wiiw

OCTOBER 2018

Policy Notes and Reports 24

# BRATISLAVA and VIENNA: Twin Cities with big Development Potentials

Doris Hanzl-Weiss, Mario Holzner and Roman Römisch


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

# BRATISLAVA and VIENNA: Twin Cities with big Development Potentials

DORIS HANZL-WEISS
MARIO HOLZNER
ROMAN RÖMISCH

Doris Hanzl-Weiss and Roman Römisch are Economists at The Vienna Institute for International Economic Studies (wiiw). Mario Holzner is the Deputy Scientific Director of wiiw.

# Abstract

The economies of Vienna and Bratislava have followed quite different development paths over the last decades. While Vienna's population increased by about 20% within two decades, Bratislava's population mostly stagnated. However, when measured in GDP per capita at purchasing power parties, average income in Bratislava has surpassed that of Vienna and is now among the top-10 leading regions in Europe. Massive foreign direct investment, particularly in the automotive sector, has created full employment in Bratislava. Nevertheless, Vienna, as one of the world's most liveable cities, is still attracting more immigration and labour markets are in less favourable conditions. Transport infrastructure between the two close cities has only recently been improving, which has left considerable scope for further reductions in travel time. Regional cooperation is under way and should be reinforced in order to meet the challenges ahead. Mass-emigration of young Slovaks over the last decades will lead to a rapid ageing in Slovakia over the next decades and the working age population is expected to shrink by almost a third by the end of the century, while Austria's will mostly stagnate. By creating a truly common labour market in the twin-city region, Bratislava could solve the problem of labour shortages and Vienna could solve its youth unemployment problem. Policy recommendations in this respect include inter alia a more substantial improvement of intercity public transport; common educational planning and training programmes; and, commuter allowances during the nominal wage-equalisation-transition. Other major long-run challenges are the ongoing processes of digitalisation and robotisation. Here, policy recommendations include projects of innovation cooperation; coordination of innovation oriented public procurement; and, improvement of transport infrastructure to connect the twin-city region with the rest of the world in order to reap potential future gains from increased economies of scale.



Keywords: Bratislava, Vienna, urban development, regional labour markets, education, R&D, demographic trends, wage differentials, technological change

JEL classification: O18, R23, I23, J11, J31, O33

CONTENTS


Economic Background ..... 1

Vienna's population growth and Bratislava's economic catch-up process ..... 1
Focus on services versus concentration on automotive industry ..... 3
Vienna most liveable city in the world – Bratislava great place to find A job ..... 5
Bratislava's labour market top – Vienna suffers from high unemployment ..... 6
High R&D intensity in Vienna, backlog in Bratislava ..... 8
Transport infrastructure: Capital cities in close PROXIMITY ..... 8
Regional competitiveness clearly above THE European average for both cities ..... 10
Many small, high value-added FDI projects vs few large in manufacturing ..... 11

Future Challenges ..... 15

The demographic challenge: immigration vs emigration and ageing ..... 15
The robotisation challenge: headquarters VersuS factory economy effects? ..... 17

Policy Recommendations ..... 21

Cooperation experiences ..... 21
General policy recommendations ..... 22
Policies to cope with the demographic and the robotisation challenges ..... 22

References ..... 25

## TABLES AND FIGURES

Table 1 / Basic indicators Vienna – Bratislava Region, NUTS-2 level ..... 1
Table 2 / Labour market and education indicators, 2015-2017 ..... 7

Figure 1 / Regional GDP per capita in PPS in Austria and Slovakia, NUTS-2 level, 2016 ..... 2
Figure 2 / Long-term developments, 2000-2016 ..... 3
Figure 3 / Gross value added at basic prices by NUTS 2 regions, 2015 ..... 4
Figure 4 / Number of people employed in manufacturing, 2016 ..... 4
Figure 5 / Perception of cities, 2015, in % ..... 6
Figure 6 / R&D expenditure, in % of GDP, 2011, 2013, 2015 and by sectors ..... 8
Figure 7 / Railway upgrading of the Vienna-Bratislava tracks: stations along the line ..... 9
Figure 8 / Means of transport primarily used to go to work/training, in % of respondents ..... 9
Figure 9 / European Regional Competitiveness Index, 2016 ..... 11
Figure 10 / Greenfield FDI projects 2010-2017: number of projects (right scale), announced capital investment (USD million) and number of jobs to be created ..... 12
Figure 11 / Number of Greenfield FDI projects by activity, 2015-2017 ..... 13
Figure 12 / Baseline working age population (aged 15-64) projections, 2020-2080 ..... 16
Figure 13 / Compensation of employees in EUR per hour worked, 2000-2015 ..... 16
Figure 14 / Average monthly gross wages in Slovak industry, year-on-year percentage change ..... 17
Figure 15 / Complementarities in relative functional specialisation within the Central European Manufacturing Core (average for the period 2003-2015) ..... 18
Figure 16 / The smile curve – value-added creation along the value chain ..... 18
Figure 17 / Exponential growth of computing, calculations per second per 1000 USD, logarithmic plot, 1990-2010 ..... 19
Figure 18 / Number of installed industrial robots per 10,000 employees in the manufacturing industry, 2016 ..... 20

# Economic Background

## VIENNA'S POPULATION GROWTH AND BRATISLAVA'S ECONOMIC CATCH-UP PROCESS

Vienna has a population of 1.9 million compared to 642,000 of Bratislava, thus it is roughly three times larger than Bratislava (see Table 1). However, strictly speaking we compare Vienna and the Bratislava Region here – including the city of Bratislava and its suburbs – on the NUTS-2 level (Vienna with a total area of 415 $km^2$, the Bratislava Region with an area of 2000 $km^2$). Economic activity as measured by the gross domestic product (GDP) at market prices is four times larger in Vienna than in the Bratislava Region. Overall, regional GDP in 2016 was valued at EUR 90,000 million in Vienna and about EUR 23,000 million in Bratislava.

Both capital cities are of major importance for their countries, with Vienna accounting for one quarter of Austria's GDP and the Bratislava Region being responsible for nearly 30% of Slovakia's GDP. In 2016, growth was swifter in the Bratislava Region and reached approximately 3% compared to 1.5% in Vienna. On a per capita basis, GDP per inhabitant in Vienna with EUR 48,600 was higher than in the Bratislava Region where it reached EUR 35,800. Overall, these figures compare favourably to the EU-28 average and both capital city regions belong to the 'rich' regions of the EU: Vienna with 167% of the EU-28 average and the Bratislava Region with 122% of the EU-28 average.

**Table 1 / Basic indicators Vienna – Bratislava Region, NUTS-2 level**

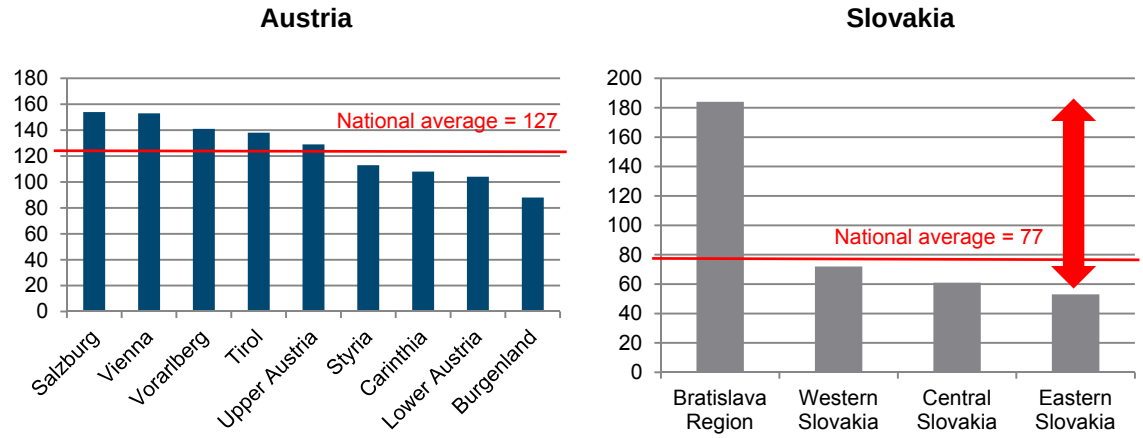
| Indicator, NUTS-2 | Vienna | Bratislava Region |
|---|---|---|
| **Population,** as of 1st January 2017 | 1,867,582 | 641,892 |
| **Total area,** km2, 2015 | 415 | 2,053 |
| **Population density,** persons per km2, 2016 | 4681.6 | 315.5 |
| **Gross domestic product (GDP),** 2016 | | |
| GDP, in EUR million | 90,110 | 22,819 |
| Share in national GDP, in percent | 25.5 | 28.1 |
| GVA, real growth rate, percentage change on previous period | 1.5 | 2.8 |
| GDP per capita, in EUR | 48,600 | 35,800 |
| GDP per capita, in EUR , EU-28=100 | 167 | 123 |
| GDP per capita, in PPS | 44,700 | 53,700 |
| GDP per capita, PPS, EU28=100 | 153 | 184 |

Notes: NUTS 2 Regions: AT13 - Vienna; SK01 - Bratislava Region.
Source: Eurostat.

If different price levels are taken into account, the Bratislava Region even overtakes Vienna and becomes the sixth leading region in the EU, while Vienna ranks in 18th place.[1] While GDP per capita in purchasing power standards (PPS) reached 44,700 in Vienna, it stood at 53,700 in the Bratislava Region in 2016. This equates to 153% of the EU-average for Vienna and 184% for the Bratislava Region. Both capital city regions are thus among the 'richest' regions in Europe. Bratislava Region's GDP per capita in PPS overtook Vienna's in 2008 for the first time.

The very good position of the Bratislava Region can be explained by the rapid catching-up and convergence process after the fall of the iron curtain in 1989. Foreign direct investment poured into the country, preferentially to the capital city. Several main headquarters are located there (e.g. of banks, retail chains, etc.). Slovak regions further in the East grew as well, but not that fast as the West, and did not offer an infrastructure of a similar level of development (e.g. the major West-East motorway between Bratislava and Košice is still not finished). As a result, regional disparities widened in Slovakia and now are amongst the largest within the EU (see Figure 1, right panel). Within Austria, Salzburg overtook the Vienna region in 2016. Overall, the spread between the richest and the poorest is rather small and GDP spreads evenly across regions (see Figure 1, left panel).

**Figure 1 / Regional GDP per capita in PPS in Austria and Slovakia, NUTS-2 level, 2016**



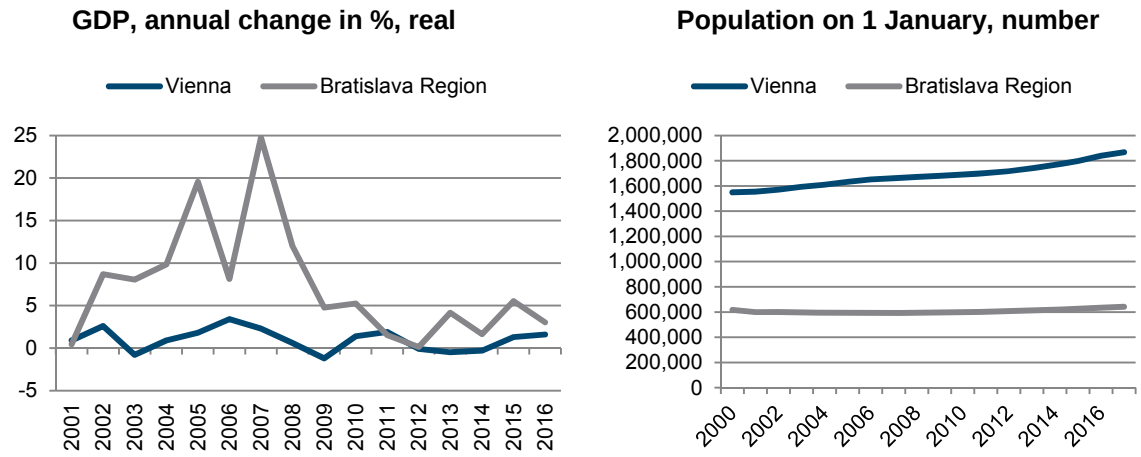

Source: Eurostat.

Looking at developments over time we find much swifter real GDP growth in the Bratislava Region than in Vienna over the time period 2000 to 2016. Only in 2011 and 2012 were growth rates very close for both capital city regions (see Figure 2, left panel). For the Bratislava Region, growth peaked in 2005 and 2007 and reached 11% average growth over the boom period 2001-2008. Even in the crisis year 2008, GDP did not contract – on the contrary – it even increased by 5%. Growth was smaller from the period 2010 onwards but still reached 3% on average. For Vienna, we find much lower growth rates, averaging 1.2% for the boom period and 0.8% since 2010.

[1] To compensate for the difference in price levels, GDP is expressed in a common currency called 'Purchasing Power Standard' that is based upon price levels rather than exchange rates. However, the comparison is based upon national price data. Price differences between regions are presumably larger in Slovakia than in Austria. The GDP at PPPs for Bratislava is therefore probably over-estimated.

In terms of population development (see Figure 2, right panel), there was a continuous population increase in Vienna during the last 20 years (from 1.5 million in 2000 to almost 1.9 million in 2017), while the population remained relatively constant in the Bratislava Region. Vienna attracted a large number of migrants both from within Austria as well as from EU and extra-EU countries. The largest group of foreigners living in Vienna are Germans, many of whom come to study at Viennese universities.

**Figure 2 / Long-term developments, 2000-2016**




Source: Eurostat.

## FOCUS ON SERVICES VERSUS CONCENTRATION ON AUTOMOTIVE INDUSTRY

Figure 3 shows the structure of the two capital city regions by gross value added. On a very broad sectoral aggregation – looking at the agriculture, industry and services sectors – services take the majority of value added (76% in Bratislava and 86% in Vienna). Industry also has an important share and is much larger in the Bratislava Region (23%) than in Vienna (14%).[2]

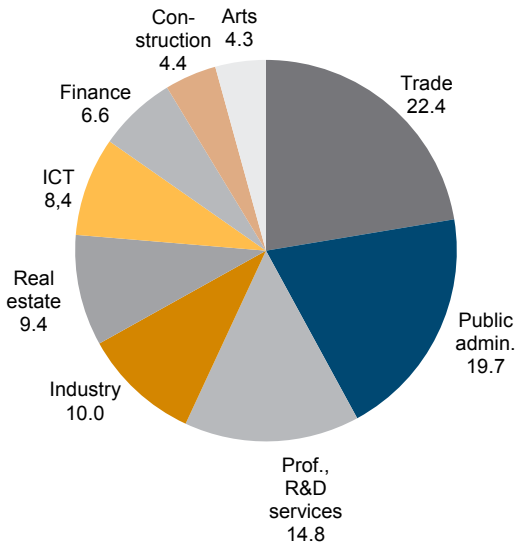
Interesting differences can be found on a more disaggregated level displayed in Figure 3. In Vienna, the largest value added are created by the trade, transport and tourism sector with 22%, by public administration with 20% and by professional and R&D activities with 15%. In the Bratislava Region, the largest sectors are the trade, transport and tourism sector with 25%, followed by industry with 18%. Together with the construction sector, these sectors make up almost 50% of the Bratislava Region's value added. Public administration accounts for 12%.

Looking in more detail at one important part of industry – manufacturing – shows that this sector plays an important role in both capital city regions, even more so for the Bratislava Region. Interestingly, about the same number of people is employed in both regions: 56,500 in Vienna compared to 54,500 in the Bratislava Region (year 2016), see Figure 4.

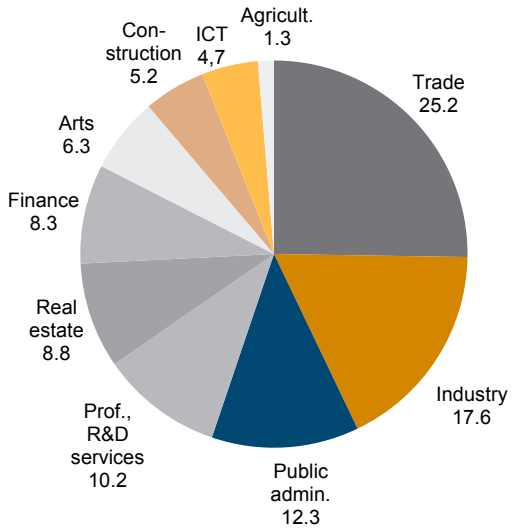
[2] The larger land area plays an important role for the sectoral distribution too.

**Figure 3 / Gross value added at basic prices by NUTS 2 regions, 2015**

**Vienna**

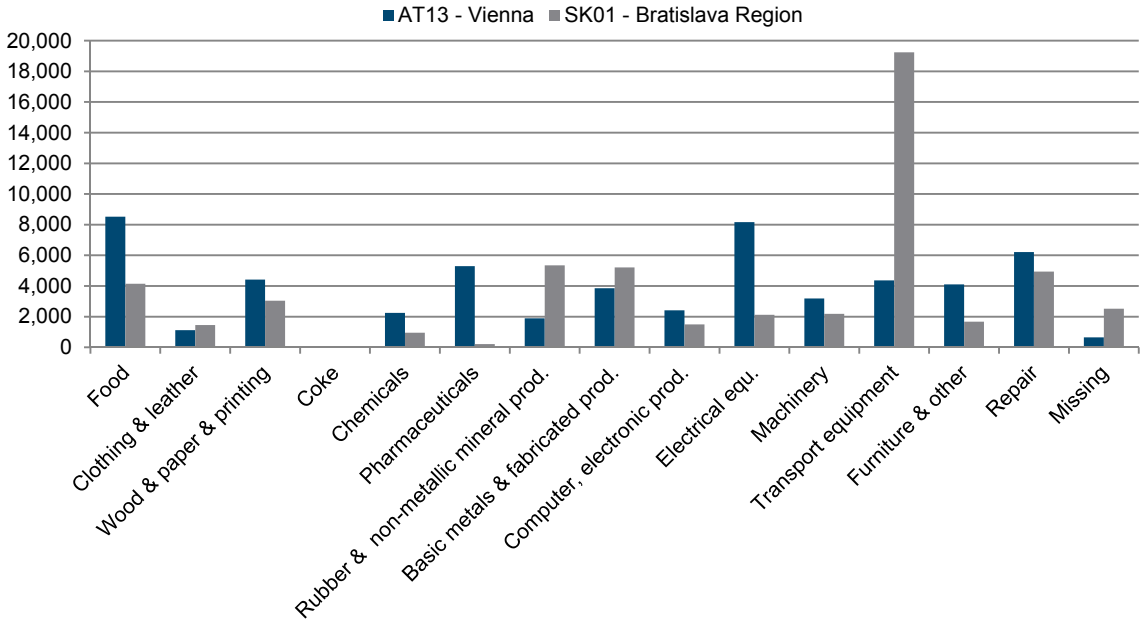



**Bratislava Region**




Source: Eurostat.

**Figure 4 / Number of people employed in manufacturing, 2016**




Source: Eurostat.

In Vienna, the sectors with the largest number of people employed are the food sector, electrical equipment, repair and the pharmaceutical sector. Together these four sectors account for 50% of all people employed. In the Bratislava Region, people employed are concentrated in the automotive industry, with almost 20,000 people working in this segment. This is no surprise, as the large Volkswagen Bratislava company is located in this area, right at the Austrian border (Devínska Nová Ves, close to Marchegg), as well as a range of automotive suppliers. Rubber & non-metallic mineral products, basic metals & fabricated metal products, and repair are also important sectors. Together these four sectors account for 64% of people employed in manufacturing.

## VIENNA MOST LIVEABLE CITY IN THE WORLD – BRATISLAVA GREAT PLACE TO FIND A JOB

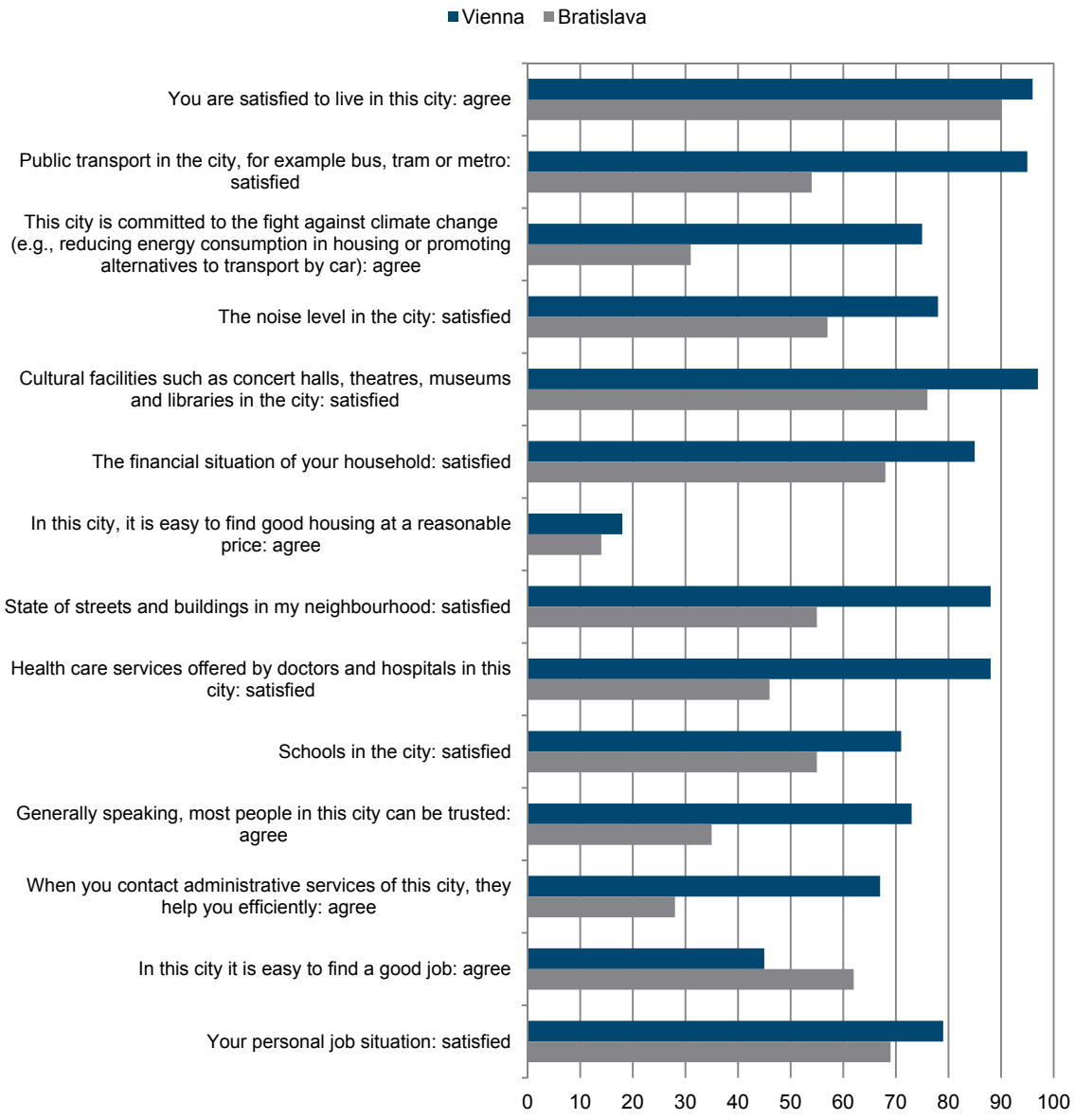
In August 2018, Vienna overtook Melbourne for the first time and became the 'most liveable city in the world' according to the Economist's 'Global Liveability Index' (EIU, 2018). Vienna reached full scores in the categories of stability, healthcare, education and infrastructure and only a slightly lower one for culture & environment. Also, in the ranking by Mercer, Vienna ranks first and is the 'best city worldwide to live in'.[3] Although Bratislava came in as the 64th most liveable city in the Economist's ranking, it is still considered among top cities, with 'few, if any challenges to residents' lifestyles' (EIU, 2018, p.3). In the Mercer-list, Bratislava took 80th place.

Looking at the results from the most recent perception survey of cities from Eurostat in 2015 (see Figure 5) we find that 96% and 90% of respondents are satisfied with living in Vienna and Bratislava respectively. In Vienna, there is a high level of satisfaction for cultural facilities, public transport and health care. In Bratislava, people agree that it is easy to find a good job – easier than in Vienna – and a high share of respondents is also satisfied with cultural facilities.

In both cities, respondents think that it is not easy to find good housing at reasonable prices. Bratislava has a low satisfaction level with administrative services, trust and the fight against climate change. The main challenges for Bratislava (defined as the largest differences to Vienna) seem to be the fight against climate change, public transport, health care services, public administration and trust.

[3] https://www.mercer.com/newsroom/2018-quality-of-living-survey.html ; 20 March 2018.

**Figure 5 / Perception of cities, 2015, in %**




Source: Eurostat Urban Audit Perception Survey results.

## BRATISLAVA'S LABOUR MARKET TOP – VIENNA SUFFERS FROM HIGH UNEMPLOYMENT

The positive perception of the labour market in Bratislava is confirmed by official Eurostat figures on the labour market (see Table 2). The employment rate stood at close to 80% in the Bratislava region while unemployment is continuously falling and reached 4% in 2017 for the 15 to 74 age-group (10% for the 15-24 age-group). Again, regional disparities are large on the Slovak labour market: regional unemployment rates are the lowest in the West – i.e. the Bratislava Region – and highest in the East (12% in Eastern Slovakia). In fact, for a long time Slovakia was troubled by very high unemployment rates including high youth unemployment. The current situation is therefore a considerable improvement.

Outcomes on the Viennese labour market are less favourable: the employment rate reached close to 70% in 2017 (also due to the large number of commuters) and the unemployment rate stood at 10% for the 15 to 64 age-group (17% for the 15-24). In contrast to Bratislava, the unemployment rate of Vienna is the highest in Austria.

Increasingly, the shortage of a qualified labour force is becoming an important factor in Slovakia. Since May 2018, simplified conditions for employing persons from outside the EU have been in force. However, these are valid only for certain occupations and for districts with an unemployment rate of less than 5%. In fact, the longest list of shortage occupations was found for the Bratislava Region, encompassing 70 occupations.[4]

**Table 2 / Labour market and education indicators, 2015-2017**

| Indicator, NUTS 2 | | Vienna | | | Bratislava Region | | |
|---|---|---|---|---|---|---|---|
| | | 2015 | 2016 | 2017 | 2015 | 2016 | 2017 |
| **Employment rate, total, in %** | | | | | | | |
| 15-64 | | 64.6 | 64.9 | 65.3 | 71.5 | 74.9 | 75.2 |
| 20-64 | | 67.7 | 68.0 | 68.4 | 75.2 | 78.7 | 79.2 |
| **Unemployment rate, total, in %** | | | | | | | |
| 15-74 | | 10.6 | 11.3 | 10.4 | 5.7 | 5.1 | 4.2 |
| 15-24 | | 18.0 | 20.3 | 16.7 | 14.5 | 15.3 | 13.0 |
| **Population by educational attainment level** | | | | | | | |
| 25-64, TOTAL | Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| | Low | 17.1 | 16.9 | 16.2 | 4.9 | 4.3 | 3.8 |
| | Medium | 43.6 | 43.2 | 41.7 | 57.6 | 56.7 | 53.5 |
| | High | 39.3 | 39.9 | 42.1 | 37.5 | 39.0 | 42.7 |
| 25-64, MALE | Total | 100.0 | 100.0 | 100.0 | 99.9 | 100.0 | 99.9 |
| | Low | 14.9 | 14.9 | 13.9 | 4.6 | 3.4 | 3.1 |
| | Medium | 45.8 | 46.5 | 45.5 | 60.5 | 60.6 | 58.7 |
| | High | 39.3 | 38.6 | 40.6 | 34.8 | 36.0 | 38.1 |
| 25-64, FEMALE | Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| | Low | 19.2 | 18.9 | 18.4 | 5.1 | 5.1 | 4.3 |
| | Medium | 41.5 | 39.9 | 38.0 | 54.9 | 53.1 | 48.7 |
| | High | 39.3 | 41.2 | 43.6 | 40.0 | 41.8 | 47.0 |

Source: Eurostat

Looking at educational outcomes, cities usually show a higher educational attainment due to more educational institutions, and in particular, the availability of universities. Thus, the share of population with a tertiary education is very high at about 42% of the population in both capital city regions. There is a considerable difference in the shares of medium level education: 54% in Bratislava and 42% in Vienna. The most striking difference in the relatively large share is in the segment with low educational attainment. In Bratislava, this sector accounts for only of 4% while in Vienna it is 16%.

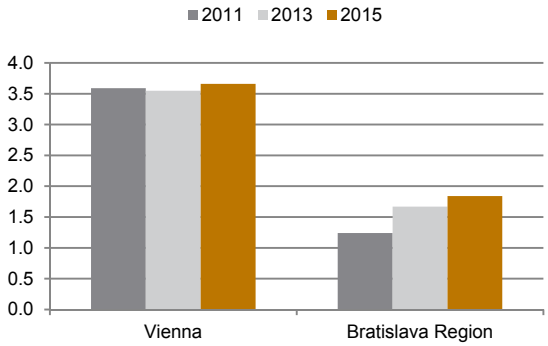
[4] https://spectator.sme.sk/c/20859051/which-occupations-do-companies-lack-the-most-employees.html as of 28 June 2018.

## HIGH R&D INTENSITY IN VIENNA, BACKLOG IN BRATISLAVA

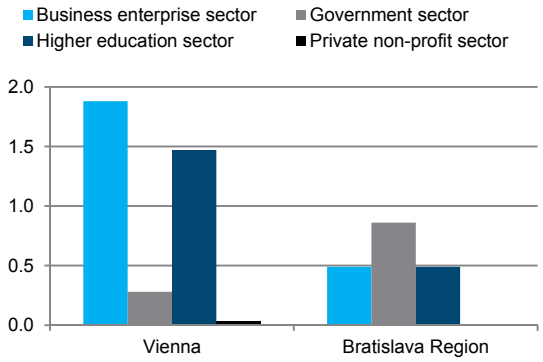
Total R&D expenditure in percent of GDP (R&D intensity) in 2015 was about 3.5% in Vienna and thus at a very high level, while it stood at 1.2% in the Bratislava Region (see Figure 5, left panel). There was a steady increase of the R&D intensity for the Bratislava Region while that for Vienna remained rather constant. In Slovakia R&D is focused on the capital city region while it is more spread across Austria. Interesting differences emerge when looking at R&D expenditures by sectors (see Figure 6, right panel). In Vienna, the business enterprise sector is the most important sector and accounts for 1.9% of GDP, followed by the higher education sector with 1.5% of GDP. The structure is quite different for the Bratislava Region, where the government sector accounts for the largest share (0.9%), followed by the business enterprise sector and the higher education sector. Differences are due to varying historic backgrounds and the still existing pent-up demand of the Bratislava Region.

**Figure 6 / R&D expenditure, in % of GDP, 2011, 2013, 2015 and by sectors**

**Total R&D expenditure**




**R&D expenditure by sectors, 2015**




Source: Eurostat.

## TRANSPORT INFRASTRUCTURE: CAPITAL CITIES IN CLOSE PROXIMITY

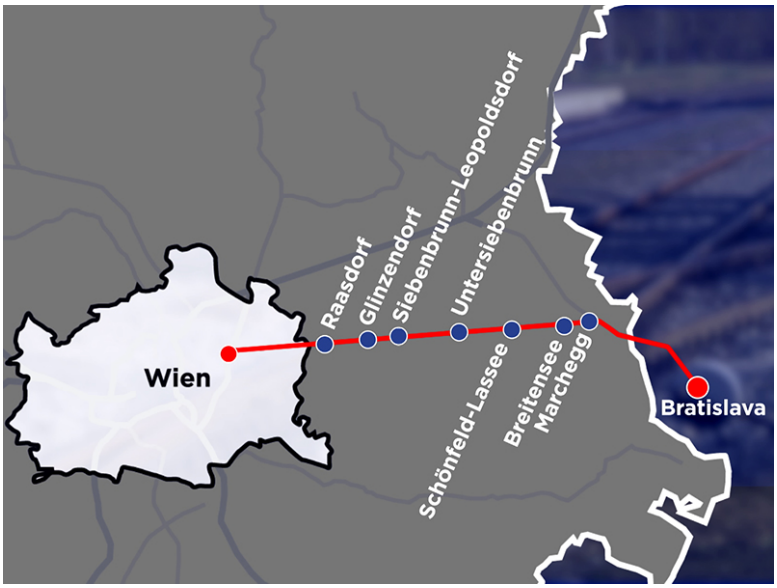
Vienna and Bratislava – the two capital cities of Austria and Slovakia – are only 55 kilometres apart (beeline), with about one hour's car (79 km via motorways) as well as train (approximately 67 km) travel time. Improvements of connections (by ship, road and railway) have been achieved in the past but could be improved further. Connection on the Danube – the Twin City Liner Danube river ferry – opened in 2005, the connection by road – the A6 motorway – in 2007. An upgrade of the train connection between Vienna and Bratislava has now started and should be completed by 2023. This should shorten the travel time by about 25 minutes.

The current rail upgrade includes full electrification of the railway line and a twin-track expansion in parts. It will be possible to drive up to 200 km/h. In between the two capital cities, in Lower Austria, seven stops are foreseen (see Figure 7). The total travel time will be reduced to 40 minutes. Investment costs of this upgrade are 539 million Euro, partly supported by EU funds.[5] This shows how costly infrastructure improvements can be and still a further infrastructure upgrade based on current

[5] https://noe.orf.at/news/stories/2933097 [31/08/2018]

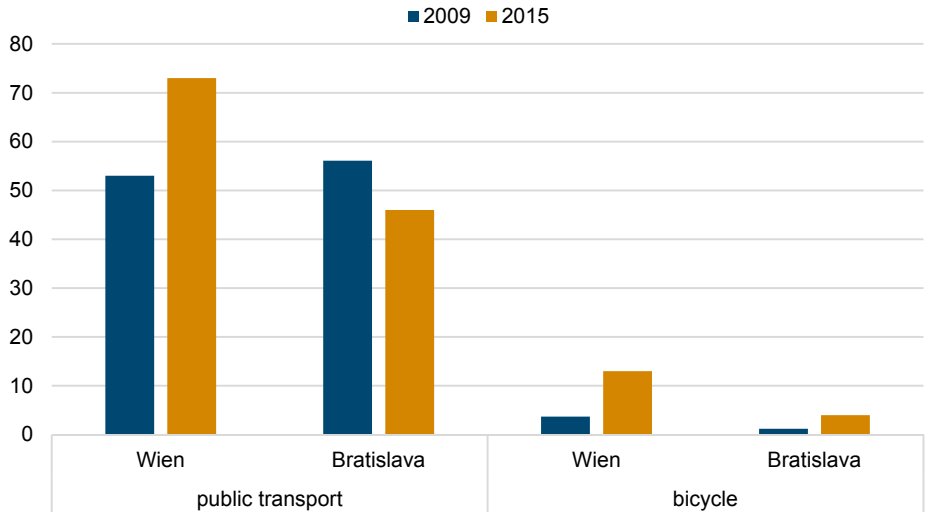
technology and a direct connection without stops in between the capitals would allow for another substantial reduction in travel time.

**Figure 7 / Railway upgrading of the Vienna-Bratislava tracks: stations along the line**




Source: noe.orf.at.

**Figure 8 / Means of transport primarily used to go to work/training, in % of respondents**




Source: Eurostat.

A number of infrastructure projects are also under way on the Slovak side. The Bratislava main railway station will be modernised.[6] Also, a ring-road will be constructed with the aim to relieve the traffic

[6] https://spectator.sme.sk/c/20902195/cabinet-to-allocate-2-8-million-for-bratislava-railway-station-renovation.html [31/08/2018]

situation in Bratislava. It is planned to be opened in 2020 with estimated costs of 1.76 billion Euro.[7] Here too, EU financial support can be used.

Moreover, there is political commitment on both sides[8] for the extension of the broad-gauge railway connection (freight only) from Košice in Eastern Slovakia all the way to Bratislava and Vienna, with two terminals – one in Slovakia and one in Austria. The investment sum is estimated to be around 6-7 billion Euro. A potential finalisation of this project can be expected by 2033 at the earliest.

Transport within the two cities is also changing quite substantially. Especially in Vienna, improvements in an already rich offer of public transport as well as bicycle infrastructure has increased the use of these two environmental-friendly types of transport considerably over recent years (Figure 8). Latest data from 2015 show that 73% of Viennese respondents used public transport as a primary means of transport to go to work or training and 13% used a bicycle. This is an increase of 20 percentage points for public transport and 10 percentage points for bicycles since 2009. In Bratislava bicycle usage quadrupled to about 4%. However, the use of public transport decreased by 10 percentage points to only 46%. Thus, there is potential for further increases in environmental-friendly means of transport in Bratislava for the years to come.

## REGIONAL COMPETITIVENESS CLEARLY ABOVE THE EUROPEAN AVERAGE FOR BOTH CITIES

Overall, both capital cities score well in the European Regional Competitiveness Index (latest edition: 2016) published by Eurostat. On a scale from 0 to 100, Vienna achieved a score of 72.6 and Bratislava 65.4 (Figure 9). This is equivalent to a rank of 49 and 96 out of 263 European regions respectively. The index is formed from a number of sub-indices which are again based on a multitude of indicators (Annoni et al., 2017).

Most of these indicators are collected at the regional level. That is where typically both cities fare quite well and above the European average. However, some of them are collected at the national level – institutions, basic education, technological readiness and macroeconomic stability. In the former three categories Slovakia is performing worse than the EU average, while Austria is outperforming the average in three of the nationally collected indices (except for the category of basic education where it is close to the EU average).

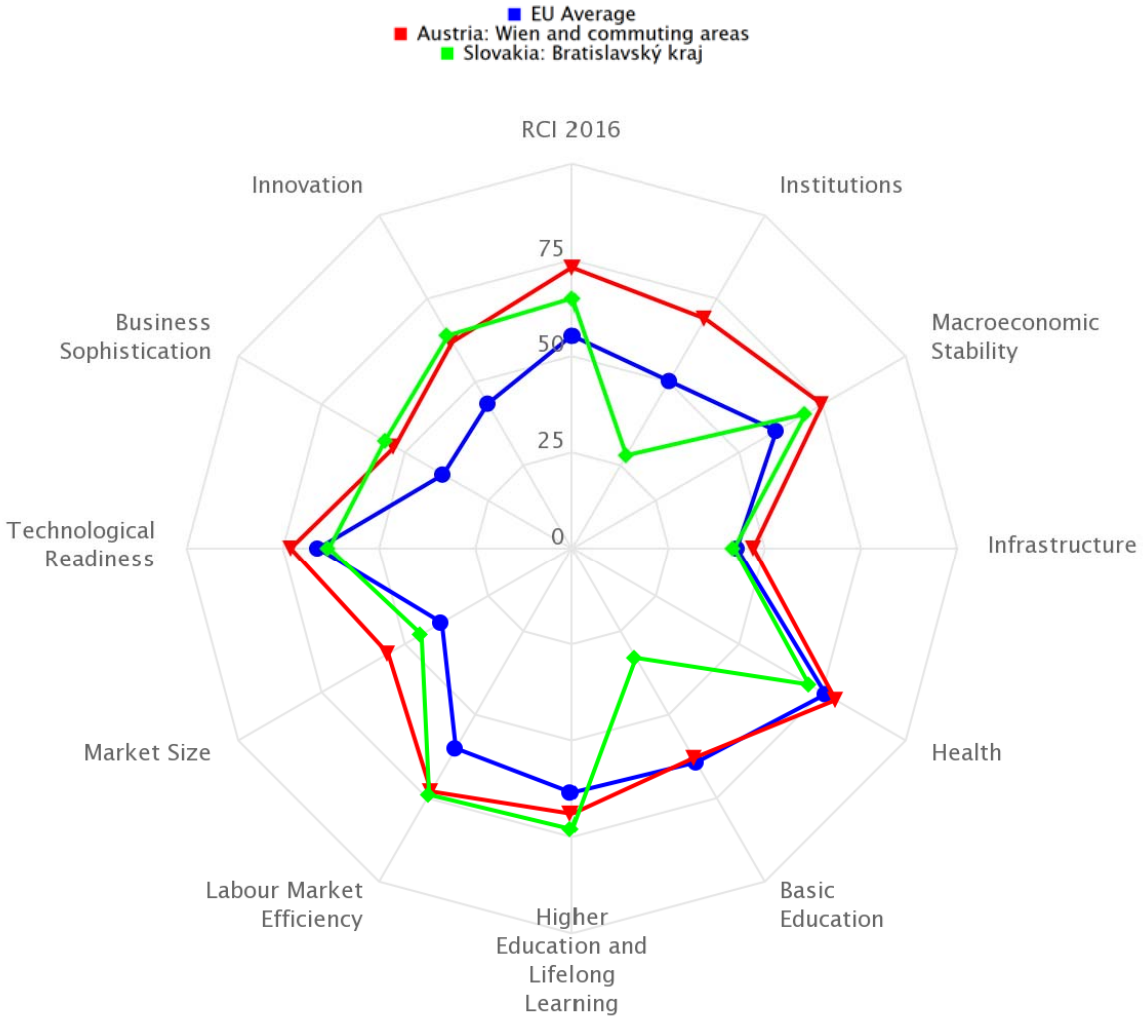
Vienna ranks above the EU regional averages in almost all of the sub-categories as well as above the Bratislava index values. Nevertheless, it is important to mention that Bratislava's scores are better than the Viennese in the following future-oriented sub-categories: innovation, business sophistication, higher education and lifelong learning as well as labour market efficiency. Vienna's regional strength lies in its large market size, the good health indicators and the infrastructure sub-categories. The last indicator is a composite index of a number of accessibility indicators which account for road, rail and air accessibility.

---

7 https://spectator.sme.sk/c/20796926/construction-of-bratislava-ring-road-has-still-not-fully-started.html [31/08/2018]

8 https://spectator.sme.sk/c/20866611/pellegrini-slovakia-wants-to-extend-broad-gauge-track-to-bratislava.html, http://www.railjournal.com/index.php/freight/austria-backs-broad-gauge-extension-to-vienna.html [31/08/2018]

**Figure 9 / European Regional Competitiveness Index, 2016**

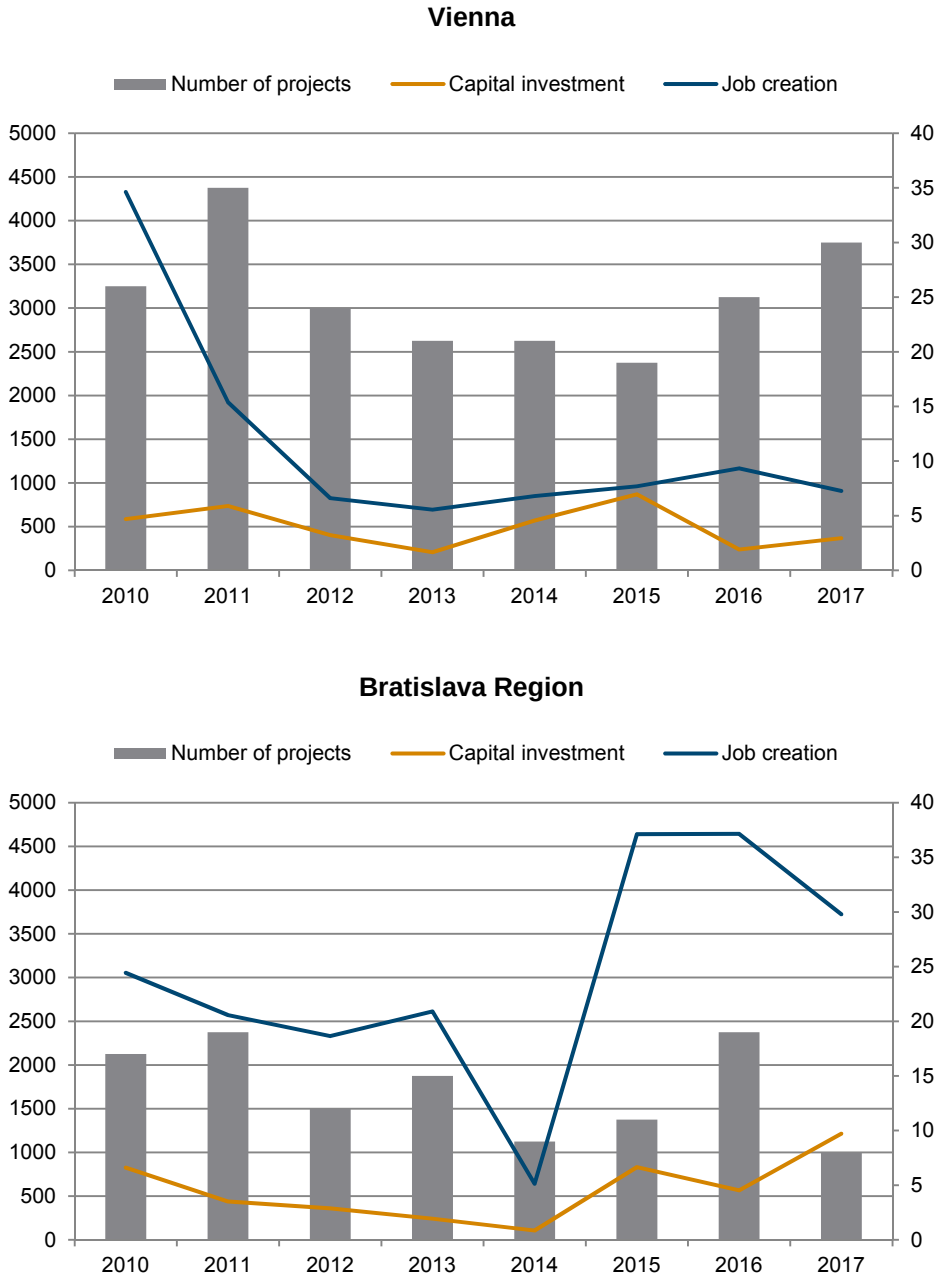



Source: Eurostat, Highcharts.com.

## MANY SMALL, HIGH VALUE-ADDED FDI PROJECTS VS FEW LARGE IN MANUFACTURING

It is difficult to come up with comparative data for firm dynamics at a regional level. One possible indicator is the information about foreign direct investment projects collected in the fDIMarkets database (wwww.fdimarkets.com, fDI Intelligence, a division of Financial Times Ltd). Data should be treated with caution though, as they represent announcements of (mostly greenfield) FDI. Nevertheless, these announcements overlap to a large extent with subsequent official FDI statistics.

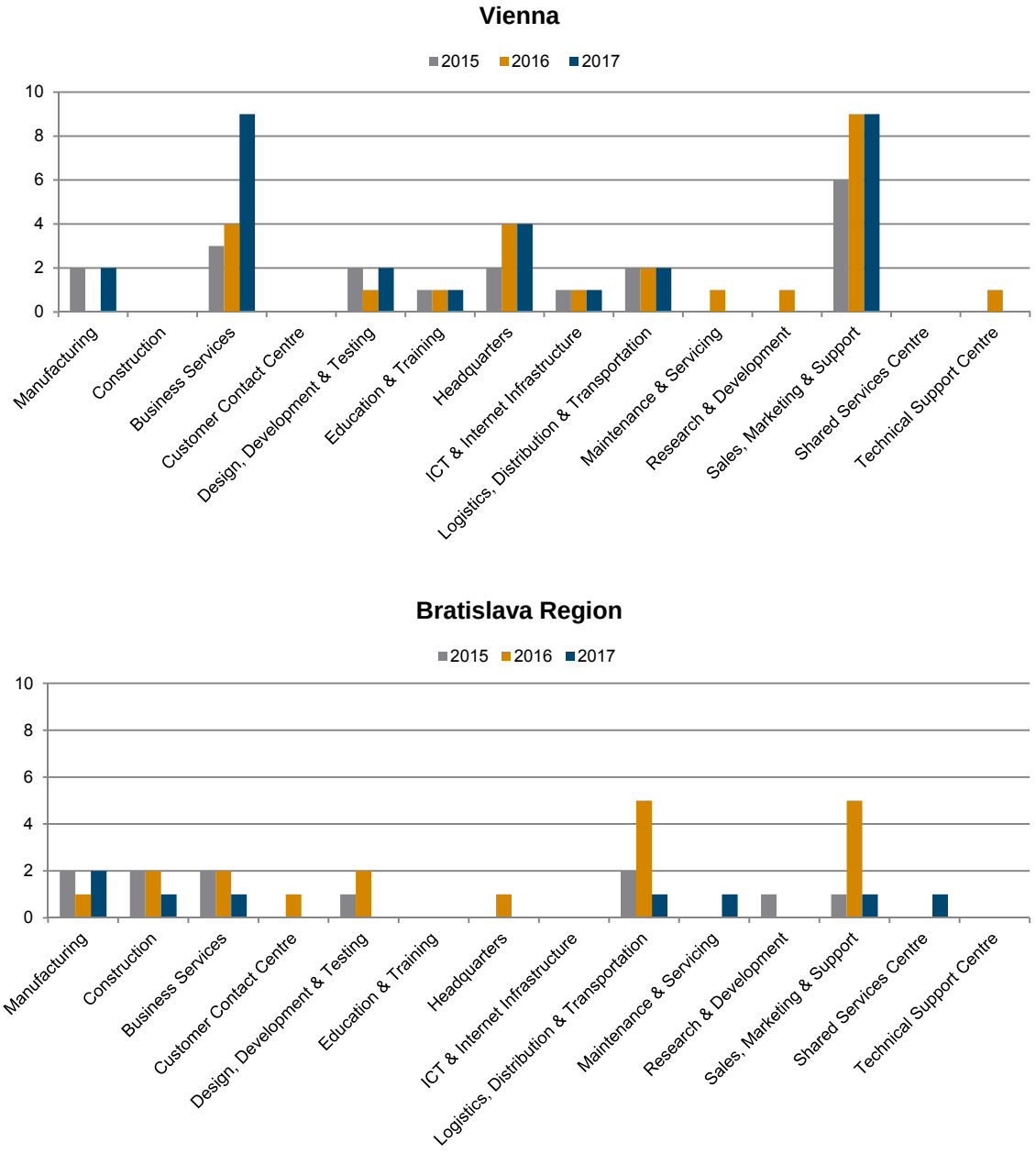
**Figure 10 / Greenfield FDI projects 2010-2017: number of projects (right scale), announced capital investment (USD million) and number of jobs to be created**




Notes: Data exclude retail projects.
Sources: fdimarkets.com

Overall, between January 2010 and 2017, a total of 200 FDI projects were announced in Vienna, compared to 100 in the Bratislava Region. In Vienna, the highest number of projects was announced in 2011; the number declined somewhat in the following years but increased again in 2016 and 2017 (Figure 10). In the Bratislava Region, the highest number of projects was announced in 2016, while no clear trend is seen over the whole time period.

**Figure 11 / Number of Greenfield FDI projects by activity, 2015-2017**




Notes: Data exclude retail projects.
Sources: fdimarkets.com

What is interesting but not surprising is that the number of jobs created was larger in the Bratislava Region compared to Vienna (an average of 220 people per project compared to 60 per project in Vienna over the whole time period). Capital invested was also double per project in Bratislava compared to Vienna. This might be due to smaller projects in the services sector in Vienna, while in Bratislava fewer but larger investment projects in manufacturing occurred (e.g. Volkswagen) which have a substantial employment effect.

A more detailed analysis by activity reveals that most of the projects were announced in services while announcements in manufacturing were rare. However, those few typically involve more capital investment and more job creation. In the services sector, we can distinguish a broad range of activities. Figure 11 shows the number of projects for the last years, 2015-2017. Retail projects were excluded in this analysis but of course play a major role in cities. In Vienna, we see the highest numbers of projects announced in sales (24), business services (16) and headquarters (10). Also, several projects in logistics (6) and design & development (5) occurred. In the Bratislava Region we find a peak for logistics (8) and sales (7) projects. Also, there were a number of projects in manufacturing, construction and business services (5 each).

# Future Challenges

Bratislava and Vienna face a number of common challenges. One of the most pressing is certainly the lack of affordable housing. Both cities need to supply high quality public housing as apparently the market does not deliver enough living space at a price that particularly young families can pay. There are also a number of specific challenges that the two cities are exposed to. Vienna's high share of a low skilled population needs special attention. Also, the Austrian capital's low share of manufacturing industry is a matter of concern, if a more balanced economic structure is to be achieved. Bratislava needs to resolve the lack of (public) transport infrastructure and the insufficiently integrated transport planning. The Slovak capital's (as well as the country's) economic structure appears to be too dependent of the automotive industry and dominated by foreign direct capital investment with a probable lack of positive spillovers. A more diversified economic structure could be helpful in view of future economic shocks. However, there are two major challenges that will affect both cities substantially and that will be touched upon in this section: demographic change as well as digitalisation and robotisation.

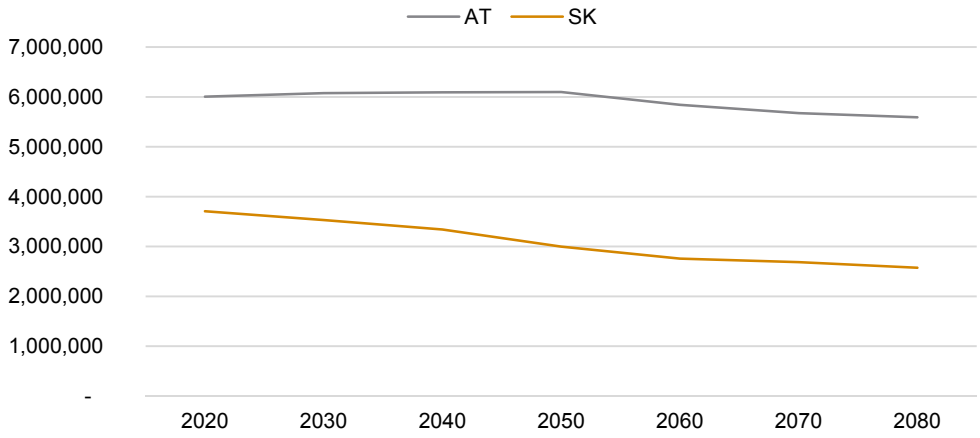
## THE DEMOGRAPHIC CHALLENGE: IMMIGRATION VS EMIGRATION AND AGEING

Although having had similar (low) fertility rates of 1.4-1.5 in the past, population developments in Slovakia and Austria are on quite different paths. In particular, the development of the working age population over the next decades is expected to diverge substantially. An important difference is the migration dynamics. While Austria has been an immigration country for decades already, Slovakia had a strong record of emigration, particularly of young and educated families. This is reflected in Eurostat's baseline projections, as depicted in Figure 12.

Austria's working age population is even forecast to increase slightly from about 6 million to 6.1 million by the mid of the century, followed by a later decrease to about 5.6 million by 2080. In contrast, the Slovak working age population is projected to drop almost linearly from about 3.7 to 2.6 million. Thus, while Austria's working age population is expected to drop by only a few percentage points by the end of the century, Slovakia's working age population is expected to fall by almost a third.

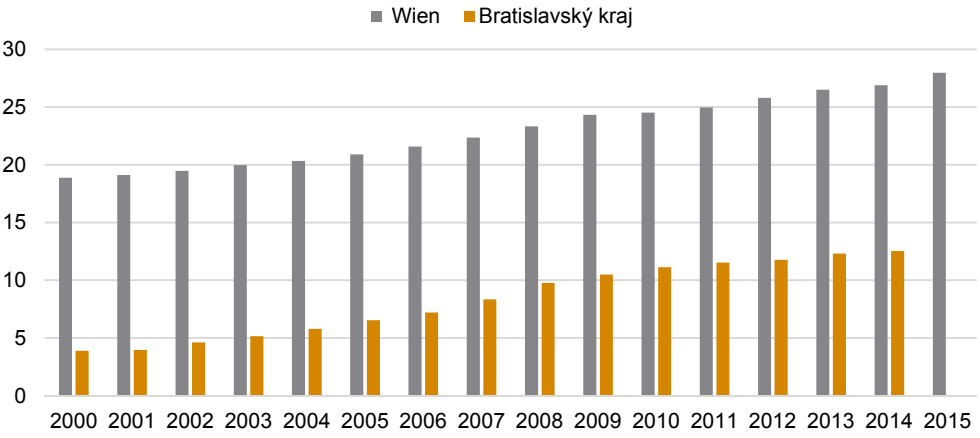
Slovakia was a net emigration country until about 2006, according to Eurostat data. High domestic unemployment rates and large wage differentials across Western Europe acted as important push and pull factors for Slovak emigration. A period of more or less balanced net migration followed. It is only since 2011 that Slovakia consistently became a net immigration country. Jobs created in the flourishing automotive industry attracted workers from poorer countries such as Ukraine and Serbia. Still, while unemployment is becoming less of a push factor for emigration, the wage differentials with Western European levels are still significant and will probably remain so for some time.

**Figure 12 / Baseline working age population (aged 15-64) projections, 2020-2080**




Source: Eurostat, own calculations.

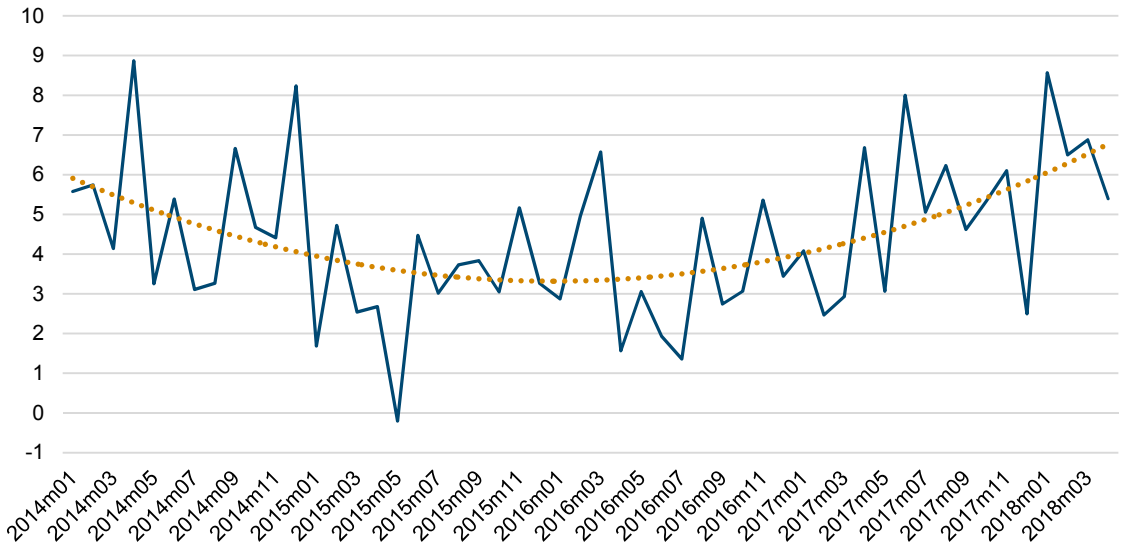
**Figure 13 / Compensation of employees in EUR per hour worked, 2000-2015**




Source: Eurostat, own calculations.

Nevertheless, relative compensation of employees – for instance of those in Bratislava compared to Vienna – improved markedly over time (Figure 13). In 2000 the hourly compensation of employees in Bratislava was only about 20% of the Vienna level. A decade and a half later it is almost 50%. While there has been a certain slowdown in the catch-up process of wages since the outbreak of the global financial crisis, there are good reasons to assume that this will change and income convergence will pick up again. One of the main reasons is precisely the demographic tightening of the Slovak labour market, which is already being felt, and which is manifested in low unemployment rates, as mentioned earlier.

**Figure 14 / Average monthly gross wages in Slovak industry, year-on-year percentage change**




Notes: Dotted line represents the polynomial trend.
Source: wiiw Monthly Database, own calculations.

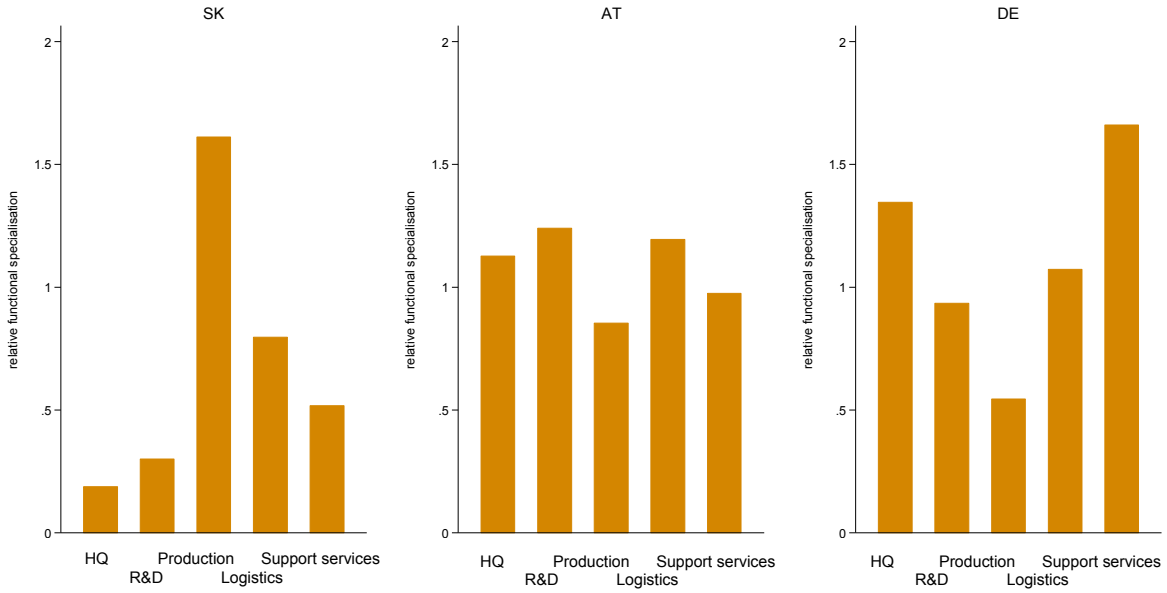
Slovak unemployment rates, which fell to single digit levels in the summer of 2016 have further declined ever since. It is also since the summer of 2016 that an exponential increase in the growth rates of average monthly gross wages in Slovak industry has been observed (Figure 13). Most recently annual growth rates were around 7%. It appears that the bargaining position of Slovak workers has improved significantly (Astrov et al., 2018).

Assuming that the wage growth differential of the last decade and a half between Slovakia and Austria of about 6 percentage points will be achieved in the foreseeable future, wage equalisation could be realised by the end of the 2020s. More modestly, assuming half of that differential we could observe wage harmonisation by approximately 2040. Even if equal wages in Euro terms will never be fully achieved, it is very likely that wages will be at least within close reach within less than a generation. Thus, in a not too distant future we might observe excess labour from Vienna filling posts in Bratislava's factories as eastward commuters. This could be a medium-term challenge for the education and transport systems of the Vienna-Bratislava-twin-city region.

## THE ROBOTISATION CHALLENGE: HEADQUARTERS VERSUS FACTORY ECONOMY EFFECTS?

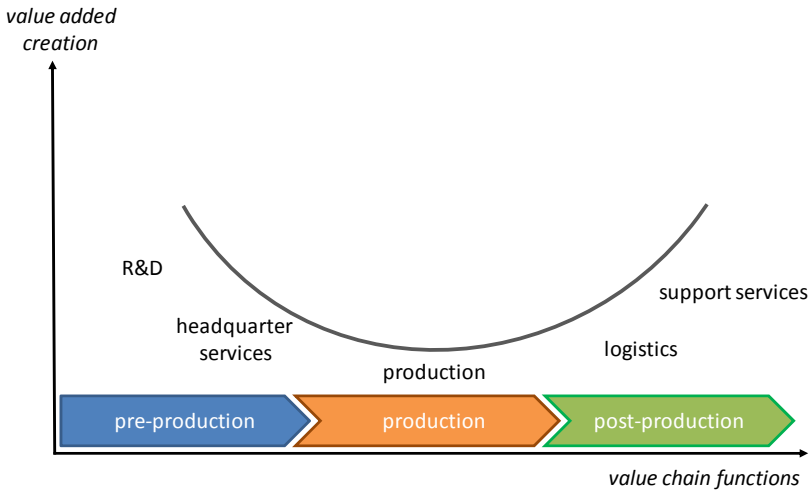
The Slovak economy can be characterised as a factory economy (Stöllinger, 2018). Over the last decade or so greenfield FDI was predominantly entering the country for production purposes (Figure 15, left panel). By contrast, Germany (source country of most of the FDI in the wider region) can be seen as a headquarters economy – the functional specialisation there is focussed on headquarters and support services (Figure 15, right panel). Austria is located in between these two economies, with specialisation in R&D and logistics (Figure 15, central panel).

**Figure 15 / Complementarities in relative functional specialisation within the Central European Manufacturing Core (average for the period 2003-2015)**




Notes: A relative functional specialisation of above 1 in any value chain function indicates that that particular country is more often used as the location for that value chain function than the world average.
Source: fDi markets database, wiiw calculations.

**Figure 16 / The smile curve – value-added creation along the value chain**



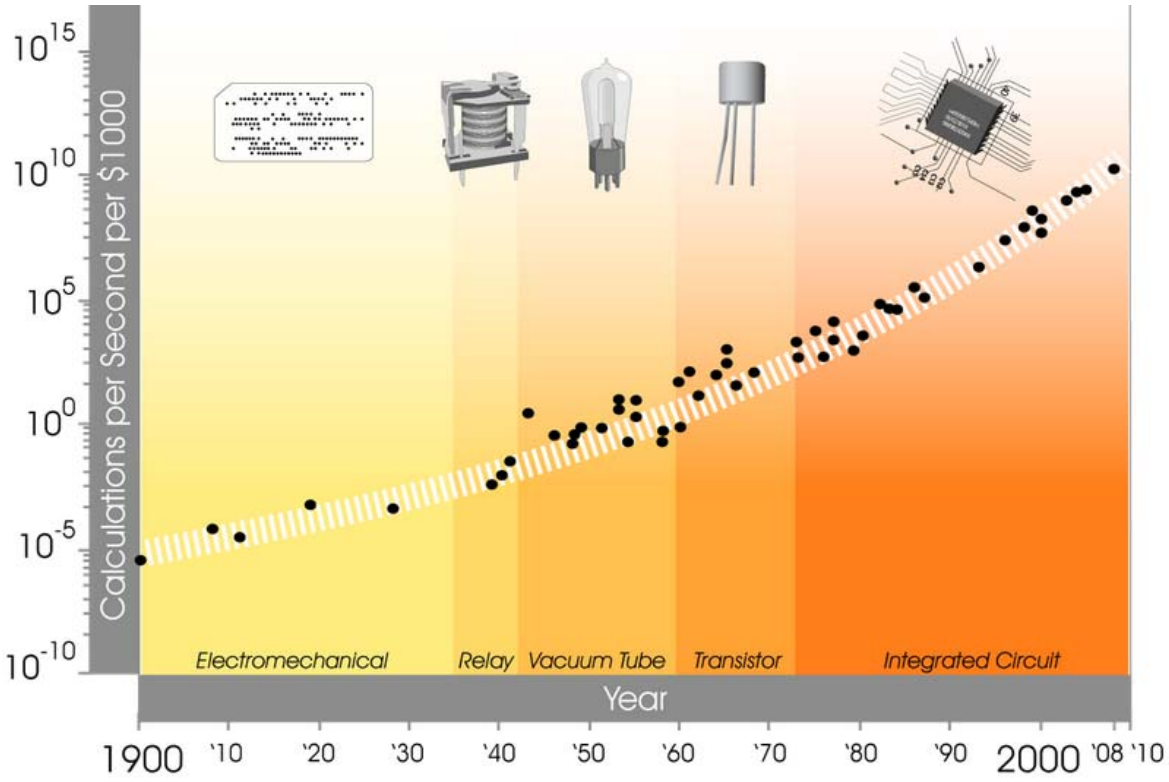

Source: wiiw.

Economists have created the notion of the 'smile curve' (Figure 16) to show a common pattern of value-added creation in industry. Value-added is highest in pre-production (HQ and R&D) and post-production (logistics and support services) activities and lowest in the actual production process. In such a situation it is risky for a country to remain locked-into a specialisation in production proper in the long-term. Although being part of global value chains – even if only in physical production – is certainly a favourable first stepping-stone for a successful economic catch-up process, business functions with higher

value-added also have to be developed. Still, Figure 15 clearly shows that both Slovakia and Austria have ample space for improvement in their specialisation patterns.

Moreover, the ongoing third and fourth industrial revolutions – i.e. the digital revolution as well as robotisation – are likely to have a substantial impact on industrialised economies, with a certain differentiation according to current functional specialisation. Similar to the original industrial revolution in the late 18th and early 19th century change might come gradually. However, the pace of change could still be somewhat quicker than in earlier periods. For instance, it can be shown that the growth of computing time is exponential (Figure 17).

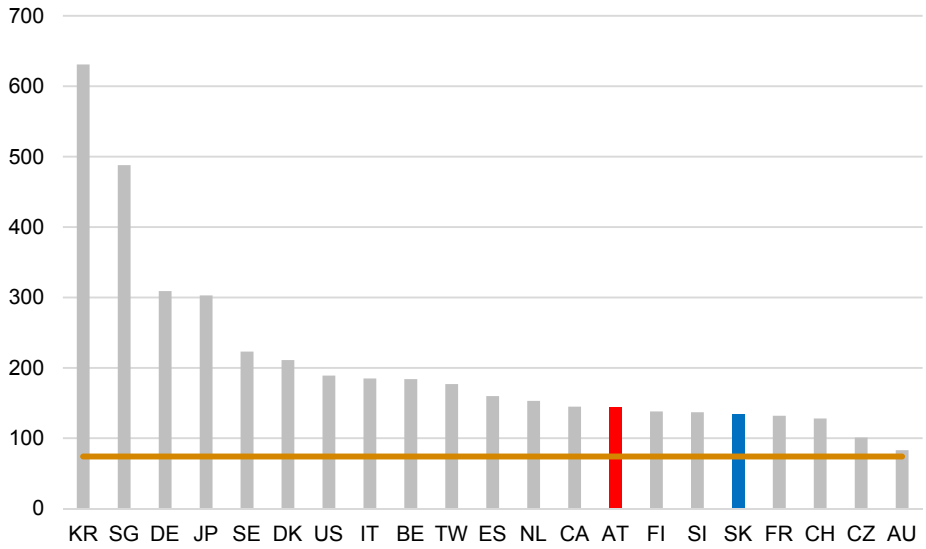
**Figure 17 / Exponential growth of computing, calculations per second per 1000 USD, logarithmic plot, 1990-2010**




Source: Kurzweil (2005).

Furthermore, robots are becoming an integral part of our economies. Recent data shows that while Austria and Slovakia are not among the top-10 they are still among the top-20 economies in industrial robot density (Figure 18). In any case, both economies have a robotisation level far above the global average. In 2016, Austria had 144 industrial robots per 10,000 employees in manufacturing and Slovakia had 135 – the world average value was only at 74.

**Figure 18 / Number of installed industrial robots per 10,000 employees in the manufacturing industry, 2016**




Source: IFR, World Robotics, 2017.

Given the current functional specialisation it is likely that further advancements in robotisation will affect Slovakia more than Austria. Still, both countries being part of the Central European manufacturing core (i.e. German automotive cluster) will – one way or another – face substantial technological change in production. This is likely to be a long-term challenge for the business support and innovation systems of the Vienna Bratislava 'Twin City' region.

# Policy Recommendations

## COOPERATION EXPERIENCES

Bratislava and Vienna may be competitors in world markets in many respects, however, given the close linkages that exist between the two cities, it is important to stress the importance of synergies achieved through cooperation. To determine those areas where synergies from cooperation may be particularly high will be one of the key aspects in formulating policies. This perspective has become even more relevant as the discussion about the shape of the structural funds for the new period after 2020 is currently under way and the 'Twin City' area will have to position itself among competing European regions.

When considering the cooperation potential it is useful to look at the history of cooperation in regional policy and try to look for lessons learned. There have already been a number of cooperative projects, e.g. the CENTROPE programme that started in 2003 with many interesting ideas, but seems to have reduced its activities over time[9]. There is the ongoing Danube Region Strategy with a very broad spectrum of activities; and there is the INTERREG Central Europe Programme. The latter achieved 20 completed projects during the last period (from 2007 to 2013)[10] with partners that came directly from Bratislava and Vienna. Among those were projects supporting IT training for SMEs (INNOTRAIN)[11], the development of solutions for green urban transport systems (GUTs)[12], a large project on railway hubs in cities (RAILHUC)[13] and a European Digital Traffic Infrastructure Network for Intelligent Transport Systems (EDITS)[14]. An interesting INTERREG project was the 'TwinEntrepreneur' initiative for empowering start-ups in the areas of Vienna and Bratislava to develop and grow together[15]. There is one large project within the Danube Region Strategy coordinated by a Slovak partner, the Integrated Drought Management Programme.[16] There are also projects between institutions from both sides funded by EU research funds for infrastructure development, e.g. one by the harbour of Vienna to develop harbour logistics infrastructure.[17]

A very interesting lighthouse project was initiated 2014 by the Austrian Chamber of Commerce in cooperation with Slovak authorities, business associations and Austrian subsidiaries in Slovakia to introduce a dual education system in the country. After the implementation of the necessary laws, the

9 http://www.mycentrope.com/de/home/about/centrope

10 http://www.central2013.eu/

11 https://www.keep.eu/keep/project-ext/15838/INNOTRAIN%20IT

12 http://www.central2013.eu/nc/projects-2007-2013/approved-projects/funded-projects/?L=se%25251%2520or%25201%253D%2540%2540version--&tx_fundedprojects_pi1[project]=58

13 http://www.central2013.eu/nc/projects-2007-2013/approved-projects/funded-projects/?L=se%25251%2520or%25201%253D%2540%2540version--&tx_fundedprojects_pi1[project]=109

14 http://www.central2013.eu/nc/projects-2007-2013/approved-projects/funded-projects/?L=se%25251%2520or%25201%253D%2540%2540version--&tx_fundedprojects_pi1[project]=120

15 http://www.twinentrepreneurs.eu/en/project

16 https://www.gwp.org/en/GWP-CEE/about/contact-us/regional-secretariat/

17 http://www.hafen-wien.com/en/press/projects

'Young Stars' pilot project was introduced, offering curricula for three vocations that are already implemented in eleven companies (of which four are Austrian subsidiaries) in the Nitra area[18]. As it is planned to extend this project, it would be worthwhile examining how this project could be extended to the Bratislava region in cooperation with Viennese institutions.

All of these projects addressed some of the major challenges for the Central European Region in general and the 'Twin Cities' in particular: to enhance the major growth potential for this region and ensure that the substantial progress that has been made on both sides will actually result in a sustainable and inclusive development. When going further it is important to keep in mind that there is already a substantial basis of very concrete project experience to build upon.

## GENERAL POLICY RECOMMENDATIONS

The analyses undertaken within the CENTROPE project[19] have already noted that there is considerable economic potential in the region, with strong and stable economic development providing good preconditions for the development of a knowledge economy, a deep integration into the world economy and a specialisation in manufacturing. However, they also list a number of challenges: weak internal linkages, the urgent need for a transport infrastructure upgrade, the removal of bottlenecks on logistics nodes, the use of untapped transport capacities of the Danube, the need for a better connection of the airports and the problem of insufficient public transport supply.[20] Moreover, the need to increase cross-border innovation networks that are still very rare and to increase the development of high-value added sectors were identified[21].

In order to overcome those challenges a number of policy recommendations were proposed in the CENTROPE project that are still relevant today: a strategic framework for an integrated transport infrastructure and for mobility management, the development of joint planning instruments, a more strategic approach to technology policy, more cooperation within the university system, collaboration between the region's existing clusters and common marketing of the region as a location of FDI, to name just some of the proposals. All of these should be further developed. We will, however, focus on those policy recommendations which may help to overcome the major future challenges that we have identified above.

## POLICIES TO COPE WITH THE DEMOGRAPHIC AND THE ROBOTISATION CHALLENGES

The chapter on challenges has outlined two major challenges that are likely to affect the Vienna-Bratislava region strongly. Already now, and even more so in the medium-term, demographic change is having, and will have, a substantial impact on the Twin Cities' labour markets. A history of (mass) emigration has made the Slovak population age quickly. The working age population is expected to shrink dramatically over the next decades. Increasing wages alone won't make a substantial change.

---

18 https://spectator.sme.sk/c/20052624/dual-education-makes-a-comeback.html [06/09/2018]

19 Peter Huber, Karol Frank, Mihaly Lados, Petr Rozmahel, CENTROPE Regional Development Report 2012

20 CENTROPE, Infrastructure Needs Assessment, 2012

21 CENTROPE, Focus Report on Technology Policy, Research and Innovation, 2012

From a current view, extra-EU mass-immigration[22] is not an option to counter labour shortages. By contrast, Vienna's population is growing quickly. High wage levels and very high life quality indicators have been important pull factors for immigration. Rapid population growth has come with high levels of unemployment, particularly among the lower educated youth. The close distance between a city with a boom in (automotive) production facilities but lack of work force and a city with a population boom but lack of jobs provides for a potential win-win situation.

The medium-term policies to be followed should include measures for connectivity and mobility improvement:

› Substantial improvement of public local transport between Vienna and Bratislava, including a metro-like direct train link operating at intervals under 20 minutes and a travel time below 30 minutes, allowing for daily commuting of large numbers of passengers

› Cooperation in the development of integrated public transport systems

› Improving language competencies in both cities and particularly Slovak language competency among young Viennese to improve their chances on the regional labour market

› School exchange programmes between the two cities and more marketing for a common, reformed dual education system

› Upgrading of skills in both cities and particularly of skills among young Viennese that are useful to the Bratislava labour market

› Introduction of special commuter allowances to support the creation of a truly common labour market, particularly in the transition period while wage levels are still quite different

The further improvement of the transport infrastructure between the two cities is certainly the top priority, also currently for the broad population. One indication of its importance are the global google queries that include the (various) names of the two cities. Analysing those queries yields top results that are solely focussed on the various ways of how to move from one city (and airport) to the other using the different modes of transport available. A similar analysis for another pair of close city agglomerations that are however well integrated within one state – Düsseldorf and Dortmund – reveals that, even though transport is among the top related queries, there are also other top and trending related queries on universities and technical colleges, cultural and sports events as well as for financial services and trade fairs.

In the longer term our earlier analysis has shown that digitalisation and robotisation are serious challenges, particularly for the Central European automotive cluster, of which Vienna and Bratislava are parts. Western Slovakia in particular will likely be affected strongly by the ongoing third and fourth

[22] However, it has to be mentioned that in Slovakia, since May easier conditions for employment of extra-EU persons have been in place. In addition, for example the government also provided 'special treatment' for Volkswagen. The company needs 1,850 new employees. It is allowed to raise quotas on hiring third-country nationals. (https://spectator.sme.sk/c/20850226/slovak-government-will-provide-special-treatment-for-volkswagen-slovakia.html [03/09/2018])

industrial revolutions due to its large number of car production factories. While it is not yet fully clear what exactly the outcome will be, it will certainly be better to be in the position to shape the process rather than being passive. Potential long-term policies in this respect should include:

› Establishment of a joint research centre that deals with the analysis of common solutions regarding the processes of digitalisation and robotisation

› Construction of a joint model factory as a laboratory of future production processes and materials in the field of e-mobility and autonomous driving

› Cooperation in technology and business foresight projects to explore opportunities in sectors other than the automotive sector, in particular high-value-added products and services that can be exported to world markets

› Coordination of innovation oriented public procurement in both cities

› Improving connections of the twin city region with the rest of the world in order to exploit the central position of the region within Europe and the related market for future production at potentially higher returns to scale, including a close connection of both airports with a logistics hub that could also be connected to the planned extension of the broad-gauge railway from Eastern Slovakia.

# References

Annoni, P., L. Dijkstra and N. Gargano (2017), 'The EU Regional Competitiveness Index 2016', European Commission, Regional and Urban Policy, Working Paper, No. 02/2017.

Astrov, V., M. Holzner, S. Leitner, I. Mara, L. Podkaminer and A. Rezai (2018), ‚Die Lohnentwicklung in den mittel- und osteuropäischen Mitgliedsländern der EU', wiiw Research Report in German language, No. 12.

Benč, V., V. Bilčík, A. Duleba, S. Gruber and T. Strážay (2013), 'Zwei Jahrzehnte österreichisch-slowakische Beziehungen', Forschungszentrum der Slowakischen Gesellschaft für Außenpolitik, Österreichische Botschaft Pressburg, Österreichisches Kultur Forum, Bratislava.

Economist Intelligence Unit (2018), 'The Global Liveability Index, 2018', London.

European Commission, UN-Habitat (2016), 'The State of European Cities 2016', Brussels.

Hanzl-Weiss, D. (2017), 'Economic Relations Between Austria and Slovakia?', wiiw Monthly Report, No. 10, October.

Huber, P., K. Frank, M. Lados and P. Rozmahel (2012), 'CENTROPE Regional Development Report 2012', Wien.

Kurzweil, R. (2005), 'The Singularity Is Near', Penguin Books: New York.

Römisch, R. (2017), 'Austria's Economic Geography Position in Europe', wiiw Monthly Report, No. 10, October.

Stöllinger, R. (2018), 'Functional specialisation in CESEE: Key to escaping the semi-periphery trap?', mimeo, forthcoming.

# SHORT LIST OF THE MOST RECENT WIIW PUBLICATIONS

(AS OF OCTOBER 2018)

For current updates and summaries see also wiiw's website at www.wiiw.ac.at

## BRATISLAVA AND VIENNA: TWIN CITIES WITH BIG DEVELOPMENT POTENTIALS

by Doris Hanzl-Weiss, Mario Holzner and Roman Römisch

wiiw Policy Notes and Reports, No. 24, October 2018
29 pages including 2 Table and 18 Figures
PDF only: free download from wiiw's website

## IS AUSTRIA'S ECONOMY LOCKED-IN IN THE CESEE REGION? AUSTRIA'S COMPETITIVENESS AT THE MICRO-LEVEL

by Mahdi Ghodsi

wiiw Working Papers, No. 151, October 2018
39 pages including 5 Tables and 3 Figures
hardcopy: EUR 8.00 (PDF: free download from wiiw's website)

## INFRASTRUCTURE INVESTMENT IN THE WESTERN BALKANS: A FIRST ANALYSIS

by Mario Holzner and Monika Schwarzhappel

wiiw Research Reports, No. 432, October 2018
33 pages including 1 Table and 16 Figures
hardcopy: EUR 8.00 (PDF: free download from wiiw's website)

## WIIW MONTHLY REPORT 2018/09

ed. by Vasily Astrov and Sándor Richter

- Graph of the month: Average gross monthly wages in Central and East European countries, at purchasing power parity, Austria = 100
- Opinion corner: How can wages in Central and Eastern Europe be sustainably increased and the pressure to emigrate dampened?
- Estimating the effects of commuting on regional GDP in Austria
- Austria's investment in its Eastern neighbourhood
- Main Austrian export destinations: the role of CESEE re-examined
- Monthly and quarterly statistics for Central, East and Southeast Europe

wiiw Monthly Reports, No. 9, September 2018
48 pages including 1 Tables and 15 Figures
exclusively for wiiw Members

**THE EVOLUTION OF TRADE UNIT VALUES: A MEASUREMENT ON QUALITY**
by Alexandra Bykova, Mahdi Ghodsi and Robert Stehrer

wiiw Research Reports, No. 431, September 2018
45 pages including 15 Tables and 11 Figures
hardcopy: EUR 8.00 (PDF: free download from wiiw's website)

**EURASIAN ECONOMIC INTEGRATION: IMPACT EVALUATION USING THE GRAVITY MODEL AND THE SYNTHETIC CONTROL METHODS**
by Amat Adarov

wiiw Working Papers, No. 150, September 2018
36 pages including 5 Tables and 14 Figures
hardcopy: EUR 8.00 (PDF: free download from wiiw's website)

**WHAT EXPLAINS AUSTRIA'S EXPORT MARKET PERFORMANCE? EVIDENCE BASED ON ESTIMATING AN EXPORT MODEL OVER 1997-2016**
by Philipp Heimberger

wiiw Working Papers, No. 149, September 2018
24 pages including 12 Tables and 2 Figures
hardcopy: EUR 8.00 (PDF: free download from wiiw's website)

**A 'EUROPEAN SILK ROAD'**
by Mario Holzner (Coordinator), Philipp Heimberger and Artem Kochnev

wiiw Research Reports, No. 430, August 2018
43 pages including 10 Tables and 17 Figures
hardcopy: EUR 8.00 (PDF: free download from wiiw's website)

**DIE LOHNENTWICKLUNG IN DEN MITTEL- UND OSTEUROPÄISCHEN MITGLIEDSLÄNDERN DER EU**
by Vasily Astrov (Koordinator), Mario Holzner, Sebastian Leitner, Isilda Mara, Leon Podkaminer und Armon Rezai

wiiw-Forschungsberichte / wiiw Research Reports in German language, No. 12, July 2018
67 pages including 16 Tables, 27 Figures and 5 Boxes
hardcopy: EUR 8.00 (PDF: free download from wiiw's website)

### WIIW MONTHLY REPORT 2018/07-08

ed. by Vasily Astrov and Sándor Richter

- Graph of the month: Russia's trade reorientation: EU versus China, 2014 and 2017
- Opinion Corner: Italy: three cheers for democracy!
- The New Silk Road: companion or competitor to the EU and the EAEU?
- Is Austria's economy still locked-in in the CESEE region? Austria's competitiveness at the micro level
- Effects of non-tariff measures on gross exports and value added exports
- Monthly and quarterly statistics for Central, East and Southeast Europe
- Index of subjects – July-August 2017 to July-August 2018

wiiw Monthly Reports, No. 7-8, July-August 2018
47 pages including 3 Tables and 27 Figures
exclusively for wiiw Members

### DIE "EUROPÄISCHE SEIDENSTRAßE"

by Mario Holzner (Koordinator), Philipp Heimberger und Artem Kochnev

wiiw-Forschungsberichte / wiiw Research Reports in German language, No. 11, July 2018
43 pages including 10 Tables and 17 Figures
hardcopy: EUR 8.00 (PDF: free download from wiiw's website)

### THE IRANIAN ECONOMY: CHALLENGES AND OPPORTUNITIES

by Mahdi Ghodsi, Vasily Astrov, Richard Grieveson and Robert Stehrer

wiiw Research Reports, No. 429, July 2018
63 pages including 2 Tables, 43 Figures and 1 Box
hardcopy: EUR 8.00 (PDF: free download from wiiw's website)

### FOREIGN DIRECT INVESTMENTS: A COMPARISON OF EAEU, DCFTA AND SELECTED EU-CEE COUNTRIES

by Peter Havlik, Gábor Hunya and Yury Zaytsev

wiiw Research Reports, No. 428, July 2018
43 pages including 2 Tables, 23 Figures and 1 Box
hardcopy: EUR 8.00 (PDF: free download from wiiw's website)

IMPRESSUM

Herausgeber, Verleger, Eigentümer und Hersteller:
Verein „Wiener Institut für Internationale Wirtschaftsvergleiche' (wiiw),
Wien 6, Rahlgasse 3

ZVR-Zahl: 329995655

Postanschrift: A 1060 Wien, Rahlgasse 3, Tel: [+431] 533 66 10, Telefax: [+431] 533 66 10 50
Internet Homepage: www.wiiw.ac.at



Offenlegung nach § 25 Mediengesetz: Medieninhaber (Verleger): Verein 'Wiener Institut für Internationale Wirtschaftsvergleiche', A 1060 Wien, Rahlgasse 3. Vereinszweck: Analyse der wirtschaftlichen Entwicklung der zentral- und osteuropäischen Länder sowie anderer Transformationswirtschaften sowohl mittels empirischer als auch theoretischer Studien und ihre Veröffentlichung; Erbringung von Beratungsleistungen für Regierungs- und Verwaltungsstellen, Firmen und Institutionen.

wiiw

wiiw.ac.at