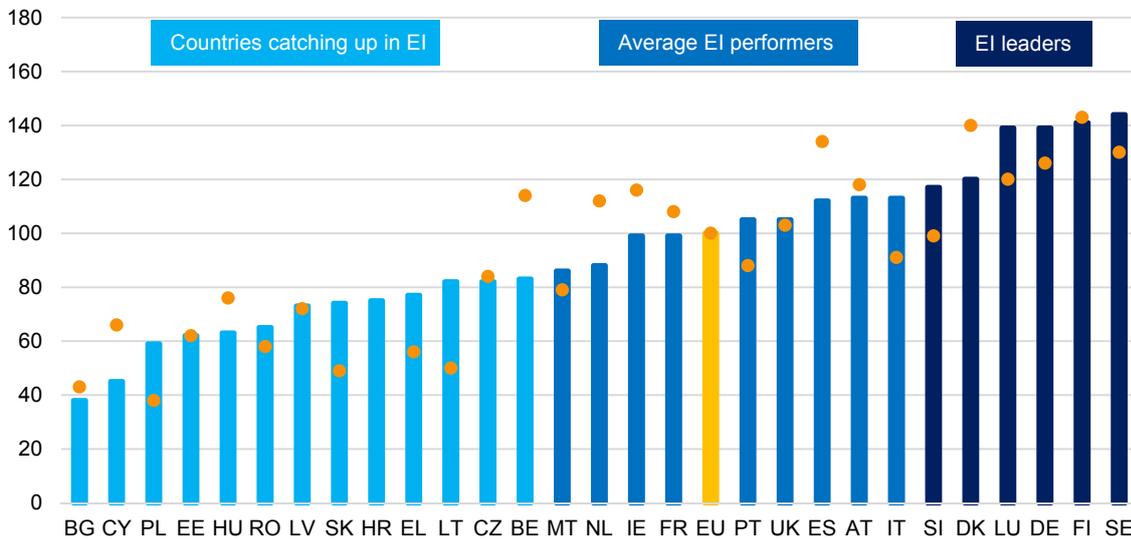
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Eco-Innovation (EI) Index

2011 (dots) and 2017 (bars)



Note: The Eco-Innovation (EI) Index captures the different aspects of eco-innovation by applying 16 indicators grouped into five thematic areas, namely: (1) eco-innovation inputs (comprising governments environmental and energy R&D appropriations and outlays, total R&D personnel and researchers, and total value of green early stage investments); (2) eco innovation activities (comprising the share of enterprises that introduced an innovation with environmental benefits obtained within enterprises, the share of enterprises that introduced innovation with environmental benefits obtained by the end user, and the number of ISO 14001 registered organisations); (3) eco-innovation outputs (comprising eco innovation related patents, eco-innovation related academic publications, and eco-innovation related media coverage); (4) resource efficiency outcomes (comprising material productivity, water productivity, energy productivity, and greenhouse gas emissions intensity); and (5) socio-economic outcomes (comprising employment in eco industries and circular economy, revenue in eco industries and circular economy, and exports of products from eco industries). A higher EI index reflects better overall EI performance.

Source: Eco-Innovation Scoreboard.

Forty-five years of wiiw: A look at the founding history of the Vienna Institute for International Economic Studies

BY PETRA MAYRHOFER¹

In 2018, the Vienna Institute for International Economic Studies (wiiw), one of the leading European economic research institutes with a special focus on Central, East and Southeast Europe, will celebrate its 45th anniversary. Today's wiiw was founded as an independent institute under the name Wiener Institut für Wirtschafts- und Systemvergleiche in January 1973 and can look back on an interesting founding history.

During the East-West confrontation, the Cold War, there were initiatives and efforts to institutionalise lasting cooperation on a scientific level, despite the tense global political situation and all the differences in political, economic and social systems. wiiw should prove to be a forum for such an exchange. The driving force behind the establishment of the Institute was Franz Nemschak, then Director of the Austrian Institute of Economic Research (WIFO). The economic researcher Nemschak did not enter unfamiliar territory: under the motto 'More science managers than scientists' he had already re-established WIFO after the end of the war in 1945.²

The background story of the founding of wiiw can be traced back to the 1960s, and this in two countries, Austria and the United States: In the Danube metropolis of Vienna, on the edge of the Iron Curtain, WIFO Director Nemschak regretted that the economic situation in the then communist countries was not systematically addressed scientifically in Austria and that it was therefore necessary to establish East-West economic research first.³ Nemschak became aware of this, above all, on the occasion of the international conference 'Economic Planning and Economic Growth', which took place in Lower Austria (in Gössing an der Mariazellerbahn) at the end of September 1965: organised by the Austrian Institute of East and South-East European Studies, economic researchers such as Ota Šik and Bedřich (Friedrich) Levčák from the Economic Institute of the Czechoslovak Academy of Sciences, Branko Horvat from the Yugoslav Institute for Economic Research, Jožef Pajestka from the National Economic Institute in Warsaw and Francis Seton from the University of Oxford met here for professional exchange.⁴ After the conference, Nemschak began to work specifically on the realisation of his vision and to recruit comrades-in-arms for it: during his regular visits to Belgrade, Budapest, Prague and Moscow, among others, he explored the willingness for possible East-West cooperation and at the same time promoted

¹ Institute of Contemporary History, University of Vienna. This article is based on the findings of the pilot study 'Rolle der Oesterreichischen Nationalbank bei West-Ost-Transfers im Rahmen des Wiener Instituts für Wirtschaftsvergleiche 1972/73-1991', financed by the Oesterreichische Nationalbank, Vienna, 2015.

² Interview with Peter Nemschak, 20.02.2015.

³ Interview with Ingrid Gazzari, 06.10.2014.

⁴ Wessely, Kurt (ed.), *Probleme zentraler Wirtschaftsplanung. Nationalökonomien Osteuropas über Theorie und Praxis der Wirtschaftspolitik*, Vienna, 1967.

Vienna as a suitable location.⁵ But it was not only Nemschak who pursued this intention: when WIFO celebrated its 40th anniversary in 1967, its president, the industrialist Manfred Mautner-Markhof, also called for the expansion of research on the East European economies.⁶

So much for the developments in Vienna during this period. At the same time, considerations were also discussed in the United States to establish an East-West scientific exchange. Specifically, McGeorge Bundy, then President of the Ford Foundation, was commissioned by President Lyndon B. Johnson. After a journey through Europe, Bundy took stock in the article 'Where East may meet West' in May 1967 and publicly pleaded for the establishment of an East-West research institute.⁷ Franz Nemschak read this article and saw it as a confirmation of his vision: he immediately wrote a letter to Bundy with the aim of making Vienna in neutral Austria attractive to him, as 'probably the world's best location' for this centre.⁸

McGeorge Bundy informed Nemschak in early October 1967 that he would send a representative of the Ford Foundation to Vienna to contact Nemschak.⁹ Then came 1968, and the anti-Semitic repression in Poland and the invasion of the Warsaw Pact troops in Prague in August 1968 were to have a direct impact on Nemschak's idea: since Czechoslovak and Polish scientists had fled their countries, the geographical location of Vienna became interesting for the United States for another reason – namely as an exile for these emigrants – and a proposal was made to Nemschak to this effect. The WIFO director immediately agreed to accept the emigrated Czechoslovak economists Jiří Kosta, Jiří Slama, Václav Nešvera and the Polish economist Kazimierz Łaski as guest researchers at WIFO.¹⁰ With financial support from the Ford Foundation, the stay of these scientists was secured. At the same time, Nemschak liked the idea of bringing guest researchers from East and West together at WIFO in order to facilitate an East-West exchange: thus the scholarship programme was deepened and supported financially by the Ford Foundation from November 1969; already before that, the department for international economic comparisons (*Abteilung für Internationale Wirtschaftsvergleiche*), in charge of the scholarship programme, had been established at WIFO.

When Franz Nemschak reached retirement age in the early 1970s, the question arose as to the future of this department. In WIFO itself, Nemschak was regarded as the mastermind for East-West research, which, however, did not play a major role in the overall research programme of the institute.¹¹ On the other hand, the then Federal Chancellor Bruno Kreisky was very interested in the continued existence of the department, as this fit perfectly with Kreisky's concept of Austria's foreign policy positioning as a neutral mediator between the two blocs during the Cold War; also, Austria had already offered itself as a

⁵ Interview with Peter Nemschak, 20.02.2015; Nemschak, F. (1978), 'Das Wiener Institut für Internationale Wirtschaftsvergleiche (I)', *Die Industrie*, No. 15, 14.04.1978, pp. 15f.

⁶ *ibid.*, p. 16.

⁷ Bundy, M. (1967), 'Where East may meet West', *Business Week*, 13.05.1967.

⁸ Nemschak, F. (1978), 'Das Wiener Institut für Internationale Wirtschaftsvergleiche (I)', *Die Industrie*, No. 15, 14.04.1978, p. 16.

⁹ *ibid.*, p. 17; Howard Swearer was Program Officer for the international agendas at the Ford Foundation between 1967 and 1970. Peter de Janosi, later Director of IIASA, was also Program Officer during this period. Other contacts of the Ford Foundation for Franz Nemschak and wiiw in the founding phase were Vice President David Bell and Secretary Howard Dressner.

¹⁰ Interview with Ingrid Gazzari, 06.10.2014.

¹¹ *ibid.*

location for an international security conference on foreign policy in 1970.¹² Moreover, at the same time the International Institute for Applied Systems Analysis (IIASA) had been established in Schloss Laxenburg south of Vienna.

Bruno Kreisky therefore asked Nemschak's deputy, the economist Hans Seidel, to take over the administration of the department as Franz Nemschak's successor, so that the cooperation between researchers from East and West could be continued.¹³ Seidel refused because he did not want to take on this task in addition to his research activities.¹⁴ Therefore, in January 1973, the department was transformed into an independent institute, which initially operated under the name *Wiener Institut für Wirtschafts- und Systemvergleiche*. The newly founded institute was headed by Franz Nemschak, his deputy was Friedrich Levčik. In the early years, wiiw and WIFO shared premises in a new building in Vienna's Arsenal.

Political representatives also supported the Institute in the Supervisory Board and the Board of Trustees: the first Supervisory Board consisted of the then Mayor of Vienna Felix Slavik (SPÖ) as President and of representatives of the Austrian National Bank (OeNB), the Austrian Federation of Trade Unions (ÖGB), WIFO, the Federation of Austrian Industries, the Chamber of Commerce (WKO), and the Chamber of Labour (AK). Representatives of the financing institutions, i.e. the OeNB, the City of Vienna, the social partners, WIFO and the Ministry of Finance, were always included. The Board of Trustees had an advisory function, bringing together people from politics, business and science, such as rectors of universities, representatives of the Federation of Austrian Industries, the ministries, the City of Vienna or state or state-related companies. The legal structure of the association was modelled on WIFO, and the financing of wiiw was also designed in analogy to the financing structure of WIFO.¹⁵ The institute itself received basic support from the City of Vienna, the Republic of Austria, the OeNB, other banks and banking associations and the social partners. In addition, project funding was obtained.

Until the beginning of the transformation in the East European countries, the Institute's research programme mainly focused on the analysis of economic relations between East and West, economic analyses of the CMEA countries, international productivity comparisons and international structural comparisons.¹⁶ Scientific research, cooperations and analyses between East and West were initiated and deepened not least through structured programmes, which, however, constituted only a small part of the research work of wiiw.¹⁷ The 'Workshops on East-West European Economic Interaction' series of events, which was launched in 1973, was of particular importance for the development of East-West relations in the early phase of the Institute's history. As in the case of the scholarship programme, an international committee was created for this purpose, which determined the selection of participants and the content of the workshops.

Among the Institute's staff of the first hour, there were – apart from Nemschak, Levčik and Ingrid Gazzari, later managing director of wiiw – also researchers from East European countries, including

¹² See Gehler, M. (2005), *Österreichs Außenpolitik der Zweiten Republik. Von der alliierten Besatzung bis zum Europa des 21. Jahrhunderts*, Volume 2, Innsbruck.

¹³ Interview with Hans Seidel, 26.01.2015.

¹⁴ Interview with Hans Seidel, 26.01.2015.

¹⁵ Interview with Ingrid Gazzari, 06.10.2014.

¹⁶ Archive of the wiiw, File General Meetings, Minutes of the General Assembly, 10.03.1975, p. 3.

¹⁷ Interview with Peter Havlik, 09.12.2014.

emigrants such as Peter Havlik, who proved to be predestined for the research agendas due to their expertise and contacts and who used these contacts to actively initiate links with scientists living in the communist states.¹⁸ In a snowball effect, existing contacts were extended for further contacts, and wiiw employees undertook regular trips to establish and deepen contacts.¹⁹ Embassy contacts of Austrian representations abroad were also used to win interested parties for guest stays or for the workshop series. Contacts were possible depending on the country-specific situation of the communist system – unrestricted in the case of Hungary, Poland, Yugoslavia and the Soviet Union, or proving difficult as in the case of Czechoslovakia and Bulgaria.

CONCLUSIONS

Since its foundation, the Institute has proved to be a place of exchange, initiation, deepening and cooperation between economists and economic policy-makers from East and West. This ‘centre of encounter’ between East and West was also of great importance until the political and economic transformation in Eastern Europe, as it enabled institutionalised contact across the political boundaries.²⁰

¹⁸ Interview with Peter Havlik, 09.12.2014; Interview with Kazimierz Łaski, 10.12.2014.

¹⁹ Archive of the wiiw, wiiw Annual Report 1973, p. 6.

²⁰ Telephone call with Ingrid Gazzari, 26.02.2015.

Exploring the separatist-controlled areas of Ukraine from outer space¹

BY ARTEM KOCHNEV²

Since the eruption of the armed conflict in Ukraine in spring 2014, the state of the separatists' economies (DNR and LNR³) remains largely unknown. As the official statistical service of Ukraine stopped collecting data for the territories of the self-proclaimed republics, the professional discussion is limited due to lack of comparable and comprehensive data sources.⁴ With some exceptions that I mention below, policy-makers and professionals have to rely on approximate calculations, journalist investigations and anecdotal evidence.

Up to now, there have been only a limited number of academic contributions with respect to the state of the separatists' economies (Mirimanova, 2017; Gorodnichenko and Talavera, 2016).⁵ One way to obtain an insight into the economies of the regions with poor or absent statistics is to use satellite imagery (Donaldson and Storeygard, 2016). Several studies in economics and remote sensing literature (Henderson et al., 2012 and Chen and Nordhaus, 2015) argue that nighttime luminosity can be a suitable proxy for the level of economic activity in the areas where economic statistics are absent or of a poor quality. Several scholars applied this approach to analyse the economic consequences of the Syrian conflict (Li and Li, 2014; Li et al., 2017).⁶

To the author's knowledge, the war in Ukraine has not received a similar portion of academic interest, with the exception of a blog note by Coupe et al. (2016). Their analysis, however, is restricted to 10 cities (including 6 cities on the territory controlled by Kyiv and 4 controlled by DNR/LNR) and uses only a subsample of the available time coverage from 2014 to 2016. The present study extends the analysis by (a) increasing the sample to urban areas of the whole territory of Ukraine, (b) enlarging the sample through dividing the urban areas into a grid, and (c) extending the time coverage taking into account all available monthly observations from January 2013 to December 2017.

¹ The article is based on the unpublished manuscript of the author's dissertation. The author would like to thank Francisco Litvay for providing access to the GIS software.

² Ph.D. candidate, Johannes Kepler University Linz and University Innsbruck.

³ As of January 2018, two separatists groups effectively controlled some territory of the Donbass region: the so-called Donetsk People's Republic (DNR) and Luhansk People's Republic (LNR). I use the acronyms throughout the text for compactness.

⁴ The DNR government classified the figures of domestic production for 'military reasons'.

⁵ There are other papers related to the conflict (Coupe and Obrizan, 2016; Zhukov, 2016) but they do not concentrate on the economic outcomes of war in their research questions.

⁶ Mainly in the remote sensing and the economic literature though.

SETTING

Prior to war, Donetsk and Luhansk were highly industrialised regions that accounted together for 15% of the Ukrainian GDP and for 25% of the national exports (Adarov et al., 2015). Starting from April 2014, the regions experienced a surge of pro-Russian protests against the change of government in Kyiv, which subsequently escalated into an armed takeover of the regional administrations. The new regional administrations (DNR and LNR) proclaimed their independence from Ukraine in May 2014.⁷ The consequence of the actions was a violent confrontation between the Ukrainian army and the separatists' armed forces that has continued up to now with varying intensity (OSCE, 2017).

Non-DNR/LNR observers usually present a grim picture of the separatists' economies (BBC Ukraina, 2015; Golovatjuk, 2017; Mirimanova, 2017; Coupe et al., 2016). In what follows from the context of the conflict, one can broadly define three sources that put a burden on the local economies. The most apparent one is the direct impact of the conflict that resulted in *destruction of physical capital* and *internal displacement* of people. The second one is the *break-up of the regions' connections* with the Ukrainian financial infrastructure and trade partners as the Ukrainian government prohibited the banking sector to work within the separatists' economies and imposed a ban on trading operations with the local companies (with the exception of the major industrial enterprises before March 2017).⁸ Finally, the change in the local laws and governance practices of DNR and LNR such as *selective nationalisation of enterprises*, the *de-facto multi-currency regime*, and *changes in taxation* were likely to worsen the local business environment.

DATA SOURCES AND PROCESSING

The main source of information I use is the satellite Visible Infrared Imaging Radiometer Suite (VIIRS) luminosity data produced and distributed by the Earth Observation Group (EOG) at the National Oceanic and Atmospheric Administration of the US Department of Commerce (EOG, 2017). The sample contains six monthly-averaged⁹ georeferenced free-cloud images prepared by EOG from 2013 to 2017 with a spatial resolution of 15 arc-seconds.

I use the regional borders of Ukraine from the GADM Project as of August 2015 (Hijmans et al., 2010) as a reference for the imagery and digitised the 'contact line'¹⁰ using the map leaked by the Ukrainian volunteer 'intelligence' group 'Informnapalm.org'. This map was apparently used for negotiations during the first¹¹ Minsk agreement (Unian, 2015). To adjust for the changes of the contact line since the first

⁷ Media and public persons frequently use the term 'Donbass'. Donbass is a name for a historical region that does not have strict borders but is frequently used as a shortcut for the Donetsk and Luhansk administrative regions *together*. I follow this convention in my paper as well.

⁸ The reason for this is not clear. The most plausible explanation is the strategic motive of the DNR government. The largest enterprises supplied valuable resources (coal and steel) to 'mainland' Ukraine earning money and guaranteeing cash flow and employment for the local workers. On the other hand, the enterprises belonged to one of the richest oligarchs, Rinat Akhmetov, who wanted to maintain the economic ties with 'mainland' Ukraine.

⁹ Images for Ukraine are available from October to March only. From April to September the daylight on Ukraine's latitude (around 50 degrees N) is too long for the satellite to provide reliable imagery.

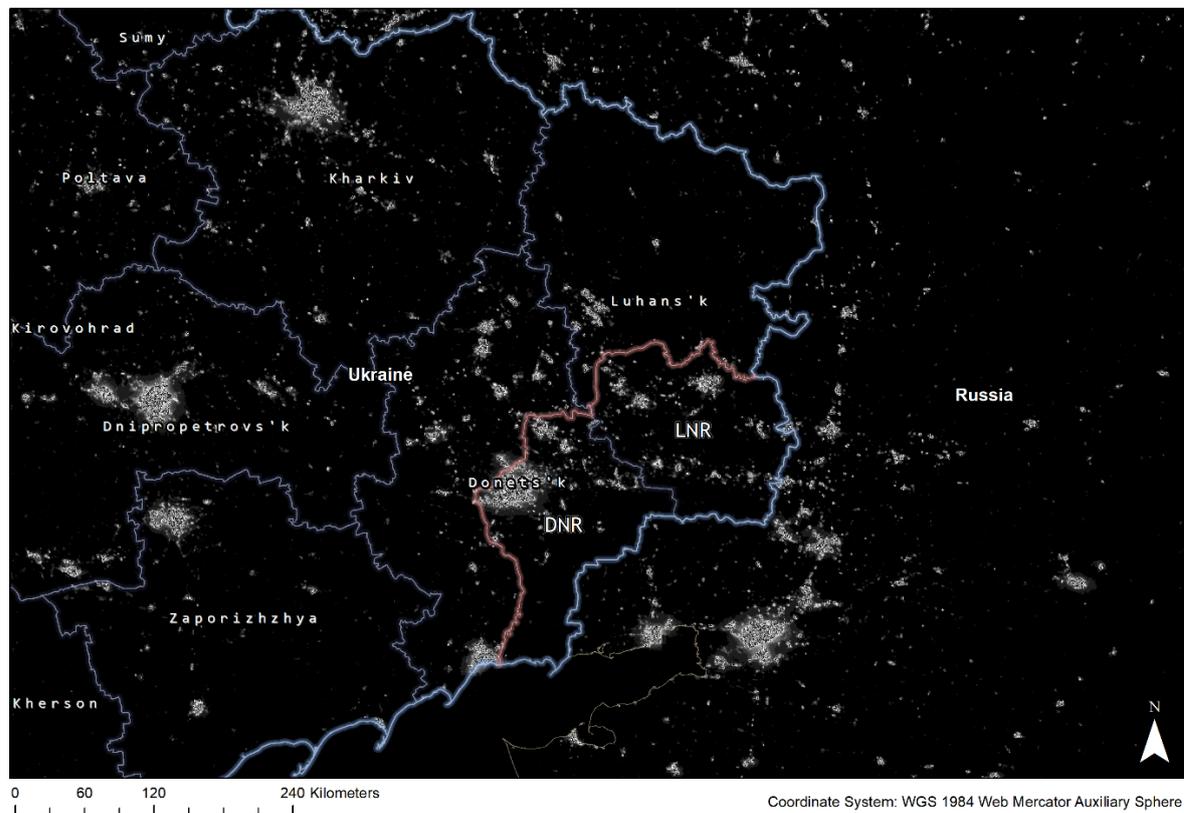
¹⁰ The contact line is an approximate border between the separatist- and government-controlled areas of the Donetsk and Luhansk areas.

¹¹ I was not able to find an alternative map with a detailed georeferenced grid for the later date. Although there were changes in the control of the areas, the ceasefire line should give a good approximation of which party controls which district.

Minsk agreement, I used the manually georeferenced map of the controlled territories published by the Ministry of Defence of Ukraine on 10 May 2018.

Figure 1 gives an overview of the 'raw' luminosity image of Eastern Ukraine as of January 2013. One has to keep in mind, however, that these images may contain temporal lights such as forest fires, boat lights or flares. To exclude temporal lights, I digitise the part of the nighttime images that geographically coincide with the urban areas in the MODIS spatial database¹² and split them into a grid with a cell size of 36x36 arc-seconds each (about 779x779 metres at 48 degrees of latitude). Since the MODIS dataset used the images from 2001-2002, it does not include the urban areas emerging since then and may not take into account new urban areas.

Figure 1 / Average monthly nighttime luminosity of Eastern Ukraine in January 2013



Note: Brighter pixels indicate areas with higher luminosity. Blue lines represent the borders of Ukraine. Red line shows the contact line as of 10 May 2018. The luminosity brightness is discretised from 0 to 10.

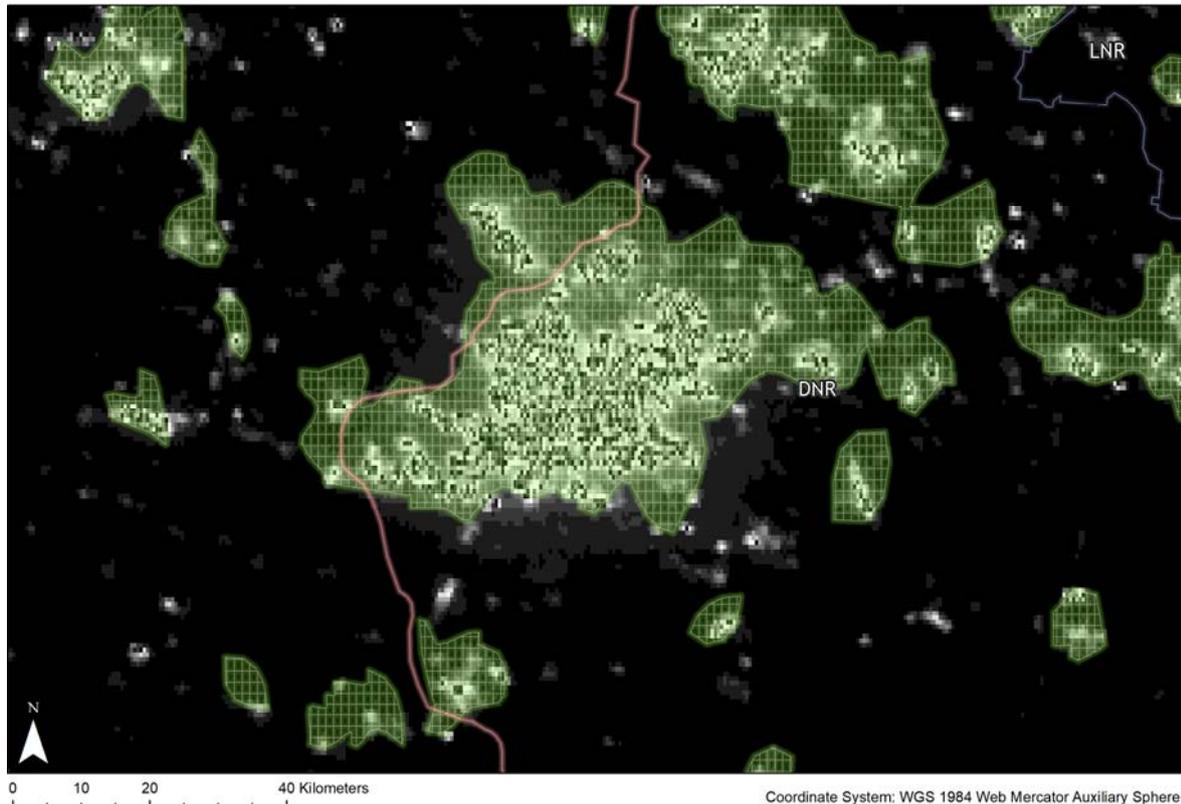
Source: EOG (2017), GADM (2015), Unian (2015). Partially georeferenced by the author.

As Figure 2 demonstrates for the example of the city of Donetsk and surroundings, some of the grid cells 'are cut' by the urban extent map. The resulting area of such observations can be smaller than the spatial resolution of the VIIRS images. Thus, I delete cells that have an area less than the 'native' resolution of the VIIRS images (742 m x 742 m) to circumvent the problem. The resulting data set contains 17,742 out of 22,528 grid cells mapped initially. Finally, I take logarithms of the luminosity levels

¹² The MODIS database defines areas as an urban extent by applying a supervised classification algorithm with region-specific adjustments to the earth-surface images collected by the Moderate Resolution Imaging Spectroradiometer. See Schneider et al. (2010) for more details.

for my analysis. Since luminosity captured from the satellites is characterised by a large inequality of values (a large mass of observations lies close to zero while there are positive extreme values), estimating the statistical parameters (means and standard deviations) from the log-values will provide a more accurate representation of the data-generating process.

Figure 2 / The city of Donetsk and its surroundings divided into a 36x36 arc-second cell grid

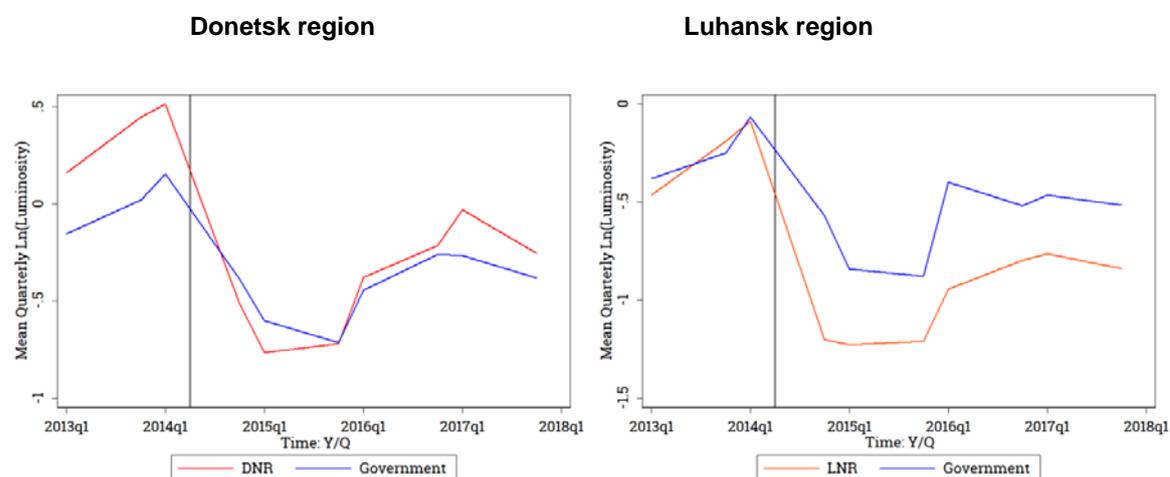


Source: EOG (2017), GADM (2015), Unian (2015), Schneider et al. (2010). Partially georeferenced by the author.

WHO IS BRIGHTER? DONETSK VERSUS LUHANSK

In order to find out whether the introduction of the separatists' control caused some change in the nighttime activity, I compare the changes in luminosity between the government- and the separatist-controlled areas of the respective regions: Donetsk and Luhansk. As one may conclude from Figure 3, there were only minor differences in the change of the luminosity levels prior to the war. Yet as it follows from the graph, the separatist-controlled areas experienced a larger decline in the luminosity levels compared to the state-controlled ones after the conflict started.

Both regions show similar dynamics in terms of luminosity levels: a rising trend before the war, a sharp decline immediately after the start of the full-scale military actions in summer – autumn 2014 and a slight recovery in 2016 that was followed by a plateau in 2017. Notably, the changes in differences (compared to the pre-conflict time) in luminosity levels between the separatist- and state-controlled regions are persistent. This suggests that differences associated with the different economic environment in the separatist-controlled areas are systematic.

Figure 3 / Level of luminosity in the city areas of the Donetsk and Luhansk regions

Note: The vertical line indicates the starting point of the violent protests in the Donetsk and Luhansk regions (April 2014).
Source: Own calculations based on EOG (2017), GADM (2015), Unian (2015), Schneider et al. (2010).

The data in Table 1 support this claim. The yearly aggregates show that

- the differences in luminosity levels are non-random as the yearly mean luminosity values in the war-years lie outside of the 95% confidence interval for all regions starting from 2015;
- the immediate effect of the war is visible for DNR- and LNR-controlled regions only;
- the luminosity of the state-controlled regions of Donetsk and Luhansk experienced a (probably random) decline in 2014 followed by a statistically significant drop in 2015.

Table 1 / Mean log luminosity level in the urban areas of Ukraine by region

Year	Donetsk		Luhansk		Other regions of Ukraine
	DNR	Government-controlled	LNR	Government-controlled	
2013	0.305 [0.27, 0.33]	-0.067 [-0.09, -0.03]	-0.325 [-0.35, -0.29]	-0.313 [-0.36, -0.26]	0.308 [0.29, 0.32]
2014	0.000 [-0.03, 0.031]	-0.117 [-0.15, -0.08]	-0.645 [-0.68, -0.60]	-0.317 [-0.37, -0.26]	0.442 [0.42, 0.45]
2015	-0.742 [-0.77, -0.71]	-0.657 [-0.69, -0.62]	-1.219 [-1.25, -1.18]	-0.859 [-0.90, -0.80]	0.222 [0.20, 0.23]
2016	-0.297 [-0.32, -0.26]	-0.352 [-0.38, -0.31]	-0.869 [-0.90, -0.83]	-0.458 [-0.50, -0.40]	0.416 [0.40, 0.42]
2017	-0.142 [-0.17, -0.11]	-0.324 [-0.35, -0.28]	-0.801 [-0.83, -0.76]	-0.489 [-0.53, -0.44]	0.344 [0.33, 0.35]

Note: 95% confidence interval shown in parentheses. The column 'Other regions of Ukraine' contains all regions of Ukraine except the Donetsk, Luhansk, and Crimea regions.

Source: Own calculations based on EOG (2017), GADM (2015), Unian (2015), Schneider et al. (2010).

Both the Donbass regions and the Ukrainian regions reached the bottom in terms of luminosity levels in 2015. Subtracting the logs luminosity levels between 2015 and 2013 and recalculating into a level form, one can find that the luminosity in the DNR declined by 65% over two years whereas the decline in the

state-controlled areas of Donetsk amounted to 45% 'only'. This is to be compared with the 59% decline in LNR, 42% drop in the government-controlled areas of Luhansk and 8% luminosity reduction for the rest of Ukraine.¹³

At the same time, the post-2015 luminosity growth was greater in the separatist areas, with DNR 'recovering' faster than the other regions. The DNR areas in 2017 became brighter by 82%, the LNR ones by 52% compared to 2015. The corresponding growth values for the government-controlled areas of Donetsk and Luhansk are 40% and 49% respectively. Despite the higher pace of catching up, the separatist-controlled areas in 2017 still lag further behind the initial luminosity levels of 2013 compared to the government-controlled areas: 36% vs 23% gap in Donetsk and 38% vs 16% in Luhansk.

CONCLUSION

As nighttime luminosity is a proxy for economic activity, the observed changes in the level of luminosity over time (and in comparison with the government-controlled area) allow to draw certain conclusions with respect to the economic performance of the self-proclaimed 'people's republics'. The available VIIRS-based data were detailed enough to capture the differences in the luminosity levels in the conflict-affected areas. According to them, the separatist-controlled areas were performing 17 to 20 percentage points worse than the government-controlled areas. Although the separatist-controlled areas 'recovered' faster over the period from 2015 than the government-controlled territories, they still lag further behind the pre-war luminosity values.

One has to warn, however, that the resulting estimates may be subject to a measurement bias due to systematic differences in how the satellite records images in different parts of Ukraine. A standard approach (Henderson et al., 2012) to circumvent this problem would be to estimate a fixed effect model that would take care of the unobserved time-invariant heterogeneity in the measurement of luminosity.

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¹³ As the luminosity values are expressed in logs, one can interpret the differences as percentage change. Yet the change in logarithm values will give an approximation only. To compute the percentage change, I used the following formula:
$$\Delta = (e^{x_t - x_{t-1}} - 1) * 100\%$$

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The drivers and effects of eco-innovations: What is the role of public policy intervention?

BY SANDRA M. LEITNER¹

THE IMPORTANCE OF ECO-INNOVATION

Given the benefits they can generate, innovation, and with it *environmental or eco-innovation (EI)*, has been moved into the centre of the Europe 2020 strategy for smart, sustainable and inclusive growth and job creation.² The European Commission defines eco-innovation as ‘... any form of innovation resulting in or aiming at significant and demonstrable progress towards the goal of sustainable development, through reducing impacts on the environment, enhancing resilience to environmental pressures, or achieving a more efficient and responsible use of natural resources’ (European Commission, 2011, p. 2).

In particular, EI has the potential to produce dual advantages: first, EI can address some of the EU’s current crucial societal challenges such as (i) secure, clean and efficient energy in times of increasingly scarce resources, growing energy needs and climate change, (ii) smart, green and integrated transport and transport systems that are more energy secure and efficient and less harmful to health, and (iii) climate change, resource efficiency and raw materials security of the economy. Second, EI can contribute strongly to the EU’s competitiveness and help stimulate economic growth.

Hence, to fully embrace and harness its full potential, the uptake of EI needs to be fostered and facilitated and still existing barriers need to be dismantled to promote, accelerate and diffuse EI. In view of the important role assigned to EI, we analyse the key drivers and barriers of EI which not only allows us to determine important bottlenecks but also to identify vital areas of policy intervention. Furthermore, we also look at the effects of EI and its competitiveness-enhancing potential to further substantiate the call for more EI in the EU.³

DRIVERS OF INNOVATION AND ECO-INNOVATION

For this purpose, the workhorse-model in innovation studies – the CDM⁴ model (Crépon et al., 1998) – was applied. It captures the complexity of innovation processes and portrays three different relationships in a sequential way: (i) the drivers and determinants of innovation inputs, (ii) the relationship between innovation input and innovation output, and (iii) the relationship between innovation output and firm performance. We simultaneously analysed innovation in general and EI in particular which allows us to

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² <https://ec.europa.eu/programmes/horizon2020/>.

³ In Leitner (forthcoming).

⁴ Named after their authors Bruno Crépon, Emmanuel Duguet and Jacques Mairesse.

shed light on and compare the differences in drivers and effects of both types of innovations. Moreover, we distinguish between different *product*⁵ and *process*⁶ EI to better bring out their differences and particularities.

As far as data are concerned, we used the latest wave of the German Community Innovation Survey (CIS) – the Mannheim Innovation Panel – pertaining to the period 2012-2014.

The results show that *R&D investments* are an important factor for both types of innovations, but appear to be more important for the development of EI.

Moreover, the results point to several important *drivers* of EI. For instance, EIs are more likely if accompanied by *fixed capital investments*. This underlines that, given the high degree of novelty of EI, complementary investments in machinery and equipment and software are necessary for successful eco-innovative activities. However, in the face of partly substantial funding constraints⁷ – which are particularly acute for SMEs⁸ – quick and effective policy intervention is needed to facilitate access to financial resources. Furthermore, *current or expected future demand* was found to be another key driver of EI, which underscores the need for effective demand-side policies to raise awareness for and the attractiveness of EIs among consumers and guarantee their envisaged increased market uptake and diffusion through society. Similarly, *voluntary actions or industry-specific standards, improving the firm's reputation* and *rising costs for energy or other resources* also provide strong incentives to undertake EI.

Public policy plays a non-negligible but somewhat differentiated role for EI. For instance, entrepreneurs are more likely to introduce EI if they receive *public financial support* for EI but remain unresponsive to existing *environmental taxes or fees*. Hence, direct public financial support is a strong incentive towards more EI while higher costs – in terms of taxes or fees – are not. In contrast, however, there is no evidence in support of the so-called 'Porter hypothesis' (Porter and van der Linde, 1995) which emphasises that *environmental regulations* are strongly needed to induce entrepreneurs who lack experience with environmental matters and are unable to recognise the cost-saving potential of environmental innovations to realise environmentally and economically beneficial innovations. Particularly, results demonstrate that both current and future regulations for EI are unable to encourage entrepreneurs to introduce EI. This is due to the absence of stricter environmental regulations in Germany after 2010 and the subsequent lack of any incentives for further adjustments to adhere to them.

⁵ Product EI refers to innovations with the following environmental benefits during the consumption or use of a good or service by the end user: (i) reduced energy use or CO₂ 'footprint', (ii) reduced air, water, noise or soil pollution, (iii) facilitated recycling of products after use, and (iv) extended product life through longer-lasting, more durable products.

⁶ Process EI refers to innovations with the following environmental benefits obtained within the enterprise: (i) reduced material or water use per unit of output, (ii) reduced energy use, (iii) reduced CO₂ 'footprint', (iv) reduced air pollution, (v) reduced water and soil pollution, (vi) reduced noise, (vii) replaced a share of materials with less polluting or hazardous substitutes, (viii) replaced a share of fossil energy with renewable energy sources, and (ix) recycled waste, water, or materials for own use or sale.

⁷ See, e.g., Álvarez and Crespi (2011), Hajivassilou and Savignac (2008), Mancusi and Vezzulli (2010) or Männasoo and Meriküll (2011).

⁸ See, e.g., Beck et al. (2006).

However, at the level of **individual product and process EIs**, drivers play a more differentiated role:

- › *Present regulations* only help trigger EIs that reduce air emissions or replace dangerous substances.
- › *Present taxes or charges* only matter for product EIs which facilitate recycling of products after use.
- › *Future regulations/taxes* trigger almost all types of EI and are quantitatively most important for process EIs which reduce CO₂ emissions or replace fossil energy sources with renewable ones.
- › *Public financial support* matters for a few EIs only, most notably for process and product EI which help reduce energy use.
- › *Present or expected future demand* is particularly effective for product EIs.
- › *Improved reputation* is of little relevance and only triggers EIs which help reduce CO₂ emissions and other air emissions and facilitate recycling of products after use.
- › In contrast, *voluntary actions or industry-specific standards* are relevant for the majority of EIs, particularly product EIs.
- › Finally, *rising energy costs* matter for a few EI only but, as expected, are quantitatively most important for product EIs which help reduce energy use.

PRODUCTIVITY-ENHANCING EFFECTS OF INNOVATION AND ECO-INNOVATION

Innovative activities are found to be commercially beneficial and foster competitiveness: innovators, in general, and eco-innovators, in particular, are more productive than non-innovators. However, this productivity-enhancing effect is considerably higher for innovations than for EI.

Furthermore, productivity-enhancing effects also differ by type of product and process EI. In particular, productivity is higher for firms that introduced process EIs which reduce energy use, other air emissions and the pollution of water or soil, and help recycle waste, water or materials, and product EI which reduce air, water, soil emissions and noise or facilitate recycling of products after use. In contrast, productivity is lower for firms that introduced process EIs which reduce material/water use and noise and which serve to replace fossil energy sources with renewable ones, and product EI which extend the lifetime of products.

CONCLUSION

In summary, our analysis identifies some key drivers of EI and therefore points to important areas of policy intervention. For instance, (current or future expected) demand provides a strong incentive towards eco-innovative activities which emphasises the need for active demand-side policies to encourage the quicker development and uptake of EIs. Similarly, in view of the strong need for complementary fixed capital investments of EIs but the presence of non-negligible funding constraints,

effective policy interventions are necessary to ease access to affordable financial sources. Furthermore, not all public policies geared towards EI prove effective. While direct public financial support is a key incentive towards EI, neither negative incentives in the form of environmental taxes or fees nor environmental regulations encourage the development of EI.

Finally, as concerns the associated commercial benefits of EI, with some exceptions, we find productivity- and competitiveness-enhancing effects, which not only underscores the important role of EI as a source of competitiveness and growth but also emphasises the need for further initiatives and policies to encourage EI.

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European Innovation Partnerships: How efficient have they been in promoting innovation in the EU?

BY RUMEN DOBRINSKY¹

WHAT ARE THE EUROPEAN INNOVATION PARTNERSHIPS?

The European Innovation Partnerships (EIPs) were launched as one of the commitments (Commitment 29 or C29) within the EU Flagship Initiative *Innovation Union*. The Communication from the European Commission on the Innovation Union (IU) stressed the need to pool European resources in order to achieve innovative breakthroughs that would address major societal challenges faced by Europe at the moment such as population ageing, the effects of climate change, and the reduced availability of resources, among others.² The EIP concept was put forward as a practical approach to achieve such a thrust. EIPs should also address existing weaknesses in the European research and innovation system such as under-investment in knowledge generation and diffusion, framework conditions which are not sufficiently innovation-friendly, fragmentation and duplication of efforts, low involvement of users and insufficient alignment of public actions.

The European Commission defines EIPs as a new, challenge-driven approach to EU research and innovation, focusing on societal benefits and rapid modernisation of the associated sectors and markets. According to their declared objectives, 'EIPs should act across the whole research and innovation chain, bringing together all relevant actors at EU, national and regional levels in order to: (i) step up research and development efforts; (ii) coordinate investments in demonstration and pilots; (iii) anticipate and fast-track any necessary regulation and standards; and (iv) mobilise "demand", in particular, through better coordinated public procurement to ensure that any breakthroughs are quickly brought to market'.³

By embarking on the EIP initiative, the EU aimed to instal a new logic of innovation by integrating, harnessing and exploiting Europe's potential in a way that creates a new ecosystem of innovation and by operating across demand and supply.⁴ The EU launched five EIPs to address important societal challenges:

(1) Active & Healthy Ageing;

¹ This note was written as part of the project 'Investigating the Impact of the Innovation Union (I3U)'. The project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 645884.

² http://ec.europa.eu/research/innovation-union/pdf/innovation-union-communication_en.pdf#view=fit&pagemode=none

³ http://ec.europa.eu/research/innovation-union/index_en.cfm?pg=eip

⁴ European Commission (2014), 'Outriders for European Competitiveness. European Innovation Partnerships (EIPs) as a Tool for Systemic Change', Report of the Independent Expert Group, European Commission, Directorate-General for Research and Innovation.

- (2) Water;
- (3) Agricultural Productivity and Sustainability;
- (4) Raw Materials;
- (5) Smart Cities and Communities.

This note presents a summary of the preliminary assessment of the state of implementation of the EIPs and their direct impact. The EIPs are living structures which have developed dynamically since their inception. The five existing EIPs are of a very different nature and each of them has been following its specific course of evolution. We seek to highlight, on the one hand, this diversity and, on the other hand, the common features among the EIPs that integrate them as one distinguished strand in the ambitious IU project.

PUTTING THE EIP INITIATIVE INTO PRACTICE

In contrast to other IU commitments, the initial effort in C29 implementation followed a top-down approach driven by the European Commission. The EC also supported and facilitated the shaping of the EIPs' governance structures as well as the preparation and adoption of their guiding principles and planning documents.

The five EIPs have identical or similar governance structures. Each EIP is led by a Steering Group (SG) composed of stakeholders from the respective sector that provides strategic direction, leadership and guidance for the EIP. At the launch of each EIP, the EC took the lead in identifying and approaching the initial members of the SGs from within its stakeholder networks in each respective sector/area. For this purpose, high-level EC officials (in most cases at the Commissioner level) approached and invited high-profile individuals from different EU Member States, typifying the stakeholder communities in the respective sectors, with invitations to become members of the Steering Group in their personal capacity. High-level EC officials also chaired and led the initial sittings of the SGs and took part in subsequent meetings. With time, the SGs became self-governing bodies with some regular rotation in their membership.

The SGs' main initial task was the preparation and adoption of Strategic Implementation Plans (SIPs) for the respective EIPs; later, the SGs led and guided the process of putting the SIPs into operation. SIP preparation itself was an iterative task involving both top-down and bottom-up elements. It involved the process of identifying the Priority Areas that each EIP set for itself and establishing the mechanisms for pursuing these priorities. In turn, the latter implied the establishing of Action (also called Focus or Expert) Groups (AGs) that took on themselves the planning, organisation and management of activities supporting the respective Priority Areas and, importantly, mobilising of EU-wide international stakeholder networks around each Priority Area.

While the first push in setting this process in motion came from the top (starting from the SGs and then the AGs), the actual planning of concrete implementation activities was very much conducted in a dialogue between AGs and stakeholder communities. Stakeholder communities were invited to come up with ideas and initiatives that they considered relevant to the respective EIP. These were then processed and aggregated and passed back to the SGs as proposed inputs to the SIPs. Several

iterative rounds of this sort were usually conducted before the SIPs took their shape and were endorsed by the SGs.

The SIPs themselves are considered as living documents and are subject to periodic review, update and revision depending of the success or problems encountered in implementation, the identification of new priorities and other factors. The structure of all SIPs is broadly identical: it formulates key objectives of the EIP as well as headline targets that epitomise the objectives. Objectives and targets may be both quantitative and qualitative. The SIP finalises the EIP Priority Areas as well as the main actions that are envisaged to be undertaken in these areas within the SIP horizon. The SIP also outlines the key tools and resources that the EIP plans to develop/mobilise and use in the implementation of its actions.

The most important operational implementation mechanism envisaged by all EIPs has been the mobilisation of motivated stakeholder communities which generate bottom-up commitments within the respective Priority Areas and drive the pursuit of the EIPs' targets and objectives. For this to materialise, the EIPs' governance bodies developed appropriate incentives aimed at motivating the stakeholder communities to generate such commitments. This was also one of the most difficult and problematic parts in the EIP implementation as none of them had dedicated budgets (and hence own financial instruments) set aside in support of implementation. EIPs were supposed to resort to existing EU and national funding sources and schemes for the support of their activities.

Ultimately, it is expected that stakeholder commitments that are being executed (or at least the most successful among them) would over time be scaled up. For this purpose the EIPs' governance structures were also tasked with the wide dissemination of indigenous best practice that the EIPs generate and with the showcasing of success stories initiated in the context of their activities. In 'leading by example', it is expected that such success stories would be taken up by other stakeholders thus contributing to the scaling up of innovative practices.

WHO IS IN CHARGE OF THE EIPS?

Throughout implementation the EC has been taking a pro-active stance by providing supervision, advice, support and technical assistance. However, since their launch, each EIP has taken its own performance course following its own logic. With time, divergences in organisation, planning, execution and outcomes have surfaced and deepened while progress towards objectives has been rather uneven across EIPs.

Individual implementation patterns were shaped under the combined effect of two different types of pressure:

- (i) 'top-down', coming from the EC and seeking to direct EIP activities towards the key objectives of EIPs as formulated at their inception and
- (ii) 'bottom-up', reflecting the interests of the stakeholder communities that each EIP mobilised in the course of implementation, which were not necessarily identical to or fully aligned with the initial EIP objectives.

At the launch of the EIPs, their performance was dominated by top-down pressures coming from the EC which sought to give a push towards the EIPs' desired goals. However, C29 was not apportioned with funds specifically allocated for the pursuit of its objectives. This initiative was expected to raise such funds from already available sources both at the EC, national and regional levels as well as to mobilise private funding. The absence of funds clearly earmarked for bonding EIP implementation to their key objectives made it difficult for the EC to continuously steer the implementation course in the envisaged direction. Fundraising from other sources often entailed the need to find a compromise between the EIP objectives and the conditionality of the respective funding agencies. Private interests were another dimension to this compromise.

The organic evolution of the EIP constituencies and stakeholder communities was another factor that added a distorting effect in shaping the EIPs' agendas. As all EIPs were delineated strictly by a sectoral characteristic, each EIP attracted a stakeholder community self-defined in the first place by its belonging to the respective sector but not necessarily to a community of innovators. This could be traced already at the top governance level (the Steering Groups have been dominated by sectoral experts) and was even more pronounced for the lower structural units (action, focus, operational groups). Thus the EIPs evolved basically as vertical structures largely defined by their sectoral characteristic. Consequently, bottom-up pressures started growing in importance (in particular, in the periodic revisions and updates in the EIP implementation plans) and they exerted a bias in the EIP activities mostly reflecting the sectoral interests of the stakeholder communities mobilised in implementation.

Thus, over time, the balance between top-down and bottom-up pressures gradually shifted from the former to the latter with the EIPs' agendas increasingly reflecting the interests of the stakeholder communities but not necessarily the initial innovation objectives. One critical factor that contributed to such a shift was that the 'top' had few levers to direct the EIP implementation agendas towards the desired direction, at least, the way the latter was formulated initially. Such an outcome basically reflects a conceptual and design flaw of the EIPs: they were pursuing vertical policy objectives (in the sense that the EIPs are sectorally delineated) mostly with horizontal policy approaches while no relevant policy instruments and levers were available at their direct disposal.

Another distorting factor was the lack of a targeted focus on innovators proper which can also be considered as a conceptual and design flaw of the EIP model. The stakeholder segment that is most visibly missing in EIP implementation is that of innovative entrepreneurs. Innovative entrepreneurs are missing already in the EIP inception documents and subsequently in the key EIP guiding documents (such as the SIPs) and in the activities of the lower-level operational structures. In consequence, the EIPs tended to focus on the nature of the societal challenges that they were addressing but not on the possible innovations that could address such challenges.

What happened in EIP implementation was that the combined effect of the above factors caused a drift in the nature of EIP activities: while these preserved their sectoral orientation, they shifted away from what should have been their main focus – innovation actions. As a result, all EIPs have been reporting relatively small shares of 'innovation activities' in the strict sense.

Summing up, due to the above design and implementation flaws, over the course of implementation, the EIPs were partly captured by sectoral industry and/or stakeholder interests. The stakeholder groups that emerged bottom-up tended to refocus the centre of EIP activities towards sector-specific issues and

interests but not necessarily related to innovation. Consequently, actual implementation started to deviate considerably from the initial concept and there has been a general lack of innovation drive in the activities of all EIPs. Crucially, it is difficult to detect results that could be classified as 'innovative breakthroughs', something that was among the EIPs' key objectives.

C29 OBJECTIVES AND OUTCOMES

The core C29 rationale as envisaged in their inception documents weighs towards the 'innovation component' of the EIPs and stresses that partnerships are conceived as a mechanism for achieving innovative 'breakthroughs'. In addition, the EIPs were aimed at delivering supportive framework conditions for achieving such innovation goals. By contrast, such innovation components were largely watered down in the self-proclaimed objectives and targets of the EIPs. Even in the cases when the notion of 'innovation' is present in EIP documents and the formulation of targets, tasks, activities, etc., a closer look into the context reveals that in many instances the innovative component of the respective target, task or activity is marginal. At the same time, the EIPs' self-declared goals weigh heavily towards sector-specific objectives and targets, which apparently reflect the interests of these communities.

On the other hand, the 'partnership' component of the EIP concept seems to have been implemented successfully. Each EIP managed to bring together communities of relevant actors (stakeholders at regional, national and EU level) and were successful in mobilising them to work together on joint projects. The key success factor in this aspect has been the EIPs' reliance on the convening power of the EC and the direct involvement of EC officials in the implementation process. Thanks to this, the EIPs did and do perform efficient systemic coordination and information brokerage: they facilitated linkages, knowledge and risk sharing among stakeholders, and promoted collaborative models among them. Consequently, the EIPs have been also relatively successful in pursuing objectives and targets related to the improvement of framework conditions, including those for innovation.

There are a number of examples of successful implementation in this area: all EIPs mobilised engaged communities of stakeholders from different countries across the whole EU; they mobilised an ongoing stream of bottom-up commitments by their stakeholder communities; most EIPs support and maintain very active online 'marketplaces' which support networking and stakeholder collaboration; all EIPs developed tools facilitating collaborative models of joint work; some EIPs actively engaged in the development of new standards in their respective sectors; the EIPs produced policy recommendations aimed at improving framework conditions and disseminated widely best practice; most EIPs have examples of successful pilot actions and plans for their scaling up. Thanks to the relatively efficient functioning of the EIPs as partnerships engaged in common objectives, they have also been relatively successful in pursuing the objectives they set for themselves which, however, diverge from the C29 objectives envisaged at inception.

STRENGTHS AND WEAKNESSES OF C29 AS A POLICY INTERVENTION

Commitment 29 has been pursuing successfully some of its objectives and goals. The EIPs have been especially successful, effective and efficient in their 'partnership' aspect and component. The EIPs designed and put in place effective and efficient novel implementation instruments and mechanisms such as the bottom-up 'commitment approach' and the online marketplaces. These mechanisms

ensured shared interest by the participating stakeholder groups in the pursuit of common goals and their engagement in the successful completion of the activities that were undertaken. These C29 achievements represent innovative solutions and can be considered as good practice worth disseminating in other EU areas and programmes.

At the same time, implementation revealed an important inconsistency, rather a flaw, in the EIP design, namely, that they served poorly one of their main objectives – to boost innovation and innovative breakthroughs that would enable European companies to lead in the development of new technologies and assume global leadership in new growth markets. In reality, the EIPs were gradually transfigured into efficient and relevant problem-solving mechanisms and structures that do address important societal challenges and add EU value but do not necessarily generate innovation of the expected and desired scale and scope. Importantly, so far the EIPs do not seem to have produced any major innovative breakthroughs, which was a central policy rationale for their launch. Given the recent EIP implementation and performance trends, it is unlikely that C29 will produce such breakthroughs within the time horizon the EIPs set for themselves.

The reasons for this failure – and transmutation of the EIPs – are complex and include a combination of factors that surfaced in the course of EIP implementation. From the very start, innovation proper and the generation of innovation outputs were not assigned the needed priority in the EIP objectives and headline targets. One key innovation stakeholder – the innovative entrepreneur – has been clearly missing in the EIPs' activities. The non-existence of funds specifically targeted to support the development of innovative products by the EIPs amounted to the absence of another support pillar. In the absence of such funds, the EIP activities tended to concentrate on activities that did mobilise funding from other sources but were not necessarily focused on innovation. Thus the EIPs gradually lost their focus as mechanisms targeting innovation.

If the EIPs are to continue pursuing the objectives set for them at their inception, including the pursuit of innovative breakthroughs, their governance structures and mechanisms as well as their implementation plans would need to be thoroughly revamped to remedy these problems.

Monthly and quarterly statistics for Central, East and Southeast Europe

The monthly and quarterly statistics cover **20 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	HUF	Hungarian forint	RSD	Serbian dinar
BAM	Bosnian convertible mark	KZT	Kazakh tenge	RUB	Russian rouble
BGN	Bulgarian lev	MKD	Macedonian denar	TRY	Turkish lira
CZK	Czech koruna	PLN	Polish zloty	UAH	Ukrainian hryvnia
HRK	Croatian kuna	RON	Romanian leu		
EUR	euro – national currency for Montenegro and for the euro-area countries Estonia (from January 2011, euro-fixed before), Latvia (from January 2014, euro-fixed before), Lithuania (from January 2015, euro-fixed before), Slovakia (from January 2009, euro-fixed before) and Slovenia (from January 2007, euro-fixed before).				

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

Online database access



wiiw Annual Database



wiiw Monthly Database



wiiw FDI Database

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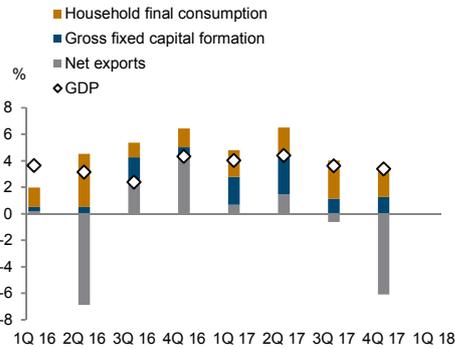
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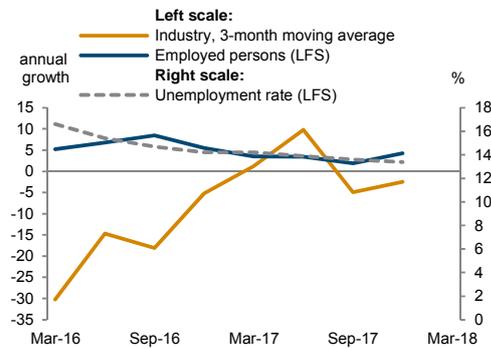
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Albania

Real GDP growth and contributions
year-on-year



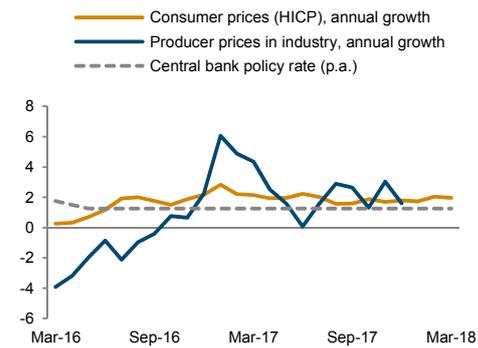
Real sector development
in %



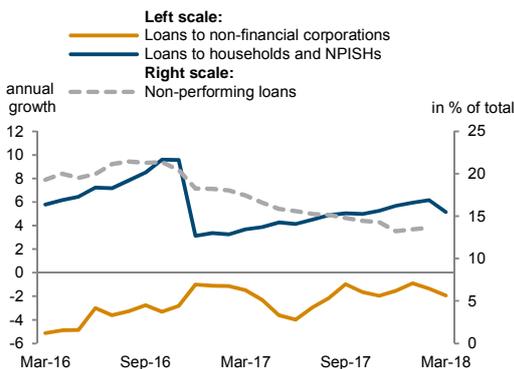
Unit labour costs in industry
annual growth rate in %



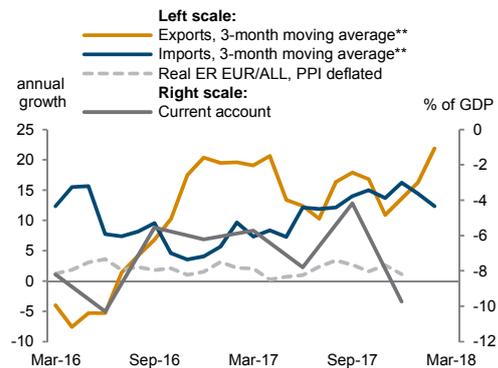
Inflation and policy rate
in %



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.

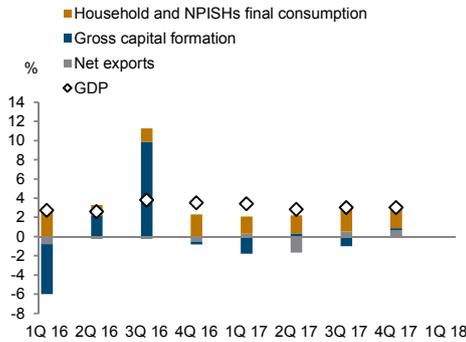
Source: wiiw Monthly Database incorporating Eurostat and national statistics.

Baseline data, country-specific definitions and methodological breaks in time series are available under:

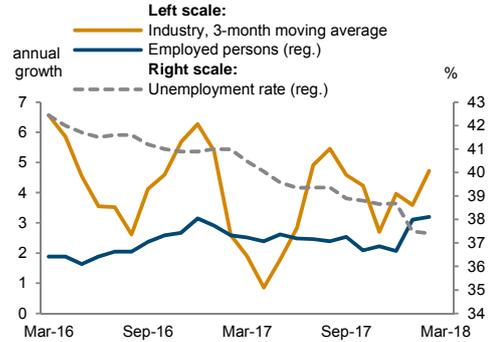
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Bosnia and Herzegovina

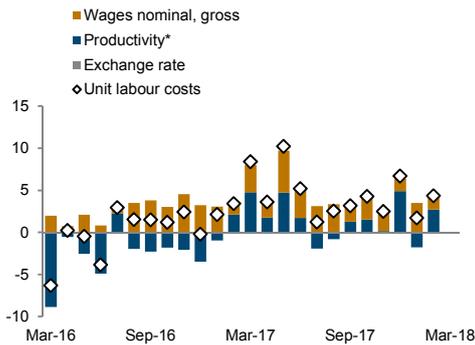
Real GDP growth and contributions
year-on-year



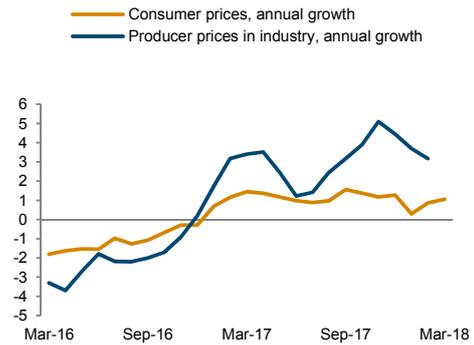
Real sector development
in %



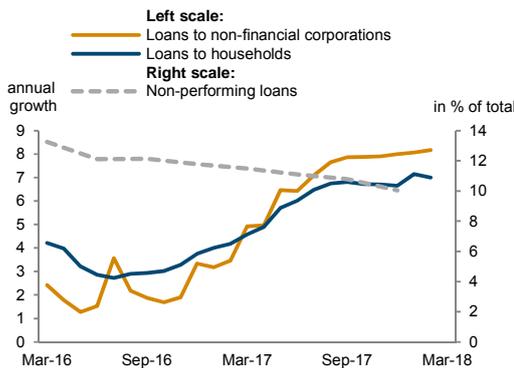
Unit labour costs in industry
annual growth rate in %



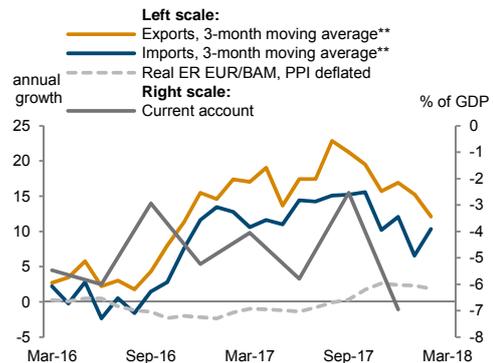
Inflation
in %



Financial indicators
in %



External sector development
in %



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

**EUR based.

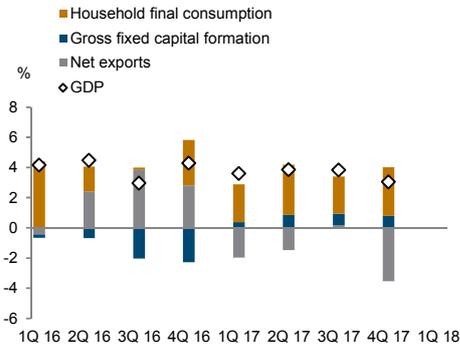
Source: wiiw Monthly Database incorporating Eurostat and national statistics.

Baseline data, country-specific definitions and methodological breaks in time series are available under:

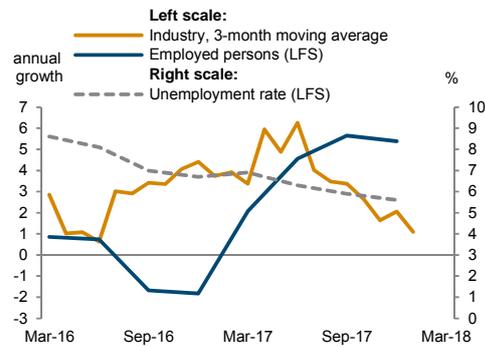
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Bulgaria

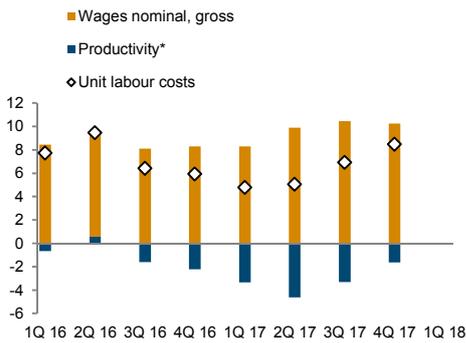
Real GDP growth and contributions
year-on-year



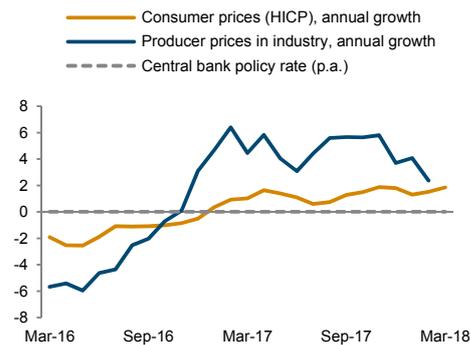
Real sector development
in %



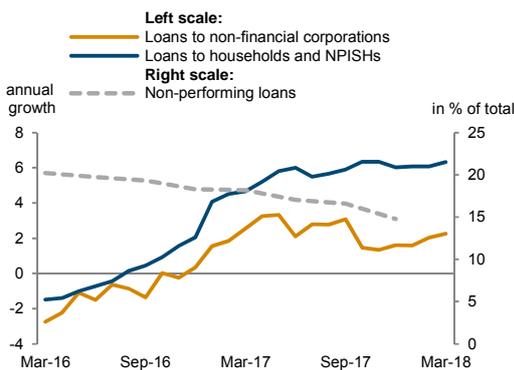
Unit labour costs in industry
annual growth rate in %



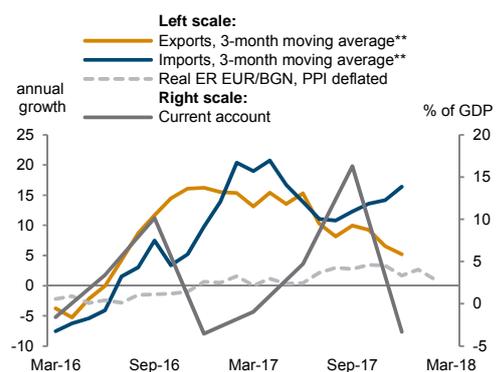
Inflation and policy rate
in %



Financial indicators
in %



External sector development
in %



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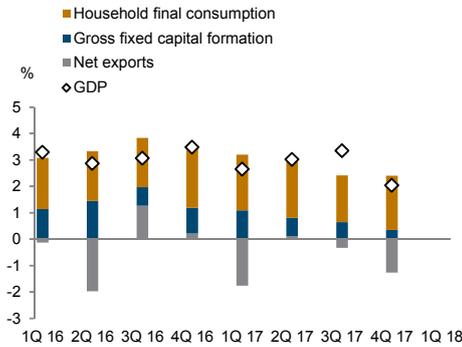
Source: wiiw Monthly Database incorporating Eurostat and national statistics.

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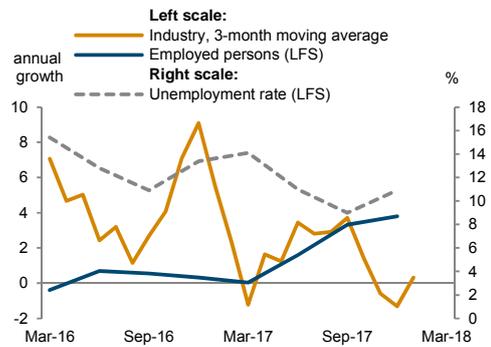
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Croatia

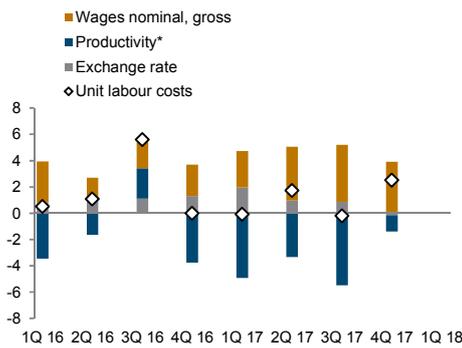
Real GDP growth and contributions
year-on-year



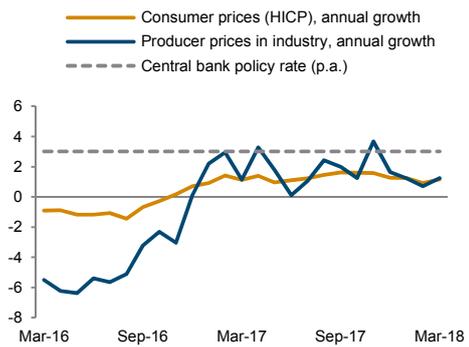
Real sector development
in %



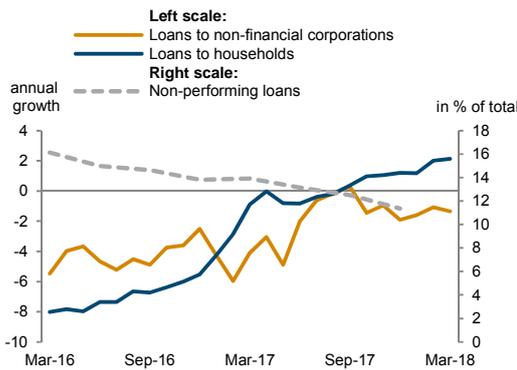
Unit labour costs in industry
annual growth rate in %



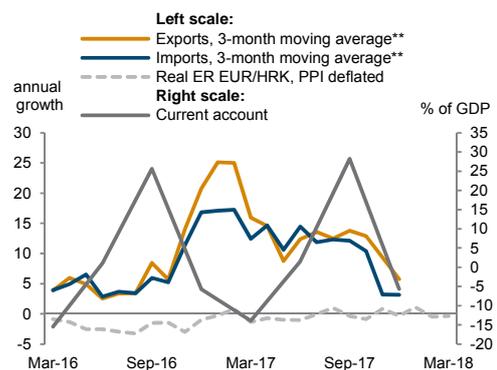
Inflation and policy rate
in %



Financial indicators
in %



External sector development
in %



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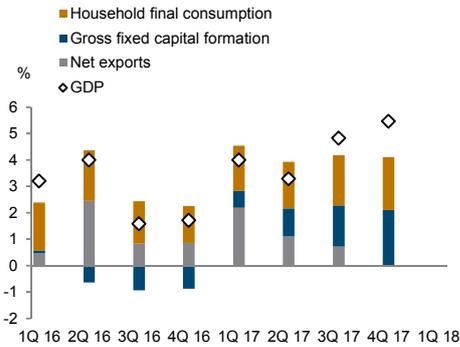
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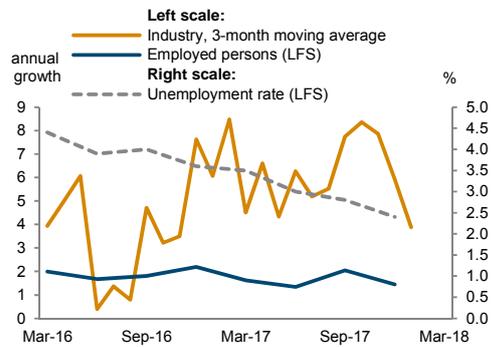
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Czech Republic

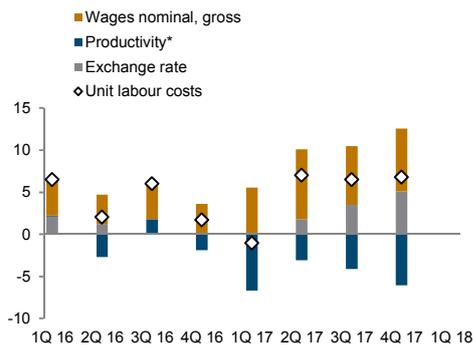
Real GDP growth and contributions
year-on-year



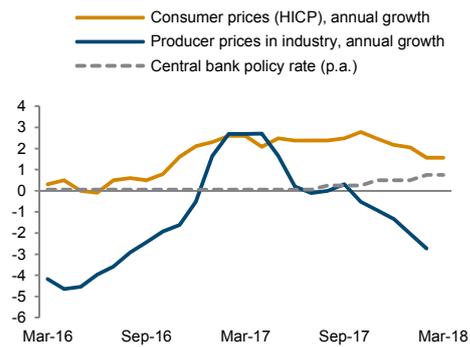
Real sector development
in %



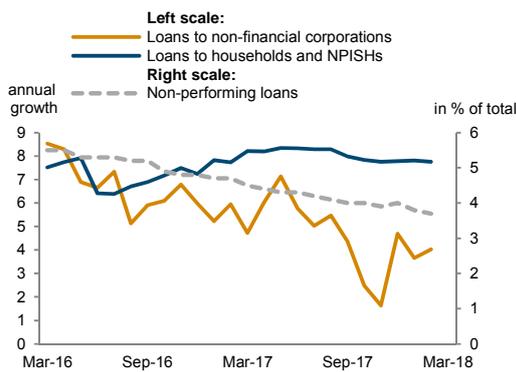
Unit labour costs in industry
annual growth rate in %



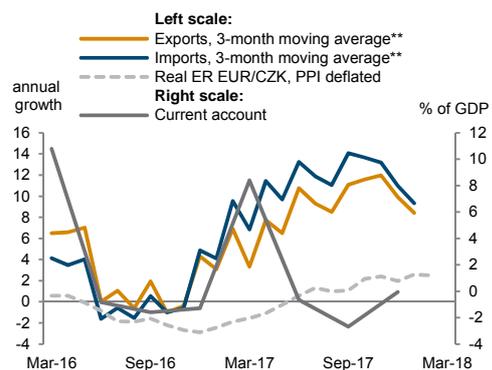
Inflation and policy rate
in %



Financial indicators
in %



External sector development
in %



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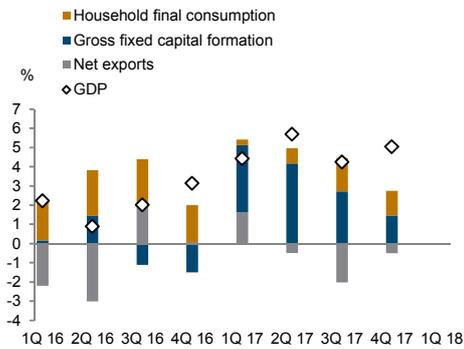
Source: wiiw Monthly Database incorporating Eurostat and national statistics.

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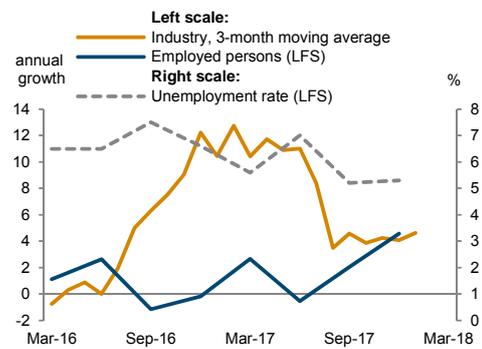
<https://data.wiiw.ac.at/monthly-database.html>

Estonia

Real GDP growth and contributions
year-on-year



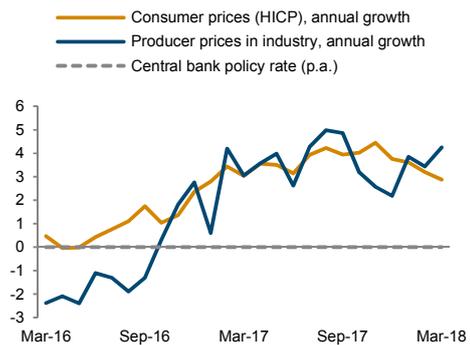
Real sector development
in %



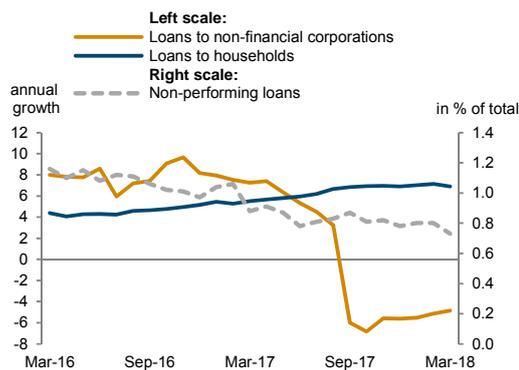
Unit labour costs in industry
annual growth rate in %



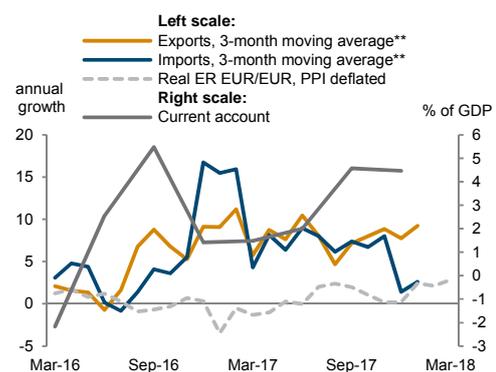
Inflation and policy rate
in %



Financial indicators
in %



External sector development
in %



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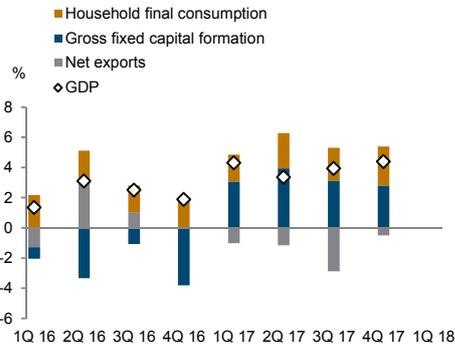
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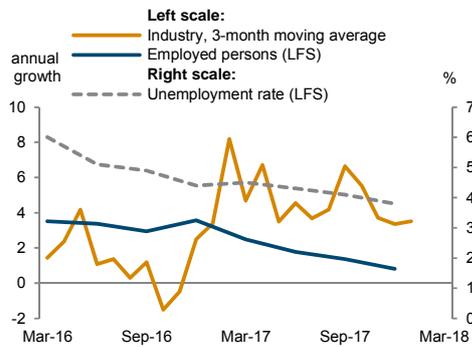
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Hungary

Real GDP growth and contributions
year-on-year



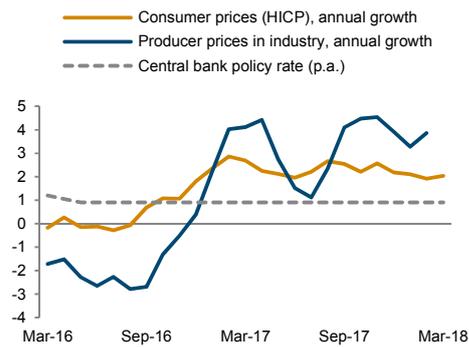
Real sector development
in %



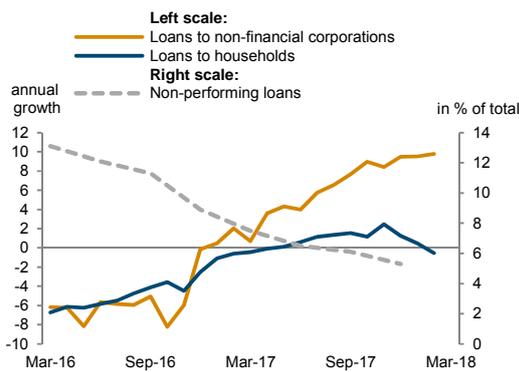
Unit labour costs in industry
annual growth rate in %



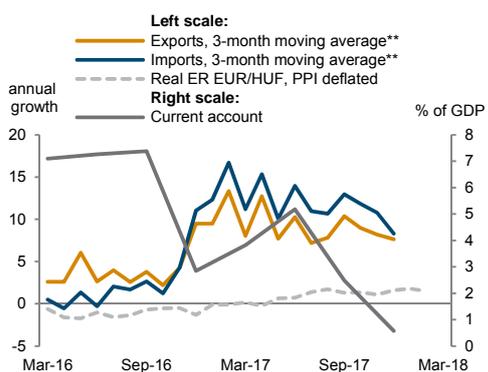
Inflation and policy rate
in %



Financial indicators
in %



External sector development
in %



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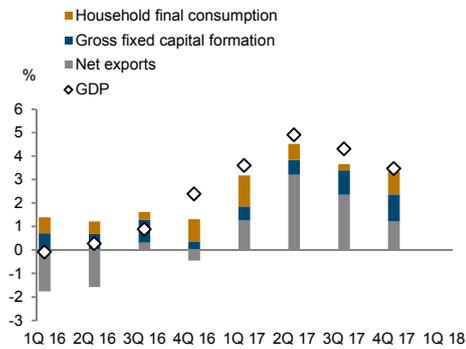
Source: wiiw Monthly Database incorporating Eurostat and national statistics.

Baseline data, country-specific definitions and methodological breaks in time series are available under:

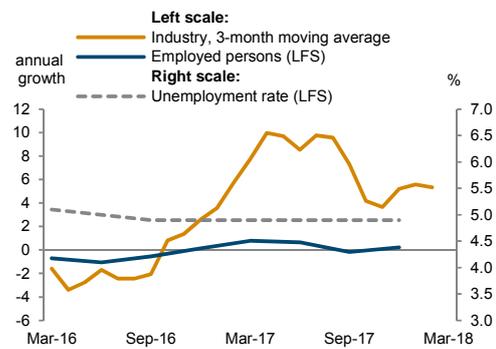
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Kazakhstan

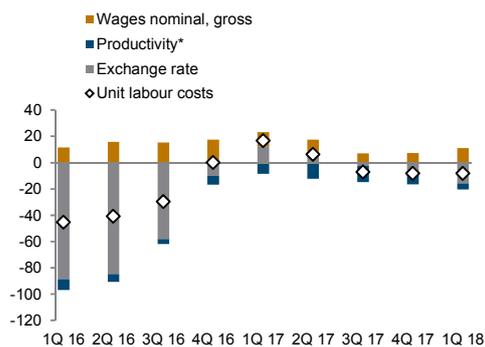
Real GDP growth and contributions
year-on-year



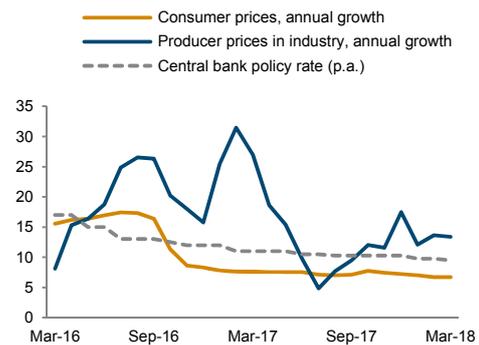
Real sector development
in %



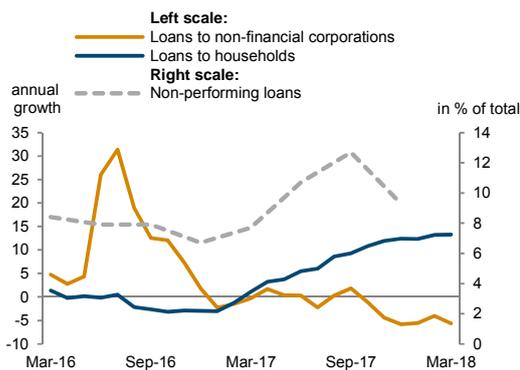
Unit labour costs in industry
annual growth rate in %



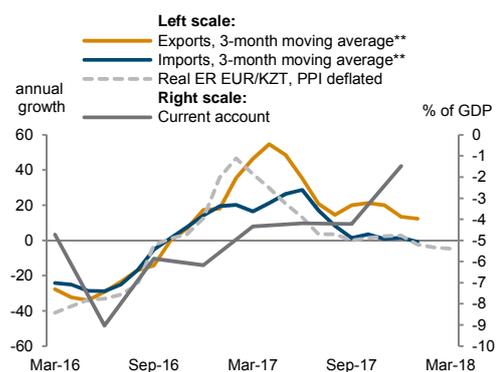
Inflation and policy rate
in %



Financial indicators
in %



External sector development
in %



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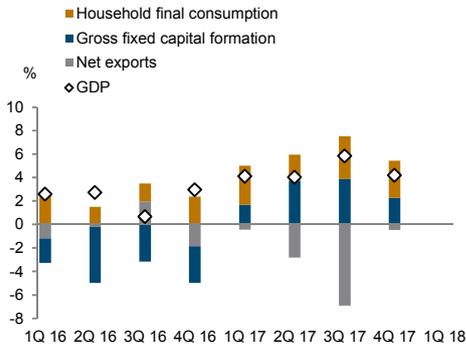
Source: wiiw Monthly Database incorporating Eurostat and national statistics.

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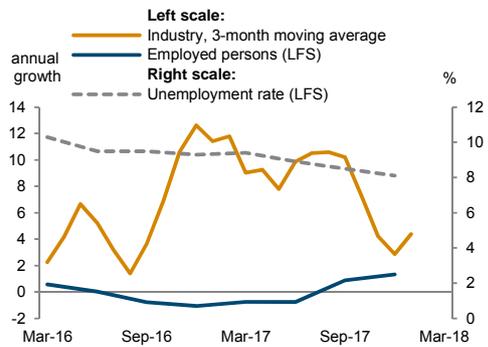
<https://data.wiiw.ac.at/monthly-database.html>

Latvia

Real GDP growth and contributions
year-on-year



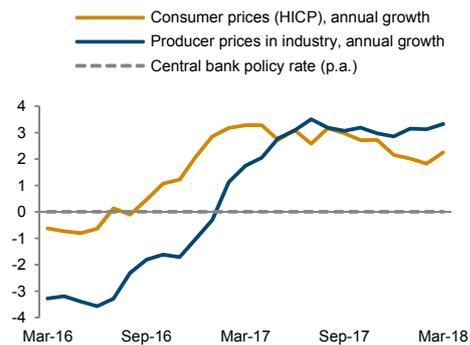
Real sector development
in %



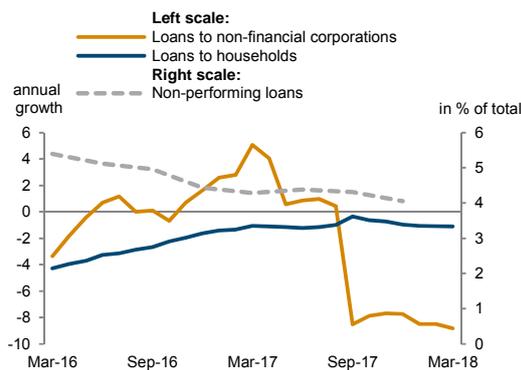
Unit labour costs in industry
annual growth rate in %



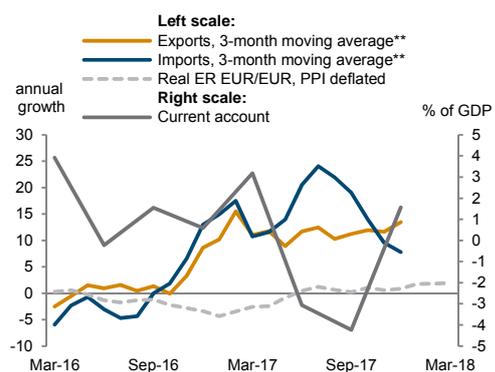
Inflation and policy rate
in %



Financial indicators
in %



External sector development
in %



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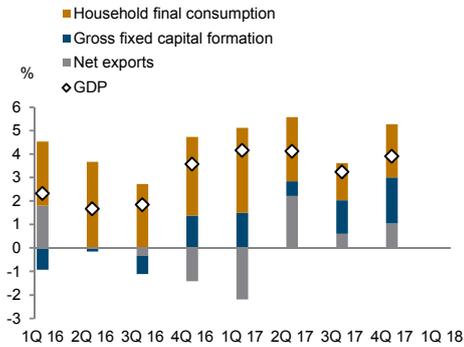
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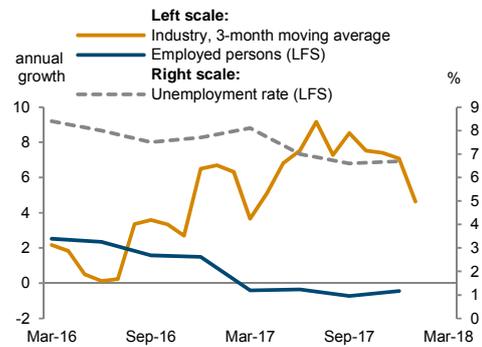
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Lithuania

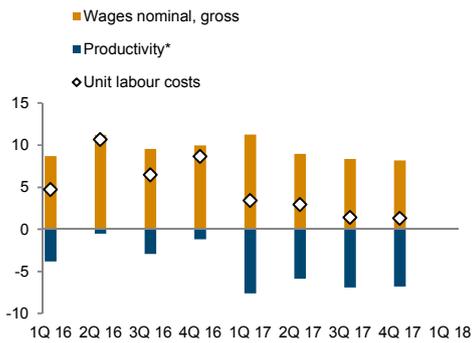
Real GDP growth and contributions
year-on-year



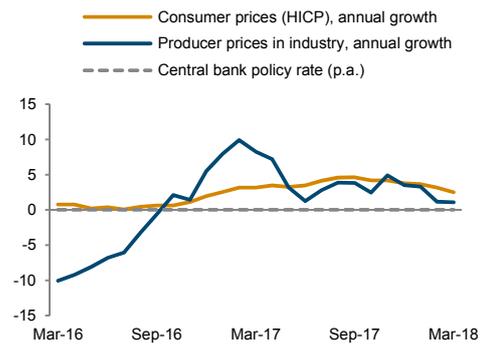
Real sector development
in %



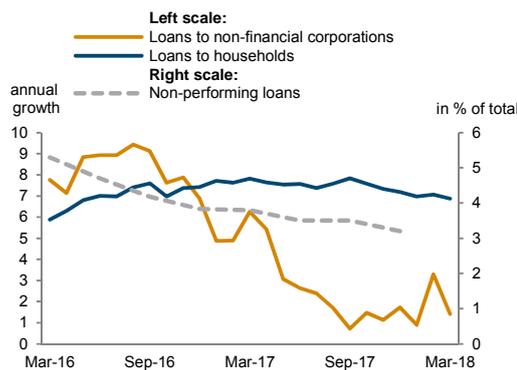
Unit labour costs in industry
annual growth rate in %



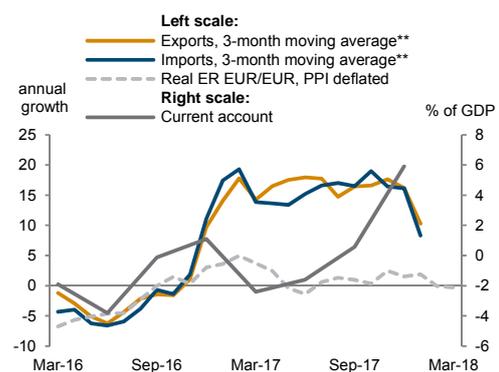
Inflation and policy rate
in %



Financial indicators
in %



External sector development
in %



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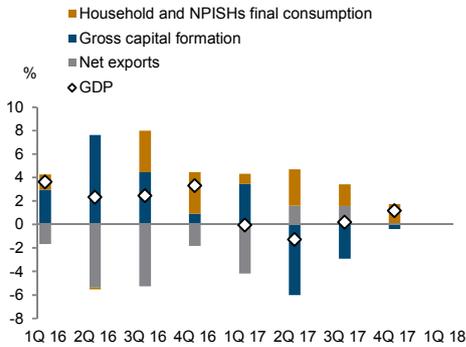
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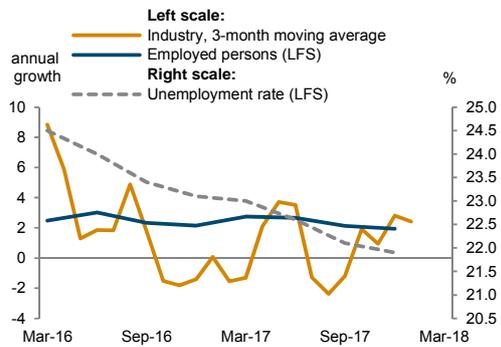
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Macedonia

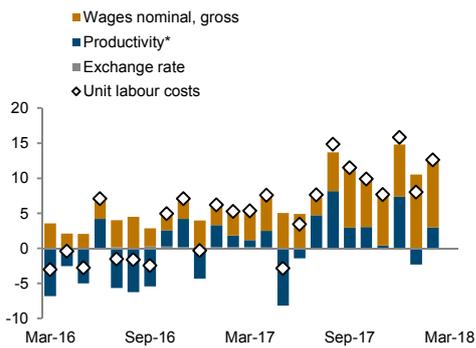
Real GDP growth and contributions
year-on-year



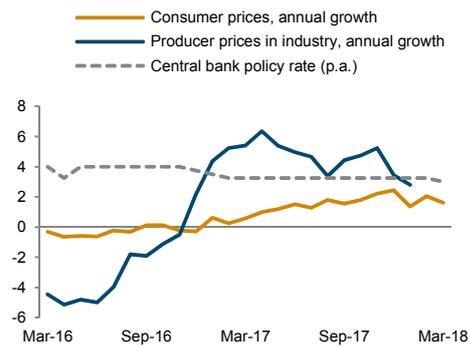
Real sector development
in %



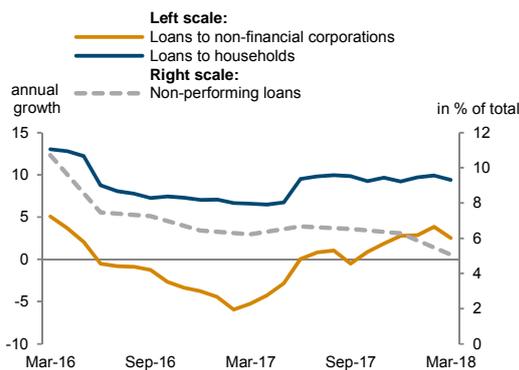
Unit labour costs in industry
annual growth rate in %



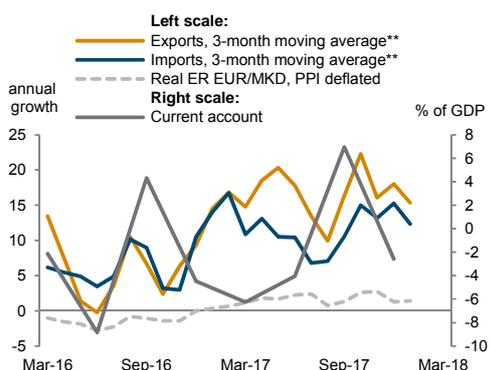
Inflation and policy rate
in %



Financial indicators
in %



External sector development
in %



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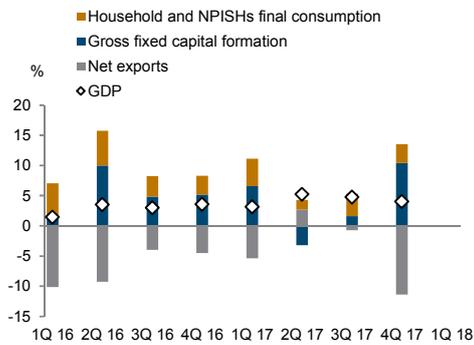
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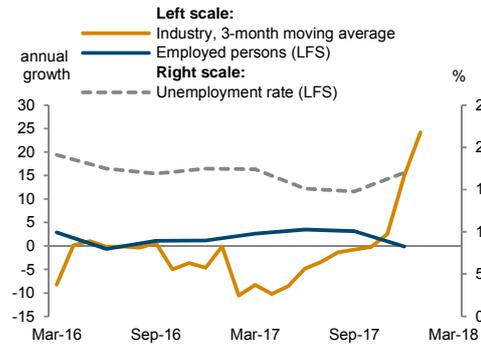
<https://data.wiiw.ac.at/monthly-database.html>

Montenegro

Real GDP growth and contributions
year-on-year



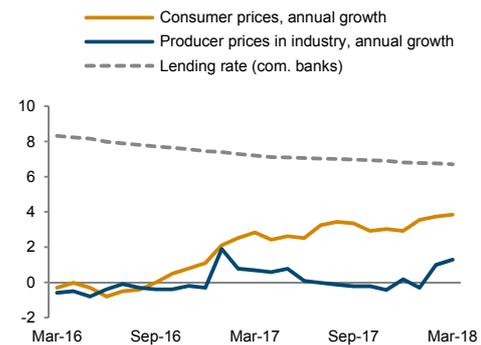
Real sector development
in %



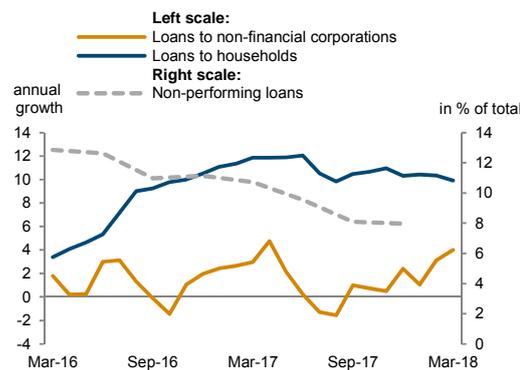
Unit labour costs in industry
annual growth rate in %



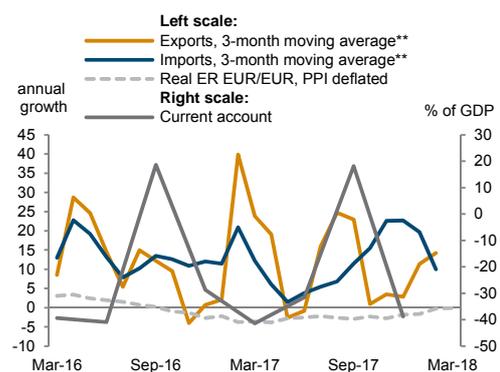
Inflation and lending rate
in %



Financial indicators
in %



External sector development
in %



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**EUR based.

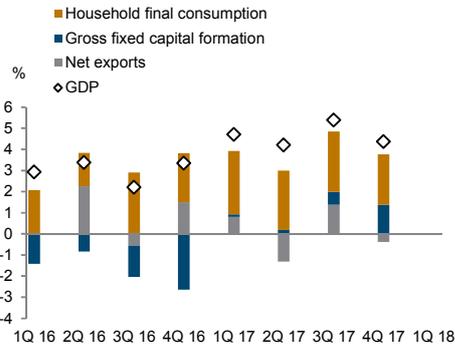
Source: wiiw Monthly Database incorporating Eurostat and national statistics.

Baseline data, country-specific definitions and methodological breaks in time series are available under:

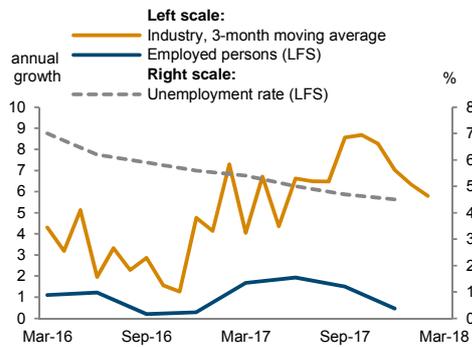
<https://data.wiiw.ac.at/monthly-database.html>

Poland

Real GDP growth and contributions
year-on-year



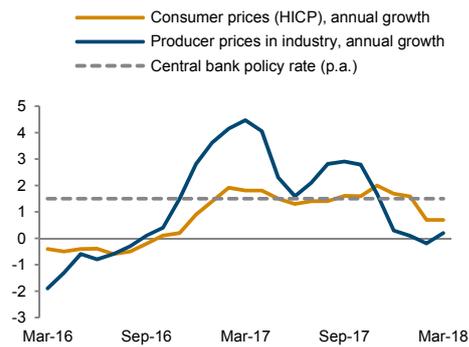
Real sector development
in %



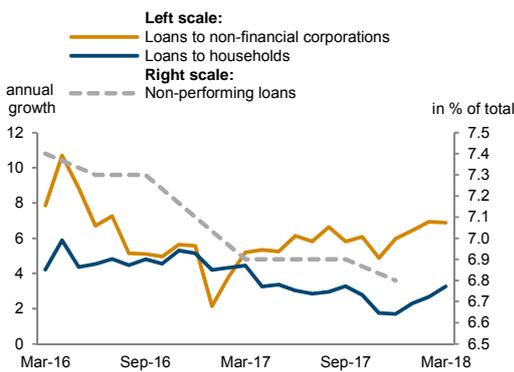
Unit labour costs in industry
annual growth rate in %



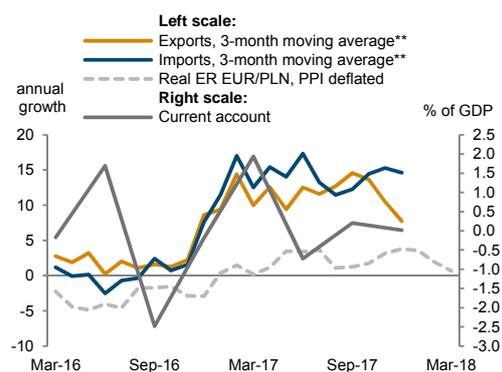
Inflation and policy rate
in %



Financial indicators
in %



External sector development
in %



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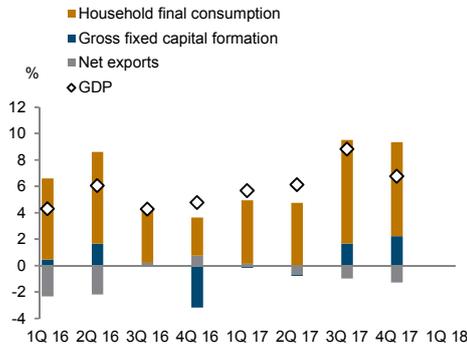
Source: wiiw Monthly Database incorporating Eurostat and national statistics.

Baseline data, country-specific definitions and methodological breaks in time series are available under:

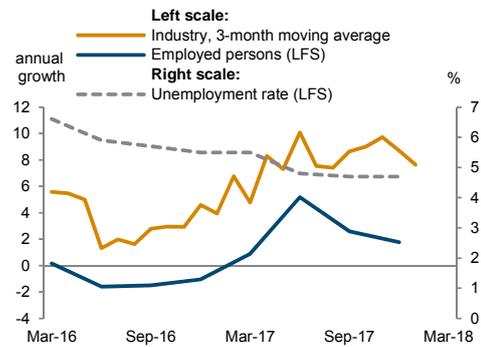
<https://data.wiiw.ac.at/monthly-database.html>

Romania

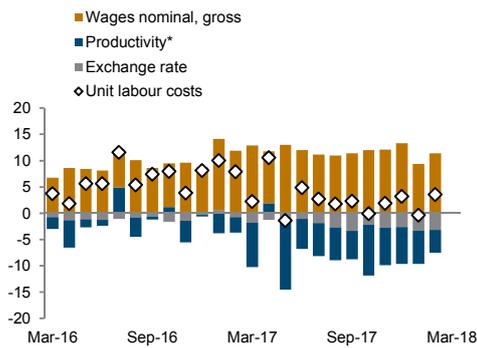
Real GDP growth and contributions
year-on-year



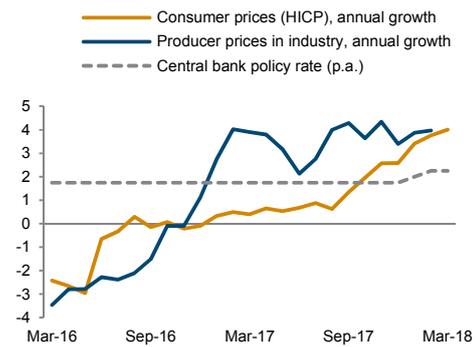
Real sector development
in %



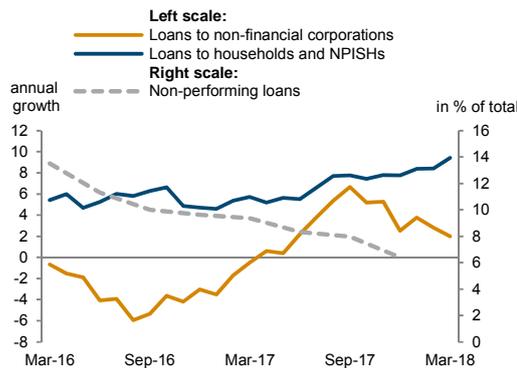
Unit labour costs in industry
annual growth rate in %



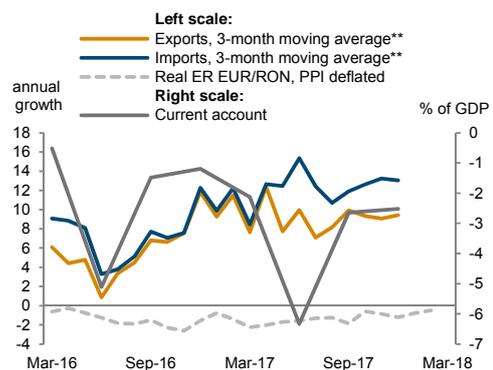
Inflation and policy rate
in %



Financial indicators
in %



External sector development
in %



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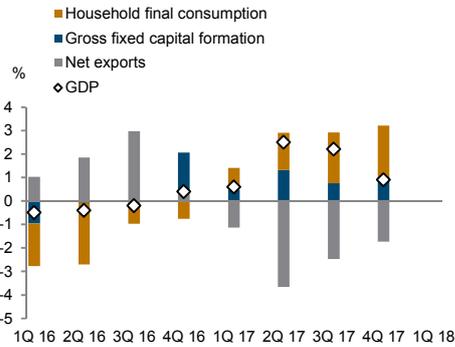
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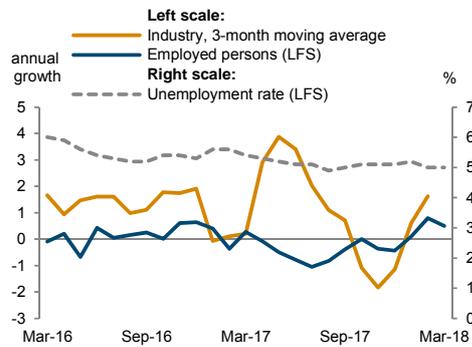
<https://data.wiiw.ac.at/monthly-database.html>

Russia

Real GDP growth and contributions
year-on-year



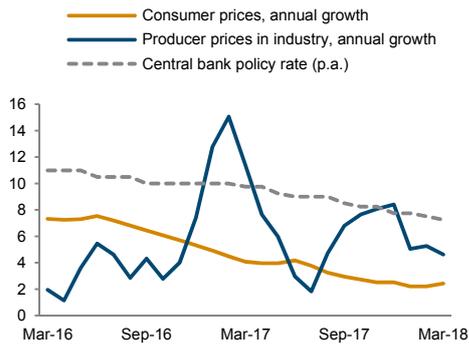
Real sector development
in %



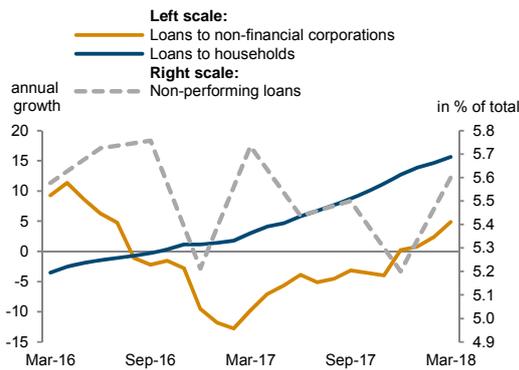
Unit labour costs in industry
annual growth rate in %



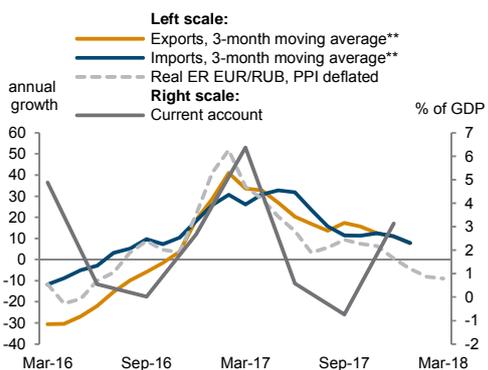
Inflation and policy rate
in %



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.

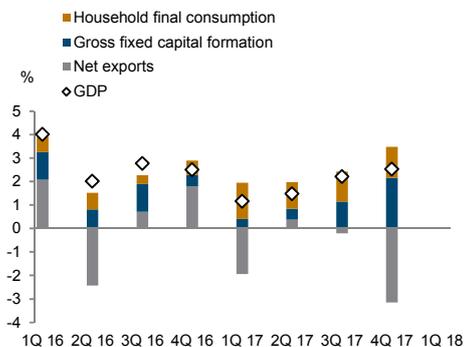
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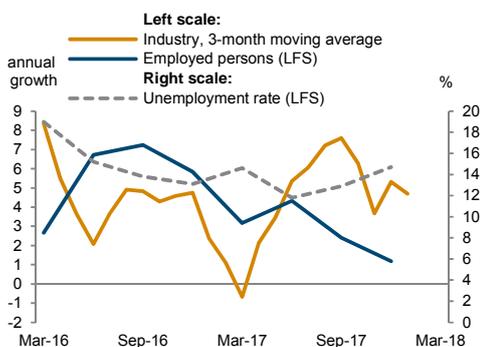
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Serbia

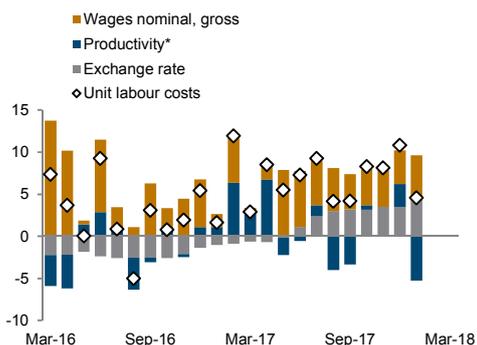
Real GDP growth and contributions
year-on-year



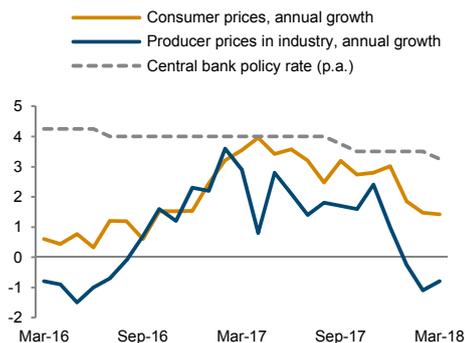
Real sector development
in %



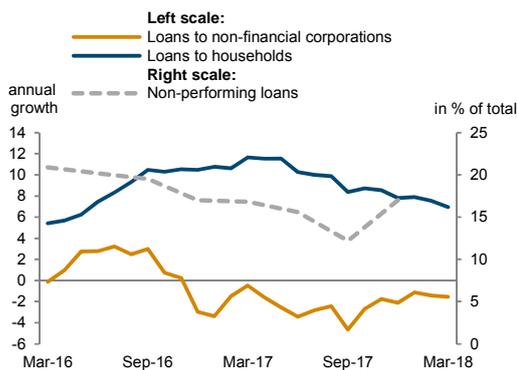
Unit labour costs in industry
annual growth rate in %



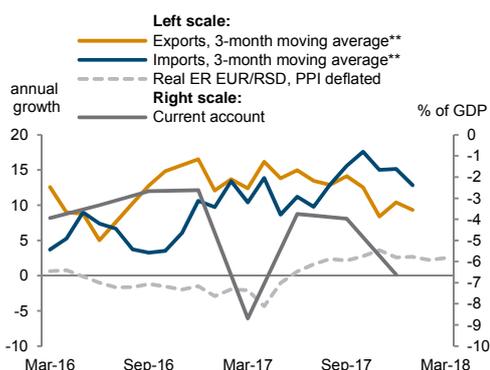
Inflation and policy rate
in %



Financial indicators
in %



External sector development
in %

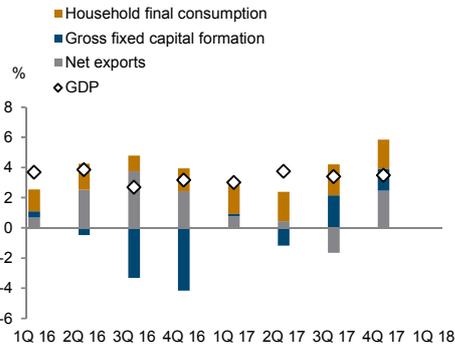


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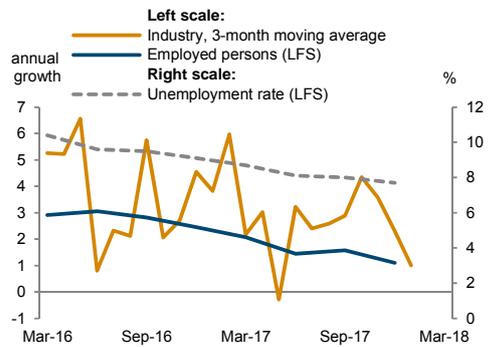
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Slovakia

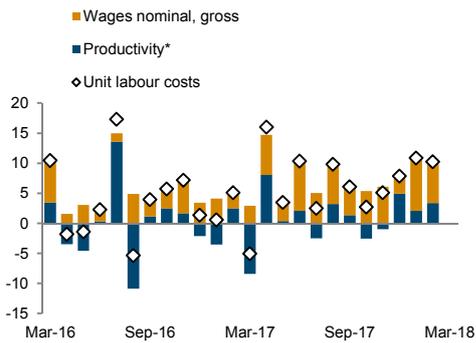
Real GDP growth and contributions
year-on-year



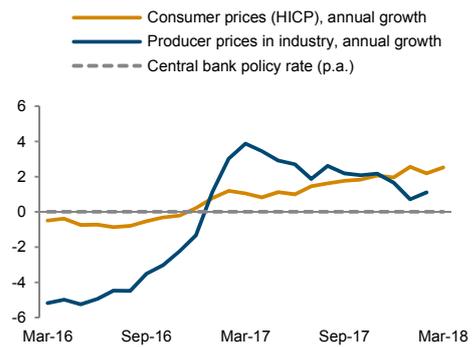
Real sector development
in %



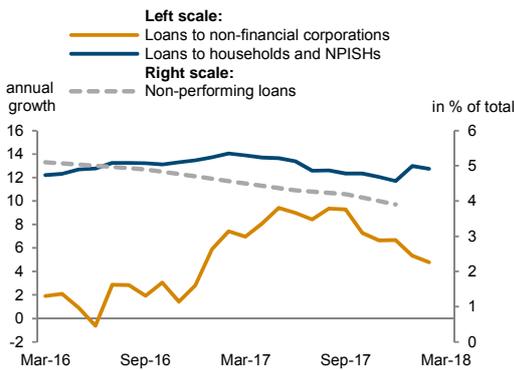
Unit labour costs in industry
annual growth rate in %



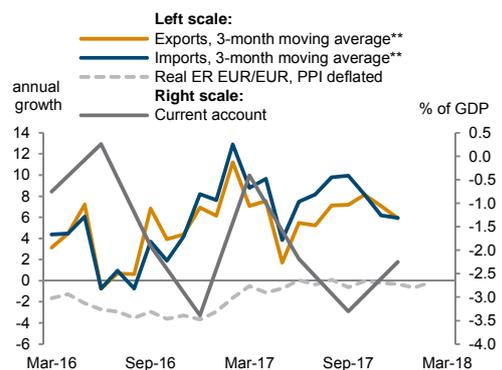
Inflation and policy rate
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Financial indicators
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External sector development
in %



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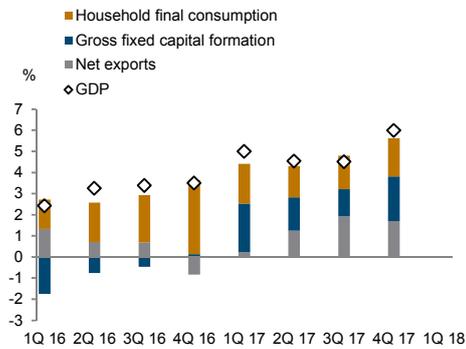
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Slovenia

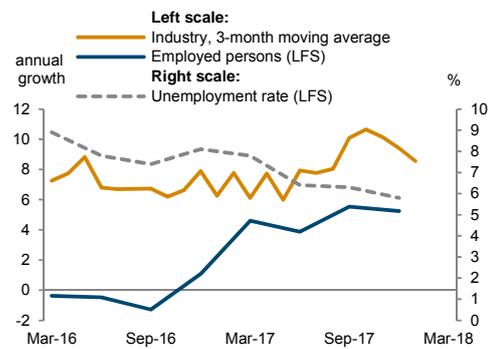
Real GDP growth and contributions

year-on-year



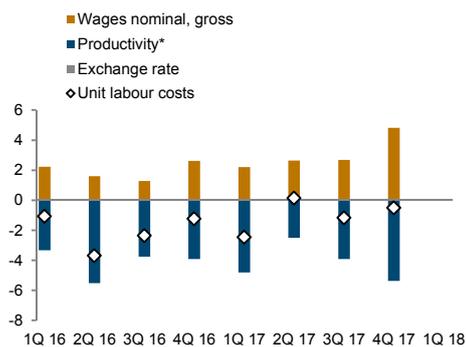
Real sector development

in %



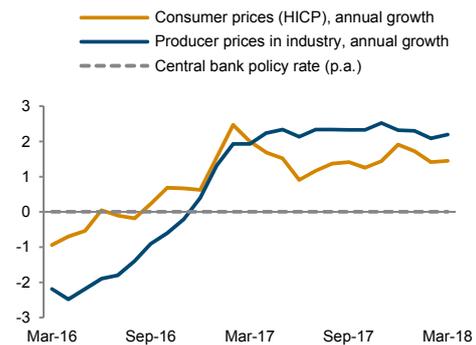
Unit labour costs in industry

annual growth rate in %



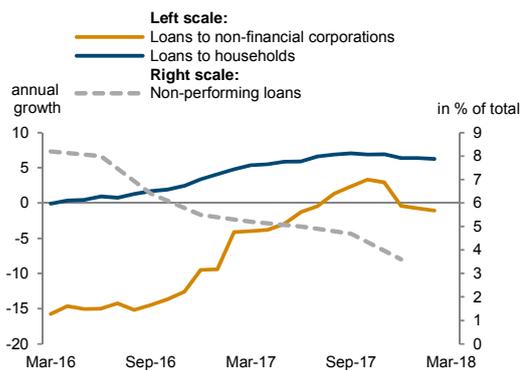
Inflation and policy rate

in %



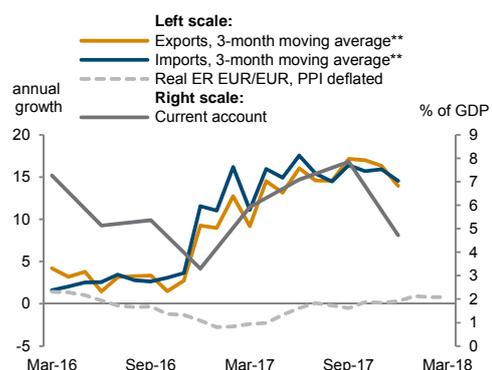
Financial indicators

in %



External sector development

in %



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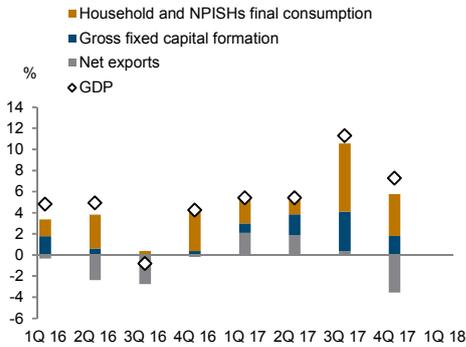
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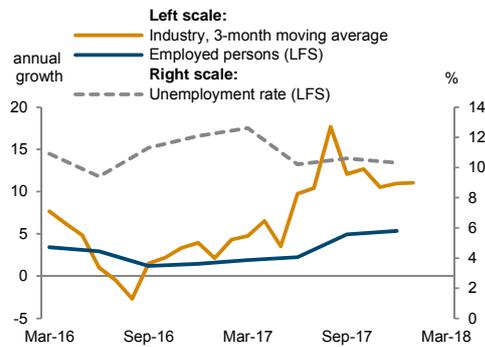
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Turkey

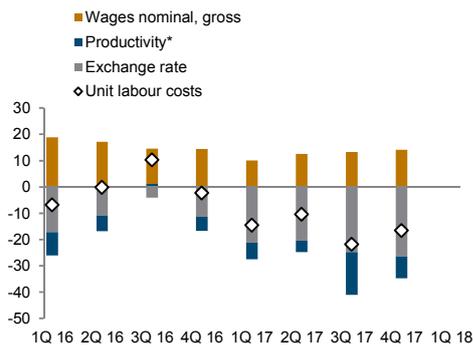
Real GDP growth and contributions
year-on-year



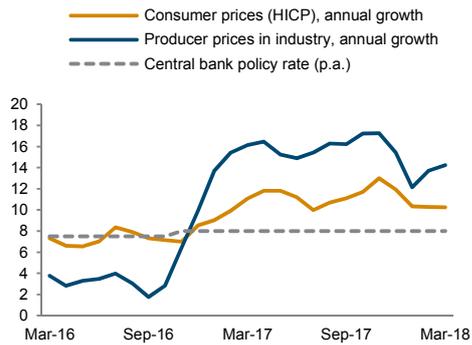
Real sector development
in %



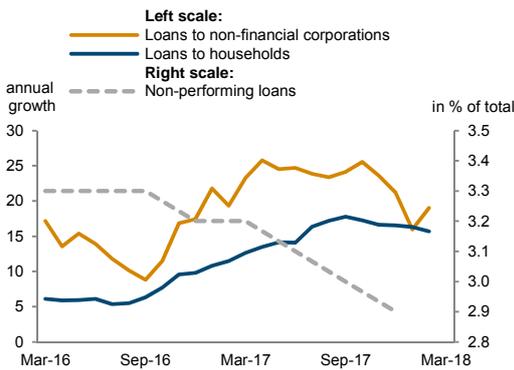
Unit labour costs in industry
annual growth rate in %



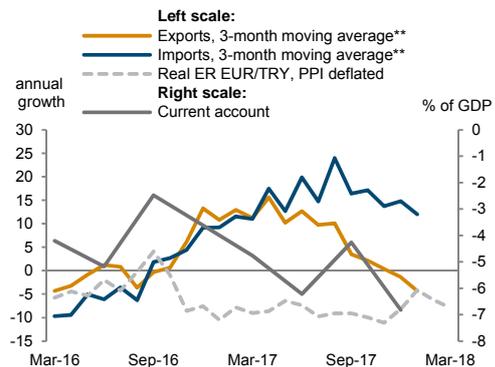
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Financial indicators
in %



External sector development
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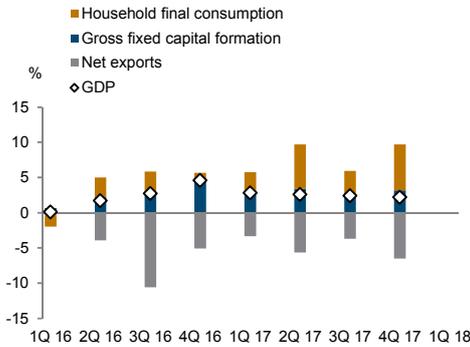
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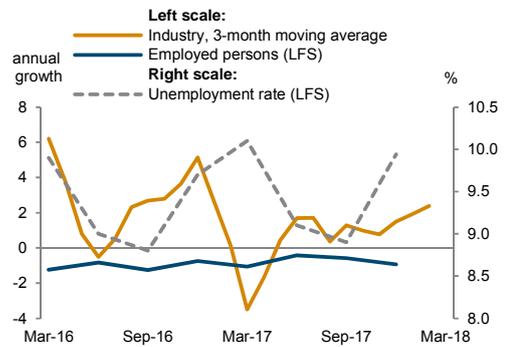
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Ukraine

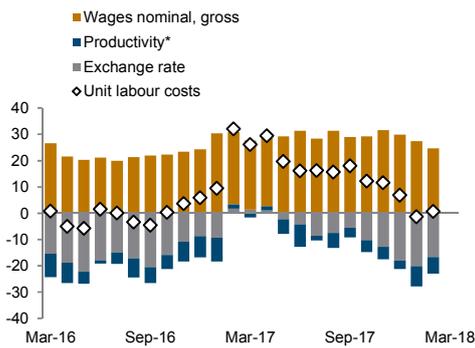
Real GDP growth and contributions
year-on-year



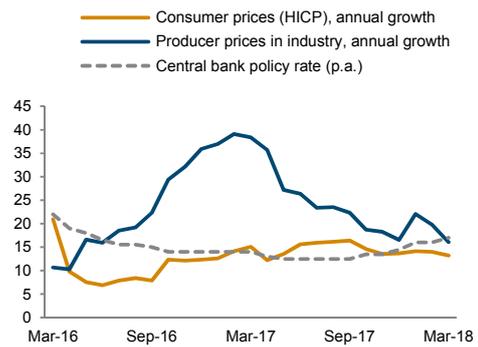
Real sector development
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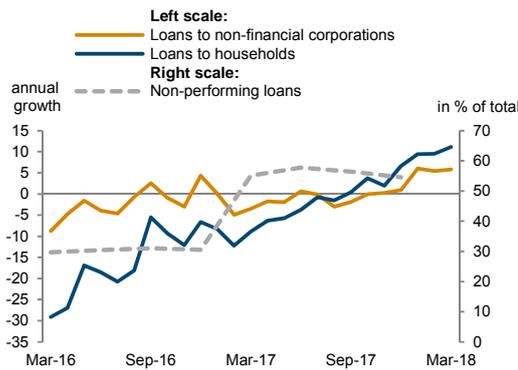
Unit labour costs in industry
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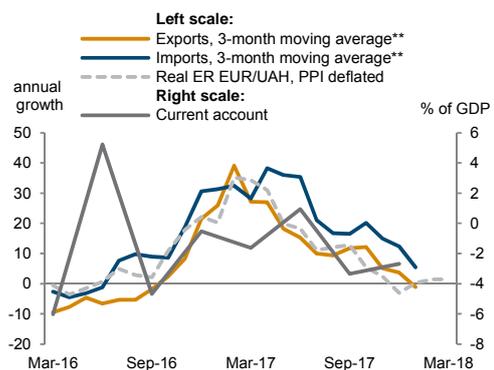
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