SLOVAK REPUBLIC

SELECTED ISSUES

March 2024

This Selected Issues paper on the Slovak Republic was prepared by a staff team of the International Monetary Fund as background documentation for the periodic consultation with the member country. It is based on the information available at the time it was completed on February 21, 2024.

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INTERNATIONAL MONETARY FUND

SLOVAK REPUBLIC

SELECTED ISSUES

February 21, 2024

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CONTENTS

INFLATION IN SLOVAKIA—DRIVERS AND IMPACTS[1]

High and volatile inflation in Slovakia in recent years seems to be mainly driven by volatile food prices amplified by the larger CPI weight of food items. Other drivers include the large impact of imported inflation, elevated profit margins of domestic firms, and higher wage growth. High inflation could erode external competitiveness through higher unit labor costs, but there is no clear evidence of this so far. Domestically, high inflation has had uneven impacts across households and firms. Firms with the largest cost increases experienced a deterioration in their financial situation, and certain categories of households, including those with low income levels and the elderly, are particularly vulnerable to the rising cost of living. The recent fall in inflation is projected to continue, but strong unit labor cost growth or an increase in profit margins could keep inflation elevated and undermine competitiveness.

A.   Introduction

1.   Inflation has declined from record-highs in early 2023 but remains high relative to other euro area (EA) countries (Figure 1). The inflation rate in Slovakia started to increase more than in other EA countries from the beginning of 2022, and both the headline and core inflation rates reached their peak of 15.4 and 15.3 percent, respectively, in February 2023.[2] The pace of price increases fell significantly in April 2023, when the headline inflation decreased from 12.2 to 5.6 percent on a momentum basis (3m/3m seasonally adjusted and annualized). The easing trend has continued until 3Q 2023, but inflation picked up moderately in 4Q 2023, especially for core inflation. At the end of 2023, inflation in Slovakia remained among the highest in the EA, and the growth rates on a momentum basis are above most EA countries. This paper addresses three key questions: 1) the drivers of higher inflation in Slovakia relative to the EA, 2) the impacts of elevated inflation on the Slovak economy, and 3) the outlook and risk of inflation remaining elevated.

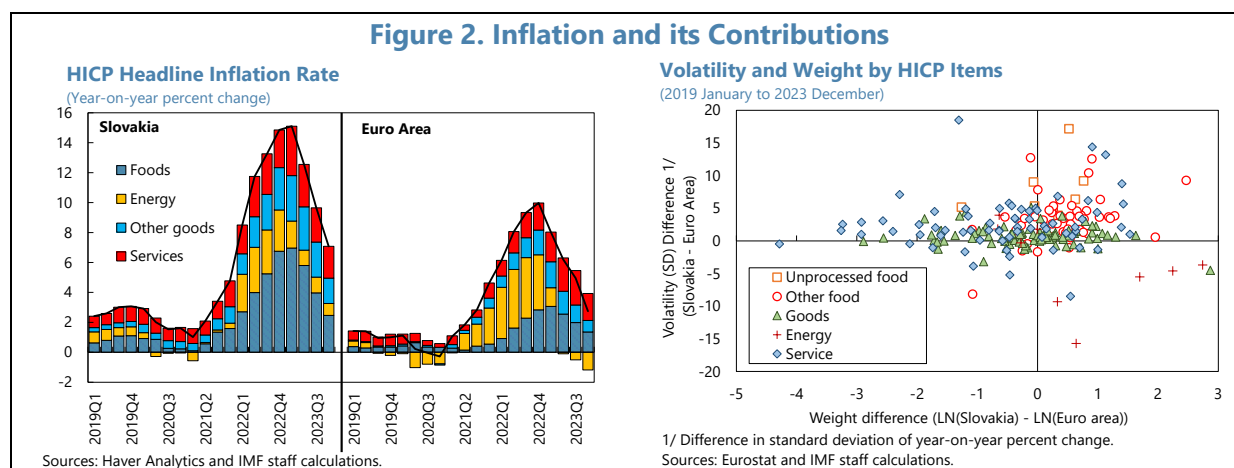
Figure 1. Recent Development of Inflation Rates

1/Euro Area range and median exclude Slovakia.
Sources: Eurostat and IMF staff calculations.
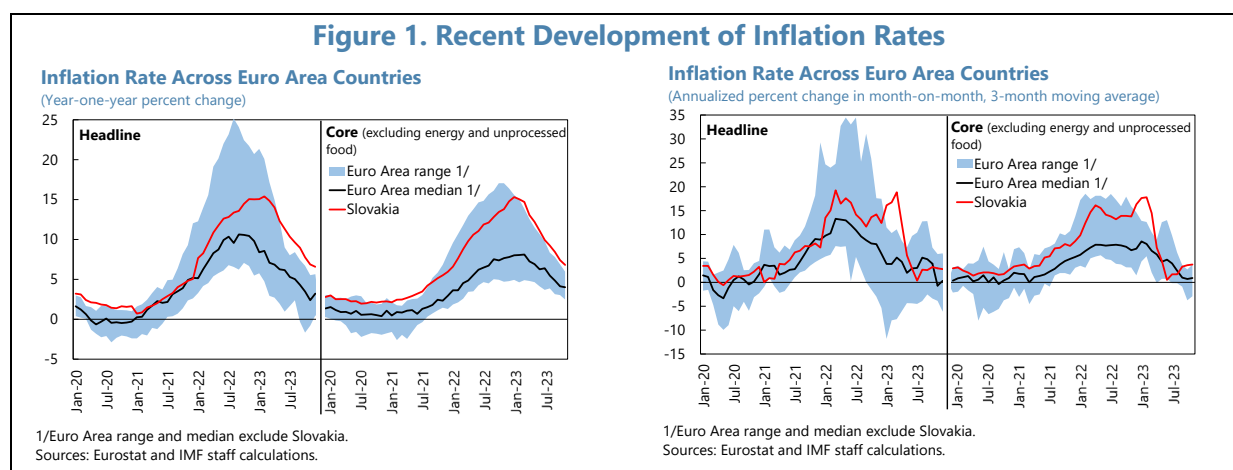
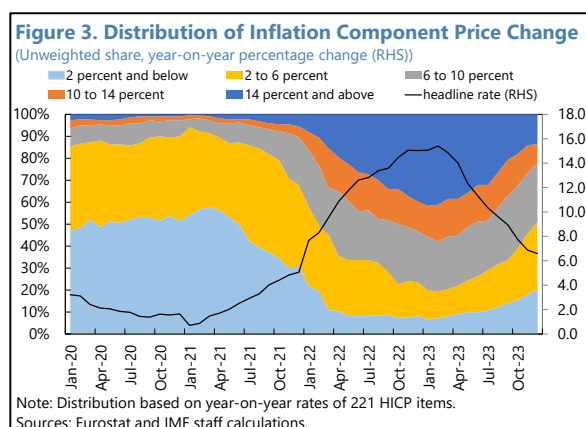
[1] Prepared by Shinya Kotera (EUR).

[2] Core inflation excludes energy and unprocessed food.

B. Drivers of Higher Inflation in Slovakia

2.   Food prices have been a more important driver of inflation than in the EA. Headline inflation and its components indicate that food inflation played a major role in Slovakia compared to the EA (Figure 2, left). On the other hand, the contribution of energy inflation was smaller in Slovakia, owing to the government's energy support measures that capped price increases for gas and heating, while freezing electricity prices. The large impact of food prices was both due to a higher weight of food in the CPI basket (26.3 percent in Slovakia versus 16.1 percent in the EA in 2023) and higher food price volatility (Figure 2, right). The latter may be related to inefficiencies in the domestic food production in Slovakia and elevated markups in some sectors of the food production chain (Casalis, 2023).[3]
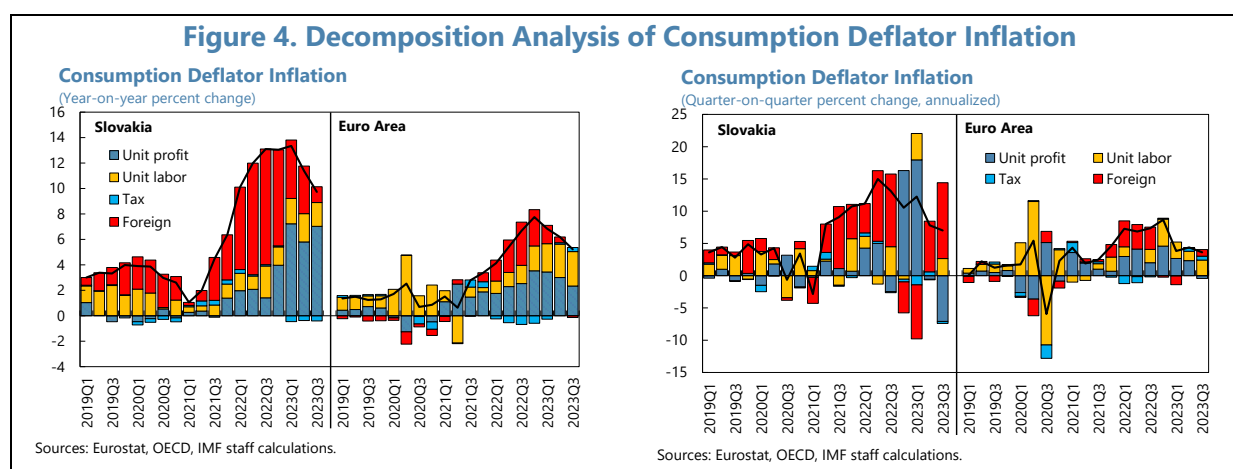
Figure 2. Inflation and its Contributions

HICP Headline Inflation Rate
(Year-on-year percent change)

Volatility and Weight by HICP Items
(2019 January to 2023 December)

1/ Difference in standard deviation of year-on-year percent change.
Sources: Haver Analytics and IMF staff calculations.
Sources: Eurostat and IMF staff calculations.

3.   In addition to food prices, a wide range of prices, particularly services, were also shaping inflation in Slovakia. Although food inflation was the main driver, the inflation surge was observed across a broad range of goods and services (Figure 3). During 2023:Q1, the price of about 40 percent of the goods and services in the CPI basket increased by 14 percent and more on a year-on-year basis. Similarly, the recent easing of inflation was also observed across a wide range of items. However, about half of the items its CPI basket still grew above 6 percent at the end of 2023, and services inflation remains about double that in the EA. Cost pressures including relatively high wage growth and significant price-setting

Figure 3. Distribution of Inflation Component Price Change
(Unweighted share, year-on-year percentage change (RHS))

Note: Distribution based on year-on-year rates of 221 HICP items.
Sources: Eurostat and IMF staff calculations.

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[3] Across the EU the main drivers of food inflation have been rising energy costs and a reduced supply (higher cost) of key agricultural inputs (e.g., fertilizers and animal feed). See the European Parliamentary Research Service (2023) for further details.

inertia are preventing services inflation from coming down faster. Some service sectors, such as restaurants, were also impacted by higher food prices in Slovakia.

4.   Higher import prices and, and more recently, corporate profits have also been important drivers of inflation in Slovakia (Figure 4)**.** Hansen et al. (2023) decompose the consumption deflator into contributions from domestic profits, labor costs, foreign prices, and net taxes. Their analysis highlights the key role of foreign (import) prices in the inflation surge in Slovakia relative to the EA, where unit profit played a larger role. However, the contribution of corporate profits increased notably in 2022:Q4 and 2023:Q1 in Slovakia, while the importance of foreign prices appears to be receding. Although this does not necessarily mean a change in the price markup, some firms could be operating with elevated margins to take advantage of higher prices in the rest of the economy, to create a cushion against future uncertainty, or to compensate for lower profits during the pandemic or period of rising input costs.[4]

Figure 4. Decomposition Analysis of Consumption Deflator Inflation

Sources: Eurostat, OECD, IMF staff calculations.

C.   The Impact of Elevated Inflation on Slovakia's Economy

5.   The evidence for a loss of external competitiveness due to the inflation surge is mixed. A higher inflation rate is associated with higher unit labor cost (ULC) in EA countries, and an increase in ULC relative to trading partners or competitors can adversely affect external competitiveness.[5] Given the importance of manufacturing for the Slovak economy, the loss of competitiveness could reduce exports and growth. After the pandemic, the overall ULC in Slovakia has increased more than in the EA as productivity growth only partially offset the higher growth of wages (Figure 5, upper left). In the manufacturing sector the increase in ULC was higher than in other EA countries but less than in other Central and Eastern Europe (CEE) countries, which includes Slovakia's main competitors (Figure 5, upper right). The real effective exchange rate calculated using most deflators has appreciated (pointing to a loss of competitiveness), but the real exchange rate deflated using the

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[4] Unit profits are defined as nominal profits per unit of output. Hence, even if the markup stays constant, unit profit can increase if the marginal cost increases.

[5] A simple correlation between headline inflation changes and ULC changes (percentage change between 2019 and 2023:Q1–Q3 (average)) among EA countries is about 0.77.

Producer Price Index (PPI)—which could be more relevant for the manufacturing sector—depreciated in 2020–21 and remains in line its pre-pandemic level despite appreciating in recent months (Figure 5, lower left).

6.   Elevated inflation does not appear to have eroded Slovakia's market share thus far.
Slovakia's market share of goods exports declined modestly in late 2021 and 2022 but has rebounded in 2023 (Figure 5, lower right). This is consistent with the disruption to Slovak exports from supply chain restrictions in 2021–22 and with the easing of supply constraints in 2023 and resulting catch-up of production. Overall, there is no clear evidence of a loss of competitiveness due to elevated inflation or of a reduction in Slovakia's export market share.

Figure 5. Unit Labor Cost and Market Share
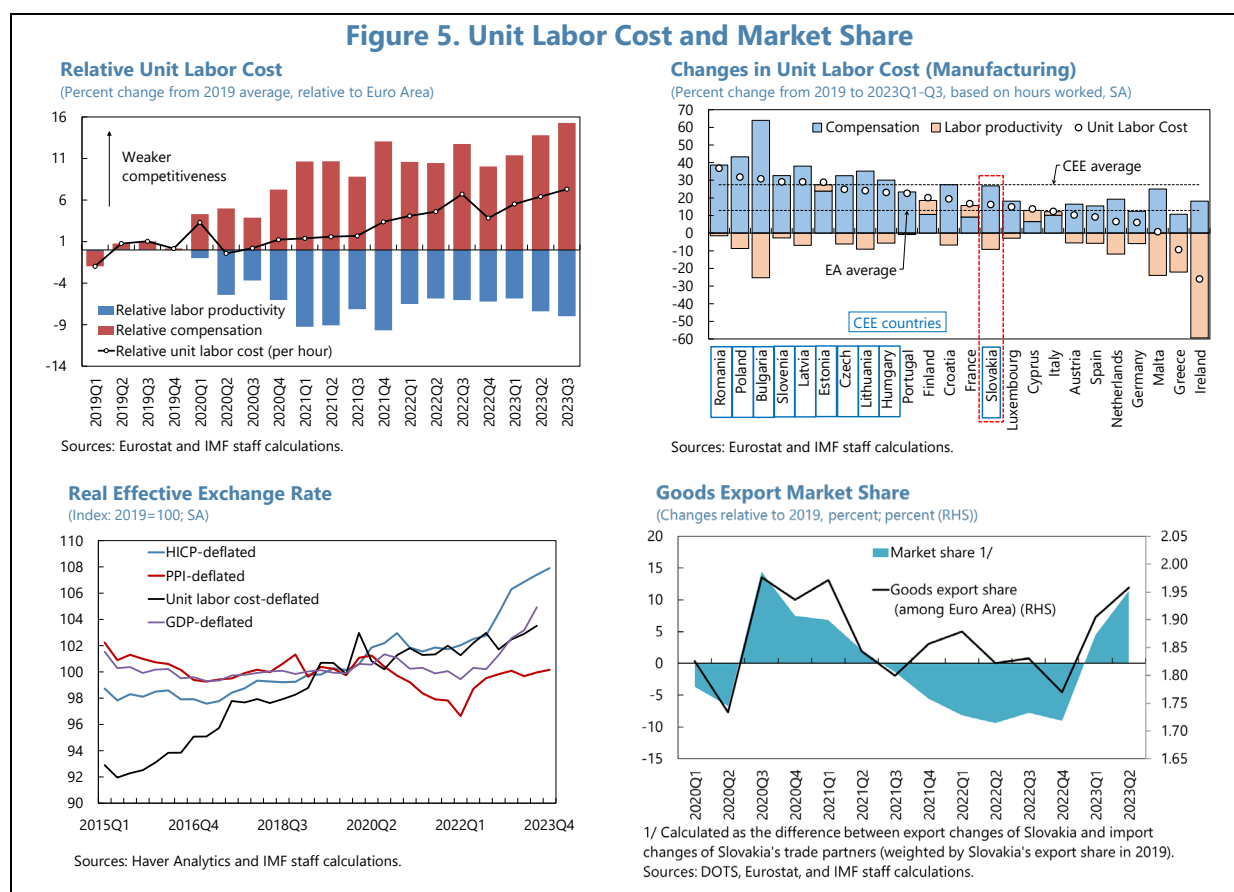
7.   Firms with the largest cost increases experienced some worsening of their financial situation, though the impact on debt repayment capacity thus far has been limited (Figure 6). While many firms managed to offset rising costs by passing them on to consumers, there is significant heterogeneity (NBS, 2023a). More than 10 percent of non-financial corporations saw costs more than double in 2022, and those faced with the highest cost rises were unable to increase revenues by the same magnitude and experienced falling profit margins, declining liquidity buffers, and increasing indebtedness.[6] However, thus far there is no evidence of an increase in bankruptcy

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[6] See NBS (2023b) for more details.

and non-performing loans, suggesting the affected firms have buffers to absorb the increase in costs or have been able to access additional financing.

Figure 6. Impacts on Firms

Distribution of firms by Change in Costs
(2022)

The effect of change in costs across firms (2022)
(median change)

Source: National Bank of Slovakia

Source: National Bank of Slovakia
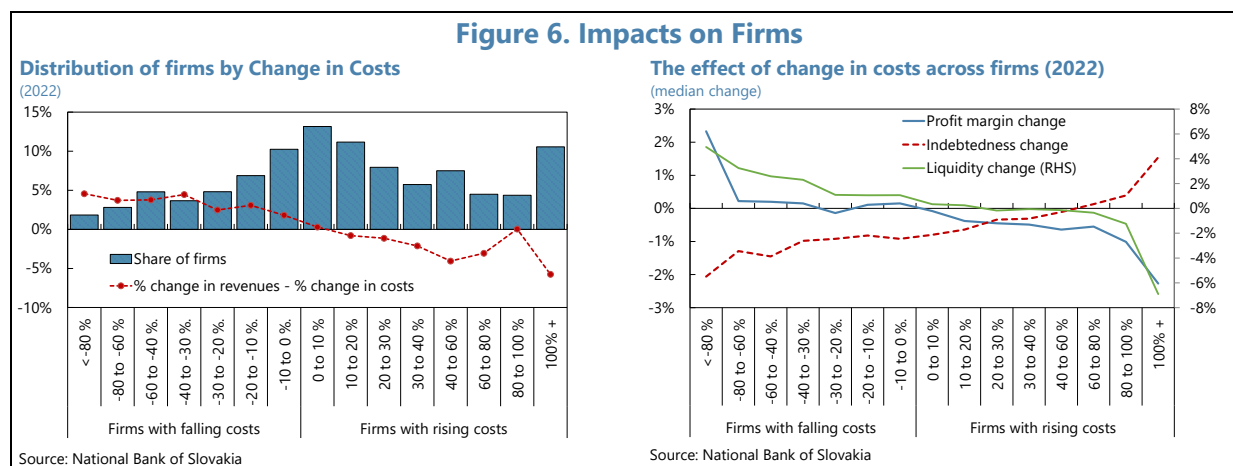
8. **The impact of the inflation surge is uneven across households due to differences in expenditure patterns.** The impact of rising living costs (from 2021:Q4 to 2023:Q4) was estimated following the methodology of Causa et al. (2022) using the micro-based national household budget survey and CPI data.[7] The result indicates large heterogeneous impacts across households (Figure 7, upper left). On average, the rise in living costs was about 11.4 percent, but the interquartile range was from 10.6 to 12.3 percent due to differences in expenditure patterns. Moreover, the factors contributing to the overall rise in cost of living varied significantly across households (Figure 7, upper right). Among the four categories, the contribution from food prices had the largest impact and standard deviation, followed by the services and energy prices. According to NBS, the financial situation of the household sector overall has thus far been resilient to high inflation, though some households have seen an increase in the risk of financial distress.[8]
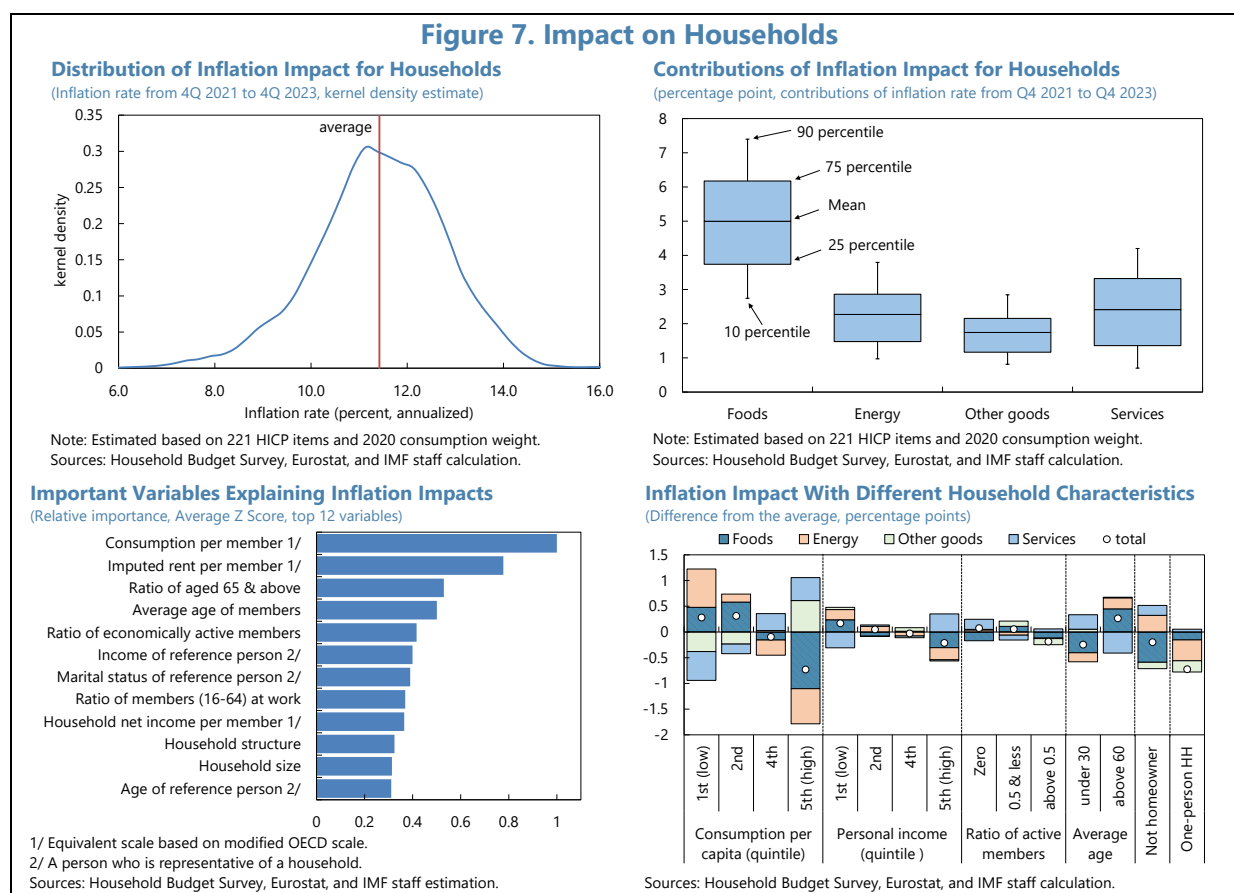
9. **Certain categories of households, such as those with lower consumption and income levels and the elderly, are particularly vulnerable to the rising cost of living.** A simple machine learning analysis was conducted in order to identify the most important characteristics affecting the difference in the impact of inflation across households.[9] The most important variables identified include consumption/income level, imputed rent, age of household members, share of economically

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[7] Causa et al. (2022) used the compensated variation framework and calculated the change in household purchasing power as the percentage variation in prices of item k weighted by the share of expenditure on item k. A similar approach has been also used by Ari et al. (2022) to assess the effect of surging energy prices on European households. Using a different framework, IMF (2023) decomposed the impact of inflation into three channels (consumption basket, income, and wealth) for 6 countries. For Slovakia, Valachyova and Senaj (2023) analyzed the impact of the inflationary shock on household welfare by combining a microsimulation model with data from the expenditure survey and obtained similar results to this paper.

[8] See NBS (2023a) for more details. Households at risk of financial distress are defined as those whose loan payments and necessary living expenses exceed their income and savings.

[9] Random forest analysis using the Boruta Package. See Kursa and Rudnicki (2010) for the details of the package. In total, 37 variables, including consumption, income, education, occupation, industry, activity status, job contract, age, gender, degree of urbanization, household structure, and household size, are used to identify the important features.

active persons, and household structure (Figure 7, lower left). A simple linear regression analysis (Figure 7, lower right) using the identified variables suggest the impact of inflation is higher in households with lower consumption (per member) and income levels, as the share of food and energy expenditure for these households tends to be large.[10,11] On the other hand, the impact form service prices tends to be larger for households with higher consumption and income levels. The impact of inflation is higher for elderly households and lower for younger households, again because of differences in the food and service expenditure share. The impact of energy prices tends to be lower in households that do not own houses. Finally, the impact of inflation tends to be lower in households with a high share of economically active persons and in one-person households.
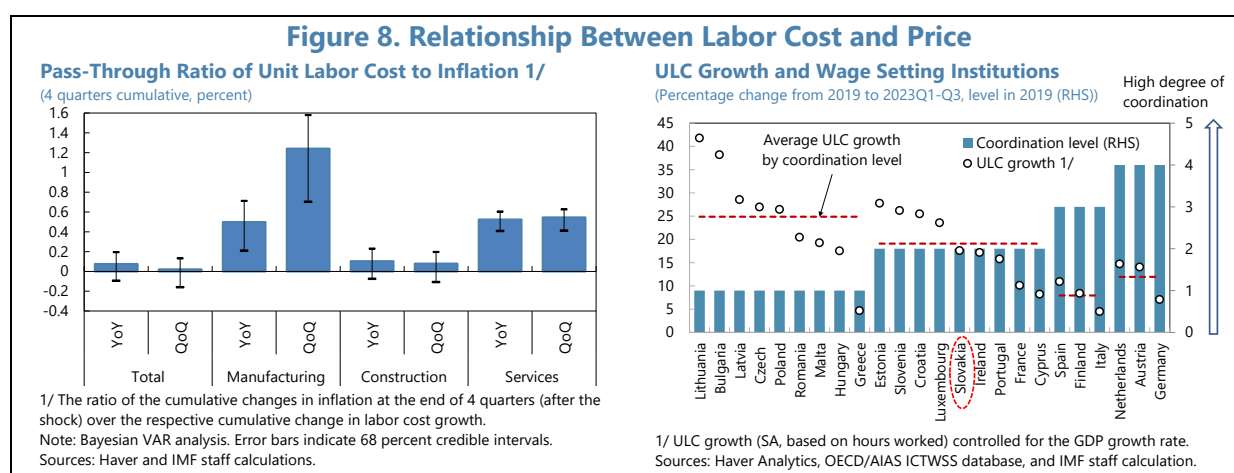
Figure 7. Impact on Households

Distribution of Inflation Impact for Households
(Inflation rate from 4Q 2021 to 4Q 2023, kernel density estimate)

Note: Estimated based on 221 HICP items and 2020 consumption weight.
Sources: Household Budget Survey, Eurostat, and IMF staff calculation.

Contributions of Inflation Impact for Households
(percentage point, contributions of inflation rate from Q4 2021 to Q4 2023)

Note: Estimated based on 221 HICP items and 2020 consumption weight.
Sources: Household Budget Survey, Eurostat, and IMF staff calculation.

Important Variables Explaining Inflation Impacts
(Relative importance, Average Z Score, top 12 variables)

1/ Equivalent scale based on modified OECD scale.
2/ A person who is representative of a household.
Sources: Household Budget Survey, Eurostat, and IMF staff estimation.

Inflation Impact With Different Household Characteristics
(Difference from the average, percentage points)

Sources: Household Budget Survey, Eurostat, and IMF staff calculation.

D.   Outlook and Risk

10.   Although inflation is projected to continue to fall, an increase in relative ULC could keep inflation elevated and undermine competitiveness. While core inflation is expected to be

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[10] Consumption per person is calculated as a household total expenditure (excluding imputed rent) divided by the modified OECD scale.

[11] See Annex for the regression tables. Not all important variables were used for the regression analysis given some overlap between them. The impact of each factor (Figure 7, lower right) is estimated by setting all explanatory variables at their respective average except the variable of interest.

stickier due to the ongoing recovery of real wages, headline inflation is projected to fall to about 4 percent in 2024 and approach the 2 percent target by 2027. However, continued strong nominal wage growth would put upward pressure on firms' costs and could keep inflation high for long. The impact of high ULCs on inflation in Slovakia across different sectors is analyzed using a simple Bayesian VAR estimated on quarterly data.[12,13] The results indicate that there is significant pass-through from ULCs to price inflation in the services and manufacturing sectors but not in the economy as a whole (Figure 8, left). The median results suggest the pass-through ratios of ULC to inflation are about 0.5 in the service sector with a relatively small credible interval. For manufacturing, the median pass-through ratios are about 0.5 on a year-on-year basis and 1.2 on a quarter-on-quarter basis, but the credible intervals are large. Overall, the results confirm that there is a risk that high nominal wage growth could keep inflation high for long and put pressure on competitiveness in the services and manufacturing sector.

Figure 8. Relationship Between Labor Cost and Price

Pass-Through Ratio of Unit Labor Cost to Inflation 1/
(4 quarters cumulative, percent)

1/ The ratio of the cumulative changes in inflation at the end of 4 quarters (after the shock) over the respective cumulative change in labor cost growth.
Note: Bayesian VAR analysis. Error bars indicate 68 percent credible intervals.
Sources: Haver and IMF staff calculations.

ULC Growth and Wage Setting Institutions
(Percentage change from 2019 to 2023Q1-Q3, level in 2019 (RHS))

1/ ULC growth (SA, based on hours worked) controlled for the GDP growth rate.
Sources: Haver Analytics, OECD/AIAS ICTWSS database, and IMF staff calculation.

11.   The risk that rising nominal wages could keep inflation high for long point to the need for responsible wage settlements that account for international competitiveness. According to the OECD, Slovakia's dominant level of wage negotiations is the industry and enterprise level, and the degree of coordination is relatively weak.[14] A simple correlation across countries suggests less coordination is associated with higher ULC growth after the pandemic (Figure 8, right). Also, a higher degree of wage coordination across bargaining units is related to better labor market performance, possibly because it makes it easier to account for the state of the business-cycle and

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[12] Past studies indicate that labor cost inflation (wage inflation adjusted for productivity developments) is the main driver of price inflation. The pass-through from wages to inflation for European countries as a whole was examined by IMF (2018).

[13] The analysis here is conducted by following Bobeica et al. (2022). A Bayesian VAR with a Minnesota prior (multivariate Jeffreys prior) is used. The variables in the VAR are 1) gross value-added growth, 2) ULC growth, and 3) deflator growth. Eight VAR models are estimated separately (four sectors and two growth rates (year-on-year (YoY) or quarter-on-quarter (QoQ)). Lag = 3 is used for all models. Cholesky orthogonalization is used with the variables ordered as listed above. The estimation periods is from 2004:Q1 to 2023:Q3.

[14] The coordination index takes five values: 5: binding norms, 4: non-binding norms and/or guidelines, 3: procedural negotiation guidelines, 2: some coordination, 1: fragmented wage bargaining. See OECD/AIAS ICTWSS database for more details. Slovakia's score is 2.

the macroeconomic impacts of wage agreements on competitiveness (OECD, 2019). In addition, although the growth in labor productivity has mitigated the increase in ULCs thus far, the downside risk to productivity is high moving forward in Slovakia due to the slow rate of digital adaptation, brain drain, and a lack of innovation (Ministry of Economy, 2022).

12.   Firms' price setting behavior could keep inflation high and volatile. Inflation could remain high for a long if firms increase their profit margin. In addition, inflation could be volatile if firms change their markups more frequently than usual given the uncertain macroeconomic environment. Using the decomposition of inflation in Figure 4, we can calculate the combinations of ULC and unit profit contributions required for inflation in Slovakia to decline in 2024 and 2024 as currently projected.[15] While the contribution from unit profit has been volatile in recent years, the analysis in Figure 9 suggests a compression in currently elevated profit margins would be required to achieve the projected amount of disinflation in the economy.

Figure 9. ULC and Unit Profit Contributions
(Percentage points)

Sources: Eurostat, OECD, and IMF staff calculation

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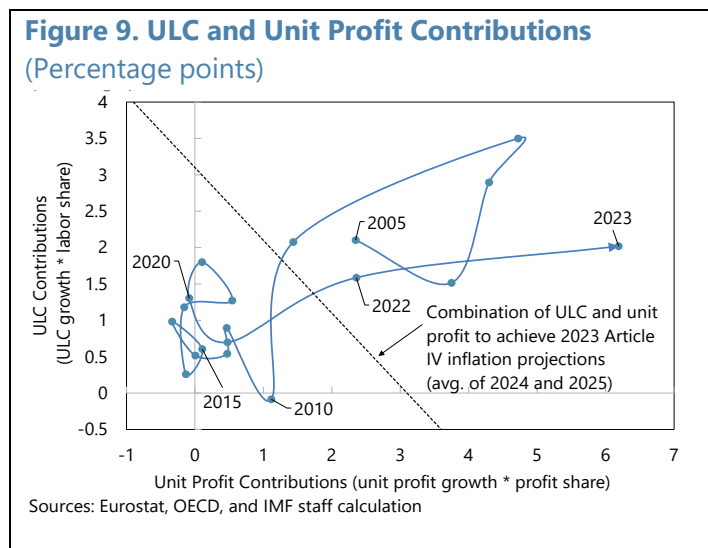
[15] The analysis is based on Hansen et al. (2023), where they illustrated the combinations of wage growth and profit share in EA to be consistent with the IMF projections. For this analysis, the contribution from tax and foreign are assumed to return to their pre-pandemic average (2010–19).

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Annex I. Regression Table

Table 1. Slovak Republic: Inflation Impacts on Households					
		(1)	(2)	(3)	(4)	(5)
Dependent variable		Inflation (total impact)	Food (contribution)	Energy (contribution)	Other goods (contribution)	Services (contribution)
Consumption per capita, quintile (base:1st)	2nd	0.0319	0.102	-0.591***	0.145***	0.376***
		(0.0763)	(0.105)	(0.0688)	(0.0427)	(0.0744)
	3rd	-0.167**	-0.421***	-0.741***	0.365***	0.630***
		(0.0745)	(0.102)	(0.0659)	(0.0446)	(0.0749)
	4th	-0.377***	-0.635***	-1.042***	0.409***	0.891***
		(0.0747)	(0.103)	(0.0663)	(0.0452)	(0.0817)
	5th	-1.011***	-1.582***	-1.429***	0.992***	1.007***
		(0.0896)	(0.110)	(0.0672)	(0.0606)	(0.0858)
Imputed rent >0 (base: zero imputed rent)		0.749***	0.130	0.413***	0.239***	-0.0330
		(0.110)	(0.136)	(0.0633)	(0.0692)	(0.0897)
Average age of household members (base: under 30)	30-44	0.123*	0.257***	0.00205	-0.0726	-0.0630
		(0.0732)	(0.0965)	(0.0493)	(0.0509)	(0.0723)
	45-59	0.299***	0.448***	0.303***	-0.0933*	-0.359***
		(0.0749)	(0.105)	(0.0560)	(0.0525)	(0.0826)
	above 60	0.512***	0.855***	0.390***	-0.0416	-0.691***
		(0.0992)	(0.146)	(0.0871)	(0.0771)	(0.111)
Ratio of economically active members (base: zero)	0< & ≤ 0.4	-0.0459	0.314**	-0.111	0.163**	-0.411***
		(0.108)	(0.157)	(0.0935)	(0.0790)	(0.115)
	0.4 < & ≤ 0.5	0.000549	0.251*	-0.0942	0.0304	-0.186
		(0.103)	(0.152)	(0.0934)	(0.0756)	(0.114)
	0.4 < & ≤ 0.5	-0.235**	0.109	-0.0507	-0.0880	-0.205*
		(0.113)	(0.163)	(0.102)	(0.0808)	(0.124)
	0.5 < & ≤ 1	-0.286***	0.00225	-0.0488	-0.162**	-0.0776
		(0.103)	(0.148)	(0.0969)	(0.0751)	(0.115)
Personal Income, reference person, quintile (base:1st)	2nd	-0.121	-0.319***	-0.0894	-0.0500	0.337***
		(0.0777)	(0.104)	(0.0605)	(0.0489)	(0.0741)
	3rd	-0.284***	-0.270**	-0.296***	-0.101*	0.384***
		(0.0859)	(0.115)	(0.0635)	(0.0585)	(0.0772)
	4th	-0.197**	-0.221**	-0.275***	0.0245	0.275***
		(0.0795)	(0.106)	(0.0693)	(0.0533)	(0.0728)
	5th	-0.382***	-0.544***	-0.433***	-0.0665	0.661***
		(0.0876)	(0.115)	(0.0677)	(0.0583)	(0.0846)
Marital status - married (base: not married)		-0.232***	-0.231**	0.0258	-0.0281	0.00123
		(0.0606)	(0.0906)	(0.0434)	(0.0380)	(0.0680)
One-person household (base: not one-person household)		-0.205**	-0.668***	0.415***	-0.155***	0.203**
		(0.0820)	(0.116)	(0.0670)	(0.0531)	(0.0921)
Constant		11.27***	5.378***	2.669***	1.275***	1.944***
		(0.167)	(0.233)	(0.122)	(0.113)	(0.162)
Observations		4,275	4,275	4,275	4,275	4,275
R-squared		0.207	0.192	0.323	0.160	0.152

Note: 1) out of the 12 most important variables identified by the random forest, 7 variables were selected based on the statistical significance, 2) all the explanatory variables are dummy variables, 3) the sample weight is used for the regression analysis, 4) robust standard errors are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1.
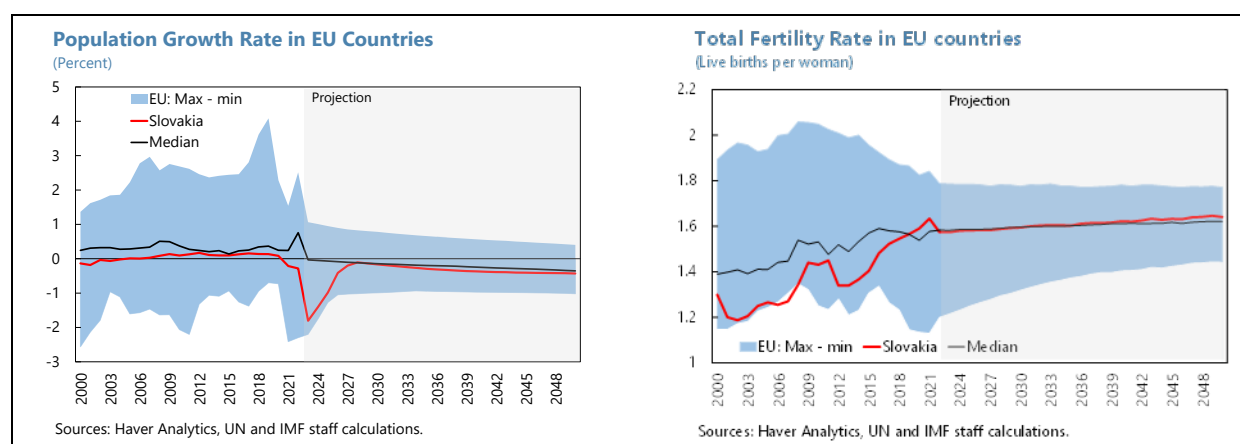
THE IMPACT OF AGING ON GROWTH[1]

Slovakia's working-age population is expected to decline over the long run while the share of the old is expected to increase. With low fertility and net outward migration and increasing life expectancy, the country is already facing the headwinds of a declining working-age population. These trends are expected to worsen going forward, putting pressure on employment, growth, and fiscal sustainability. Projections of real GDP per capita over the next 50 years that account for the impact of aging point to a stagnation of living standards. Labor market policies as well as industrial and innovation policies will be needed to reverse the decline in working-age population and boost productivity and growth.
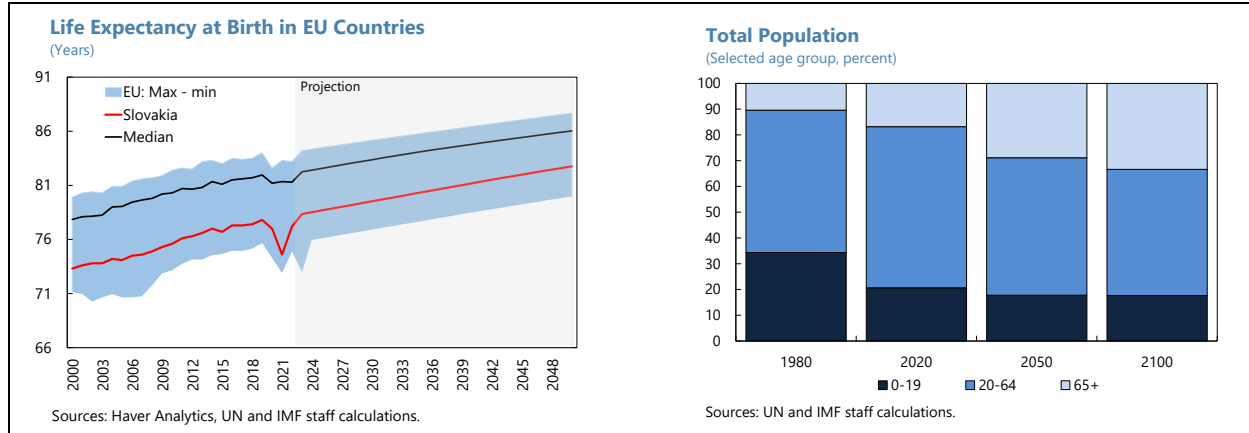
Demographics Today and in the Future

1.   Slovakia's population is expected to decline as fertility and immigration stay low.
Slovakia's population growth has turned negative and like in many other EU countries is projected to remain negative for the foreseeable future. Low fertility and immigration rates are not contributing favorably to population dynamics. With fertility below the replacement level and low immigration rates (and relatively high outward migration of the young), the outlook for population growth going forward is relatively grim.


Sources: Haver Analytics, UN and IMF staff calculations.

Sources: Haver Analytics, UN and IMF staff calculations.

2.   Increasing life expectancy is projected to increase the share of the old in the population and the old-age dependency ratio. Life expectancy is expected to increase above 80 years of age but remain below the EU median. The share of the old is expected to increase substantially by 2050 while low fertility is projected to reduce the share of the young. The old-age dependency ratio is projected to double by 2050, and the total dependency ratio (including the young and the old as the share of the working-age population) is projected to increase as well.

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[1] Prepared by Fuad Hasanov.

Life Expectancy at Birth in EU Countries
(Years)

Sources: Haver Analytics, UN and IMF staff calculations.

Total Population
(Selected age group, percent)

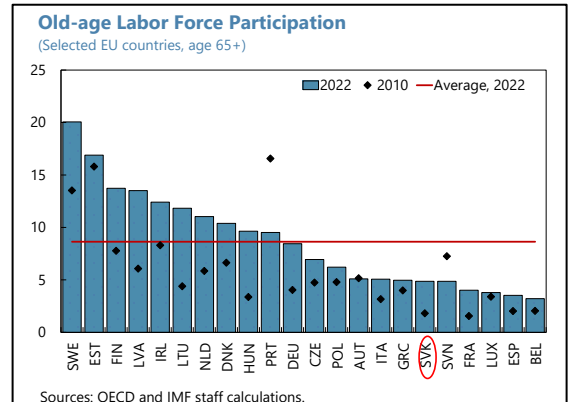Sources: UN and IMF staff calculations.

3.   These unfavorable population dynamics imply that the working-age population is expected to decline substantially, affecting the size of the labor force. Since the early 2010s, the working-age population ratio (15–64 years of age) has been falling from highs above 70 percent to 67 percent in 2022, and it is expected to fall to 57 percent by 2050 and converge to the (declining, albeit at a slower pace) level in the EU. The declining working-age population and increasing dependency ratios will put downward pressure on the labor force going forward.
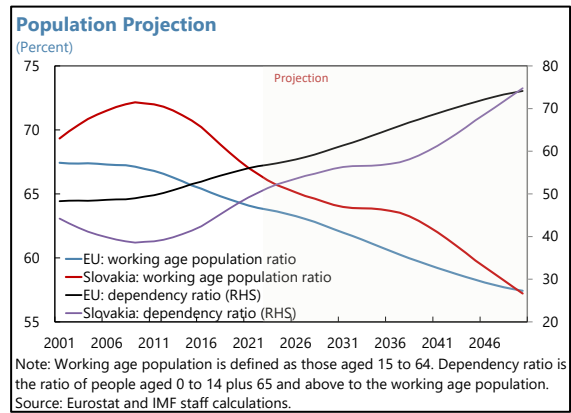
4.   The female labor force participation rate (LFPR) in Slovakia has been rising since 2010 and is close to the EU average. Since 2010, the female LFPR (in the 15–64 age group) has increased from about 60 percent to 72 percent by 2022. It is higher than the OECD average of about 66 percent and similar to that of Slovenia and Czechia, but lags that of the Baltic states and is far behind Sweden, which at 81 percent has one of the highest female LFPRs in the OECD. Moreover, it is lower than men's LFPR of about 80 percent.
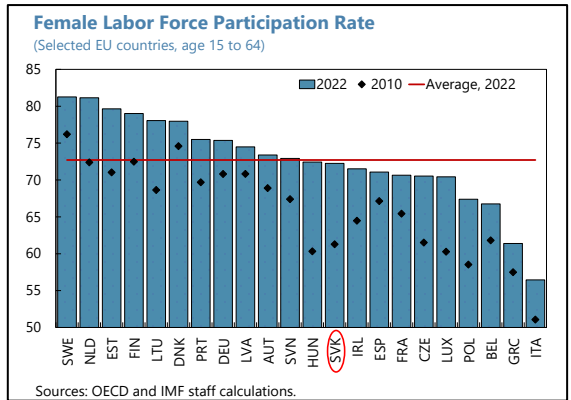
5.   The old-age labor force participation rate in Slovakia has increased but remains one of the lowest in Europe. In 2022, the old-age LFPR (over 65 age group) was about 5 percent, up from 2 percent since 2010 but below the OECD average of

Population Projection
(Percent)

Note: Working age population is defined as those aged 15 to 64. Dependency ratio is the ratio of people aged 0 to 14 plus 65 and above to the working age population.
Source: Eurostat and IMF staff calculations.

Female Labor Force Participation Rate
(Selected EU countries, age 15 to 64)

Sources: OECD and IMF staff calculations.

Old-age Labor Force Participation
(Selected EU countries, age 65+)

Sources: OECD and IMF staff calculations.

about 16 percent and behind Czechia and the Baltics and much lower than Sweden, which has one of the highest LFPRs in the OECD.

Economic Growth: A Look into the Past

6.   Slovakia's real GDP per capita amounted to about 44 percent of the U.S. level in 2019.[2] Relative income declined to about 33 percent by 1999 from about 50 percent in 1990 before increasing back to 50 percent in the early 2010s.[3] It has since declined to 44 percent at the start of the COVID-19 pandemic.

7.   Slovakia's recent growth performance has underperformed relative to the neighboring countries. Since the 2008 financial crisis, Slovakia's real GDP per capita (in PPP terms) has stagnated and fallen below that of Latvia. In addition, income has not converged with that of neighboring countries like Slovenia and Czechia, even though in 1990 income levels of Slovenia and Slovakia were the same.[4] The income gap with the richer neighbors has stayed relatively similar for the past 30 years.

Real GDP per Capita
(in 2017 PPP USD)

Source: Penn World Tables (PWT) 10.1.
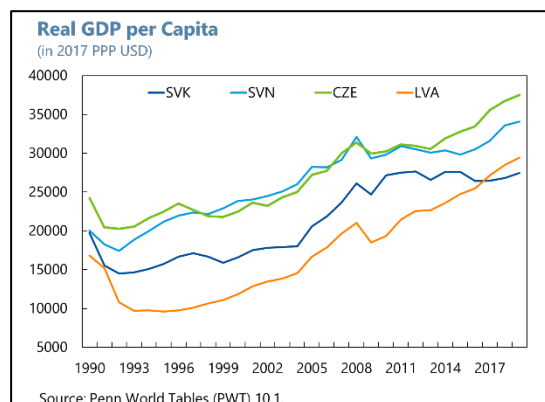
8.   Productivity growth has been the driving force behind the rise in living standards since 1990, but both the investment rate and total factor productivity have declined since 2010. Total factor productivity (TFP) growth was relatively high in the decade following the fall of communism, exceeding that in Czechia and Slovenia, and driving most of the increase in real GDP per capita growth until the late 2010s. However, the investment rate fell from an average of 28 percent of GDP over 1994–2010 to 23 percent of GDP in the last decade; TFP growth declined even more, falling from an average of 2.4 percent in the 1990s and 2000s to 0.7 percent since 2010.

TFP at Constant National Prices
(Index; 1994=100)

Source: PWT 10.1.

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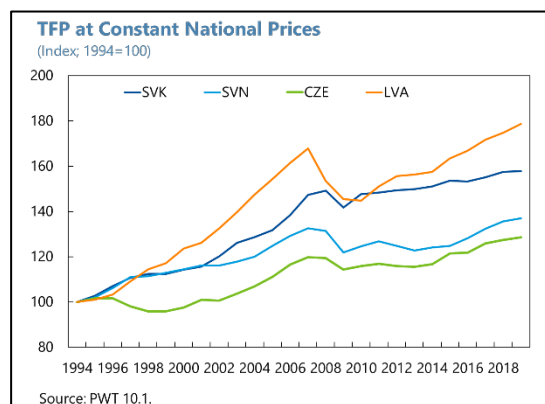
[2] Penn World Tables 10.01 (in 2017 PPP $).

[3] The 20 percent level corresponds to the upper-middle-income threshold while the high-income threshold is defined as 50 percent of the U.S. level (Cherif and Hasanov 2019).

[4] The methodological adjustment to PPP price calculations resulted in higher price growth in the recent period and reduced GDP in PPP terms in Slovakia relative to its neighbors. For more details, see https://www.mfsr.sk/files/archiv/14/ppp_web_EN.pdf.

9. **Decomposing real GDP per capita growth into its key components confirms that TFP growth has been the driving force of growth dynamics in Slovakia.** Assuming a Cobb-Douglas production function, real GDP per capita (in constant national prices) can be written as follows:

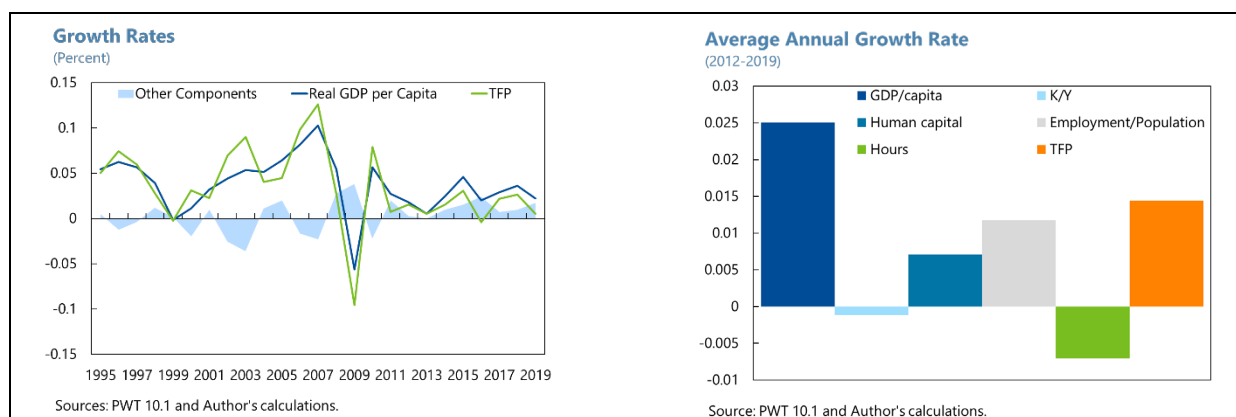$$y_t = \left(\frac{K_t}{Y_t}\right)^{\frac{\alpha}{1-\alpha}} h_t l_t hrs_t A_t^{\frac{1}{1-\alpha}}, \tag{1}$$

where K is physical capital, Y is real GDP, h is human capital per capita (based on years of schooling and returns to education), l is the employment to population ratio, hrs is hours worked, A is TFP (factor-neutral), and α is the capital share (and $1 - \alpha$ is the labor compensation share).[5] The growth rate of real GDP per capita then becomes (in logarithmic terms):

$$\Delta \ln(y_t) = \left(\frac{\alpha}{1-\alpha}\right) \Delta \ln\left(\frac{K_t}{Y_t}\right) + \Delta \ln(h_t) + \Delta \ln(l_t) + \Delta \ln(hrs_t) + \left(\frac{1}{1-\alpha}\right) \Delta \ln(A_t) \tag{2}$$

Hence, real per capita growth can be decomposed into (i) the capital-output ratio, (ii) human capital, (iii) the employment-population ratio, (iv) hours worked, and (v) TFP. Over 1994–2019, TFP growth contributed the largest share of growth in the region, including in Slovakia. Like in many European countries, hours worked in Slovakia have been on a declining trend and contributed negatively to growth. The capital-output ratio has declined with a fall in investment, putting downward pressure on growth.

Cumulative Growth
(1994-2019)
Sources: PWT 10.1 and Author's calculations.
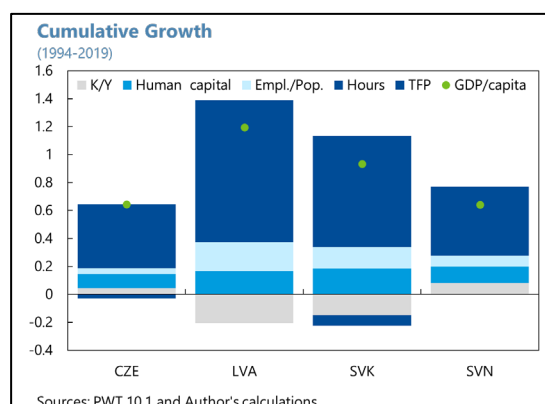
10. **Over the last decade (2012–2019), Slovakia's per capita growth has declined due to lower TFP growth.** TFP growth continues to contribute positively to per capita GDP growth, albeit less than in previous years. At the same time, other components of growth such as human capital and the employment-population ratio have failed to compensate for the decline in TFP growth.

Growth Rates
(Percent)
Sources: PWT 10.1 and Author's calculations.

Average Annual Growth Rate
(2012-2019)
Source: PWT 10.1 and Author's calculations.

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[5] See Inklaar and Timmer (2013). The data used are PWT 10.01. For a more extensive discussion of the growth decomposition, see Jones (2022).
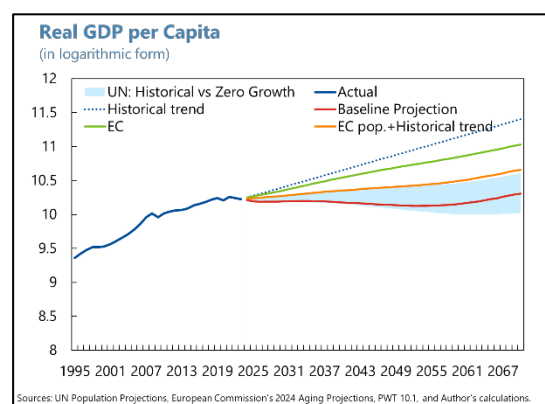
11.   Adverse population dynamics would act as headwinds to both productivity and growth going forward. Aging and a declining working-age population would slow down growth directly and potentially reduce productivity growth. The impact on growth would be compounded as a result. The link between population dynamics and productivity growth can be seen by dividing productivity into a misallocation of resources and an ideas component. The ideas component of productivity is driven by the number of researchers and negative population dynamics could reduce the number of researchers (even if the share stays constant), putting pressure on TFP growth.[6] Declining innovation and business dynamism may further hinder TFP growth. Slovakia's recent growth performance has already shown signs of declining TFP. In addition, growth theory predicts that in the very long run, growth depends only on population growth while other variables only have level effects on income.[7] Population dynamics is thus crucial for Slovakia to sustain its growth performance into the future.

Looking into the Future: Demographics, Productivity, and Growth

12.   We use equation (2) to simulate different paths for trend real GDP per capita from 2024 till 2070 under the assumption of no change in policies to address the impact of aging. We use historical averages for 2012–19 to project forward all the major components except the employment-population ratio. In particular, human capital is assumed to grow by 0.7 percent per year, the capital-output ratio declines by 0.1 percent per year, hours worked fall by 0.7 percent per year, and TFP is assumed to grow by 1.4 percent per year. We forecast the employment-population ratio using projections in the UN Population Projections database which imply a decline of 0.4 percent a year.[8] The labor share in GDP is assumed to remain constant at the 2019 value of 57 percent.

13.   The figure shows several alternative paths for real GDP per capita (in logs). The line "Historical trends" assumes Slovakia continues to growth at its 2012–2019 average of around 2.5 percent per year. The green line ("EC") assumes Slovakia grows by 1.7 per year as assumed by the European Commission in their 2024 Aging Report Projection. The upper part of the shaded area assumes a growth rate of 0.8 percent a year on average consistent with historical trends for the components of growth and UN population projections (as described in the previous paragraph). The same forecast using the European Commission's more optimistic

Real GDP per Capita
(in logarithmic form)

Sources: UN Population Projections, European Commission's 2024 Aging Projections, PWT 10.1, and Author's calculations.

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[6] See Jones (2022).

[7] See Jones (2022).

[8] The European Commission's 2024 Aging Report Projection assumes the following parameters, which are not significantly different from the recent historical averages: (i) a 0.6 percent per year decline for hours worked; (ii) 1.3 percent per year TFP growth; and (iii) a 0.3 percent per year decrease in the employment-population ratio.

assumption on the employment-population ratio results in a growth rate of 0.9 percent (orange line).[9] The lower part of the shaded area assumes zero growth for all major components while keeping the UN employment projections, resulting in growth of -0.4 percent per year. Lastly, a baseline projection of 0.2 percent growth per year assumes historical averages for all major components, UN population projections, and TFP growth equivalent to one-third of the recent historical trend, consistent with empirical evidence in Maestas, Mullen, and Powell (2023) that productivity falls by a third of the growth in the share of the old in the population.[10] In the baseline, real GDP per capita could decline by about 9 percent by 2050.[11]

14.   The simulations suggest that in the absence of strong policy measures, adverse population dynamics could create strong headwinds to growth and living standards. With a declining employment-population ratio, growth rate falls from 2.5 percent a year to 0.8 percent. Incorporating the impact of aging on TFP, growth rate falls further to 0.2 percent a year. In fact, for most part of the 21st century real GDP per capita stagnates and even falls, before recovering after the mid-2050s as the employment-population ratio starts growing again. All-in-all, living standards could be stagnant for the next 2–3 decades unless appropriate policy measures are taken to counter the adverse population dynamics.

Policies to Increase Living Standards

15.   Reversing the projected decline in real GDP per capita in Slovakia will require supportive labor market policies to counter the impact of unfavorable labor force dynamics. We experiment with a few parameters to see the impact on the paths of real GDP per capita going forward. In particular, we assess the impact of increasing: (i) hours worked, (ii) total employment, (iii) female labor market participation, (iv) old-age labor market participation, (v) migration/working-age population, and (vi) a combination of labor market policies. We also explore the impact of reversing the projected decline in productivity.

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[9] The European Commission incorporates the legislated future increase in retirement age that will raise the old-age participation rate and reduce the decline in the employment-population ratio.

[10] Using U.S. states data over 1980-2010, Maestas, Mullen, and Powell (2023) estimate that about two-thirds of the fall in real GDP per capita due to aging is accounted by the decline in labor productivity while one-third is due to the decline in employment. We use the impact of aging on productivity from their regressions to adjust the projection of the growth of TFP in Slovakia.

[11] The OECD estimates that Slovak GDP per capita could drop by 20 percent by 2050 (Hwang and Roehn 2022).
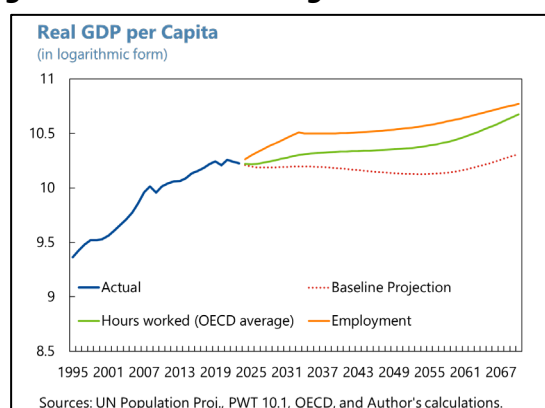
16.   Increasing hours worked raises the path of real GDP per capita going forward compared to the baseline, but it does not achieve the historical growth trend. Raising

Slovakia's hours worked (1,700 hours) to the OECD average (1,750 annual hours; green line) or to that in Poland (1,800 annual hours; blue line) increases the real per capita growth rate to an average of about 1 percent a year compared to the baseline of 0.2 percent.[12] The simulation assumes the increase in hours to reach the OECD average is achieved over 10 years or 20 years for Poland, implying an increase of about 0.35 percent a year with hours worked fixed thereafter. This policy bucks the general trend of decreasing hours worked in Europe and may

Real GDP per Capita
(in logarithmic form)

Sources: UN Population Proj., PWT 10.1, OECD, and Author's calculations.

therefore be challenging. Even if it were feasible, it does not increase growth rate back to the historical average over the forecast period.
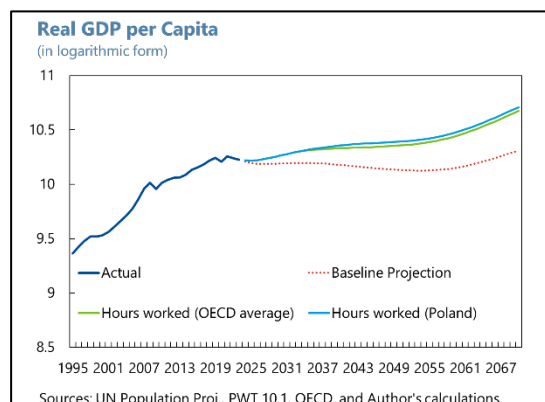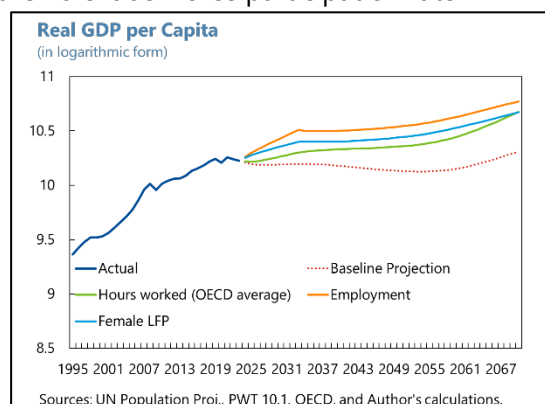
17.   Policies to raise employment would have a significant effect on the growth rate of real GDP per capita. The simulation assumes that employment is raised such that the employment-population ratio increases from the current level of 0.45 to 0.5 (the level in Estonia and Sweden) over 10 years. The growth rate in employment needed to achieve this is about 1.1 percent per year for 10 years. The simulations suggest this would raise real GDP per capita growth to about 1.2 percent a year on average over 2024–2070 (orange line), significantly more than the policy to raise hours worked to the OECD average (green line) discussed in the previous paragraph.

Real GDP per Capita
(in logarithmic form)

Sources: UN Population Proj., PWT 10.1, OECD, and Author's calculations.

18.   The increase in employment could be driven by higher female or old-age labor force participation. A policy to raise the current 77.5 percent female labor force participation rate

(20– 64 years of age) to 85 percent as in Sweden and Estonia, is consistent with an increase in employment of about 0.5 percent a year for 10 years. The growth rate of real GDP per capita resulting from such a policy would be about 0.95 percent a year over 2024– 2070 (1st figure, blue line). The results are similar if the policy to increase employment concentrates on raising old-age labor force participation. In particular, increasing the current old-age labor force participation rate of 4.8 percent (65+) to 19.2 percent

Real GDP per Capita
(in logarithmic form)

Sources: UN Population Proj., PWT 10.1, OECD, and Author's calculations.

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[12] The latest data on hours worked, employment, labor force participation rates, etc. are taken from the OECD database.
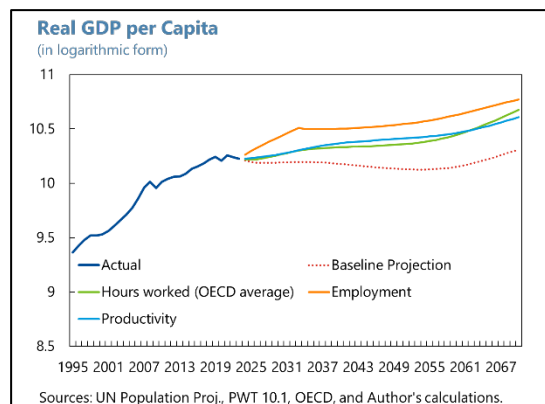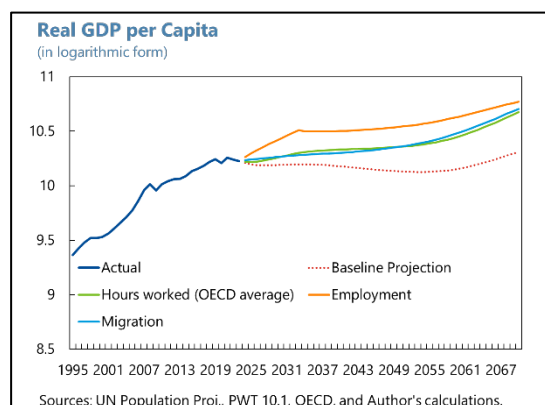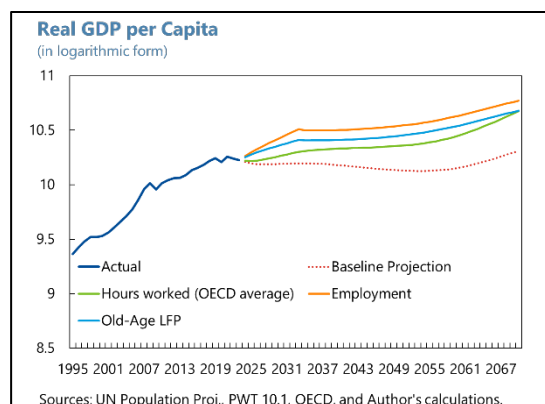
(that of Sweden) over 10 years is consistent with an increase in employment of about 0.6 percent a year until 2033. The growth rate resulting from such a policy would be about 0.97 percent a year (2nd figure, blue line). Other options to increase employment include improving labor market conditions for the large Roma minority, which accounts for about 10 percent of Slovakia's population and is younger than the population as a whole.

19.   Increasing inward migration would help offsett the decline in the working-age population and employment going forward. In particular, a simulation assuming an increase in net inward migration by 18,000 per year on average would keep employment at the level in 2019/2022, implying an increase in employment growth of about 0.7 percent a year on average. The growth rate of real GDP per capita resulting from such a policy would be about 1 percent a year (blue line), similar to that of other policies above.
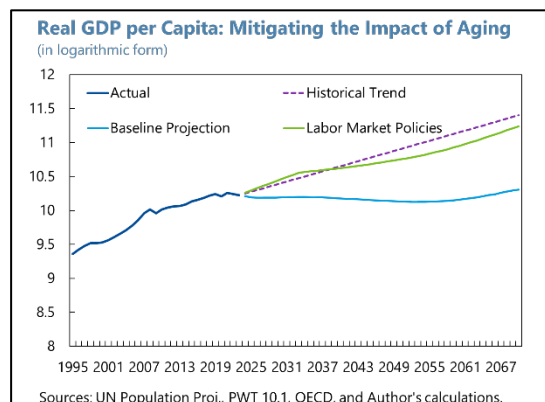
20.   Policies to reverse the aging-related decline in productivity would help offset the impact of adverse population dynamics. The simulations above assume that aging will reduce TFP productivity by a third, consistent with estimates in Maestas, Mullen, and Powell (2023). A simulation which instead assumes that productivity growth increases by about 0.4 percent a year on average with labor market dynamics as in the baseline (no policies to offset the impact of aging on the labor market) raises the growth rate of real GDP per capita to about 0.8 percent a year on average (blue line).

Real GDP per Capita
(in logarithmic form)

Sources: UN Population Proj., PWT 10.1, OECD, and Author's calculations.

Real GDP per Capita
(in logarithmic form)

Sources: UN Population Proj., PWT 10.1, OECD, and Author's calculations.

Real GDP per Capita
(in logarithmic form)

Sources: UN Population Proj., PWT 10.1, OECD, and Author's calculations.

21.   A combination of labor market policies could raise the growth rate close to the recent historical trend. Raising both female and old-age labor force participation rates and increasing hours worked and net inward migration would increase the employment-population ratio, boosting growth. In addition, we assume that an increase in employment would also have a positive effect on productivity (partially reversing the decline due to aging). In this scenario average growth would increase to about 2.15 percent a year, close to the recent historical average of 2.5 percent. If we were to add a further increase in employment due to improved labor market conditions for the Roma minority, the historical growth trend could be within reach.

Real GDP per Capita: Mitigating the Impact of Aging (in logarithmic form)

Sources: UN Population Proj., PWT 10.1, OECD, and Author's calculations.

22.   A policy package to increase employment and productivity is key to mitigate the impact of aging on the growth dynamics and living standards. Policy options include:

Labor Markets

- Provide incentives for flexible work hours (e.g., remote work).

- Improve transportation links with key regional centers and increase urbanization.

- Increase incentives for child support, early childhood education, and housing access to improve fertility rates (e.g., family package).

- Improve personal and elderly care, reduce maternity leave (one of the longest in the OECD), and provide training after maternity leave.

- Increase retirement age with life expectancy (as recently legislated), reduce early retirements, and provide training to the elderly (labor market exit at average age of 62, one of the lowest in Europe).

- Support low-income population and minorities (e.g., Roma community) to participate in the labor market (e.g., housing, education/information).

Immigration

- Align immigration with labor market needs whether high- or low-skilled (e.g., long-term visas for high-skilled), provide integration programs and skill training.

- Strengthen relations with the Slovak diaspora to share knowledge and attract talent.

Productivity[13]

- Create a dynamic export sector with a focus on (i) sophisticated products; (ii) sectors rather than firms to preserve competition and "creative destruction" and enforce accountability for the support received; and (iii) domestic firms producing homegrown technology.

- Increase investment spending (e.g., infrastructure, industrial parks, training institutes, vocational programs), public R&D, and support to various innovation programs.

- Raise the absorption of the EU funds in R&D, education, and infrastructure to support innovation and industrial clusters, universities, and research institutes.

Concluding Remarks

23.   Without offsetting policy measures, aging could have a large negative effect on real GDP per capita growth and living standards in Slovakia. In an unchanged policies scenario average annual growth could fall from an historical 2.5 percent (2012–2019) to 0.2 percent on average over 2024–2070, with large implications on welfare and public finances as rising aging-related spending and declining tax revenues puts fiscal sustainability at risk. A comprehensive set of policies are required to keep employment growing, while policies to boost productivity growth are needed to compensate for the potential negative effect of aging on productivity.

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[13] See Cherif and Hasanov (2019).

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REGIONAL INEQUALITY IN SLOVAKIA[1]

Regional income inequality in Slovakia is among the highest in Europe. Despite over a decade of income convergence, GDP per capita in Bratislava significantly exceeds that in the rest of the country. In contrast, the East is the poorest region with a large number of disadvantaged households. Income disparities are both due to differences in productivity levels and hours worked per capita. Variations in productivity can be partially attributed to investment ratios, education levels and sectoral compositions. Regional differences in hours worked are explained by variations in unemployment rates, labor force participation rates, and average hours worked per employee. To reduce regional income inequality, measures are needed to boost investment in physical and digital infrastructure, raise education levels, and increase the housing stock in locations with less labor market slack. In addition, efforts are needed to support disadvantaged groups, including the Roma community.

## A. Context - Overview of Regional Inequality in Slovakia

1.   GDP per capita in Bratislava is about three times higher than in the East. Slovakia's
capital region is home to only 12 percent of the total population but accounted for over 28 percent of real GDP in 2021. There has been some income convergence in the past decade, but Bratislava's real GDP per capita remains about 130 percent higher than the national average. While Slovakia has the most equally distributed income in the EU at the national level, it has among the highest levels of regional income inequality.[2,3]

Regional Real GDP per Capita
(Percent of national average)
Sources: Eurostat and IMF Staff calculations.
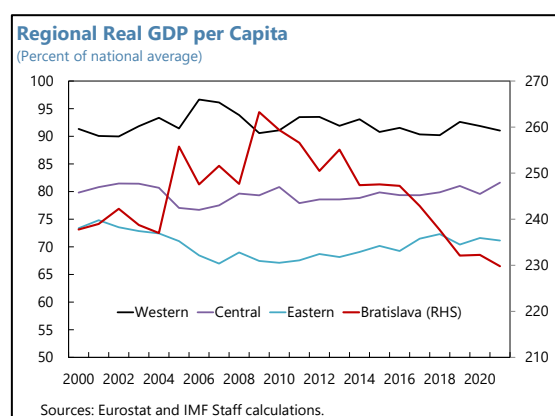
2.   Disparities in household's income across regions are smaller, but still significant. Income
per capita in Bratislava is about 85 percent above the national average. The reason for the somewhat smaller regional differences in household income compared to GDP per capita could be that people commute to work in Bratislava, and that fiscal transfers redistribute income from the more affluent western regions to the eastern regions.[4] Many headquarters of large companies are also based in the capital, while a large part of the

Regional Household Income per Capita
(Percent of national average)
Sources: Eurostat and IMF Staff calculations.

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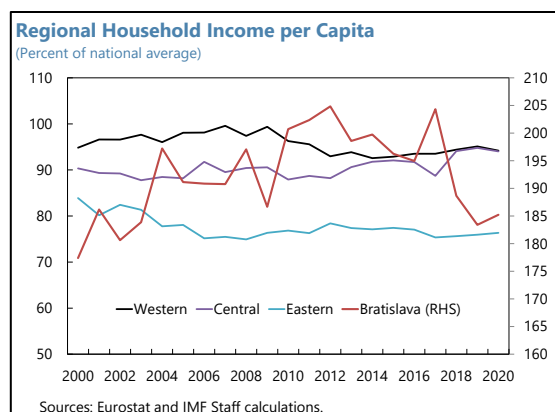
[1] Prepared by Farid Boumediene.

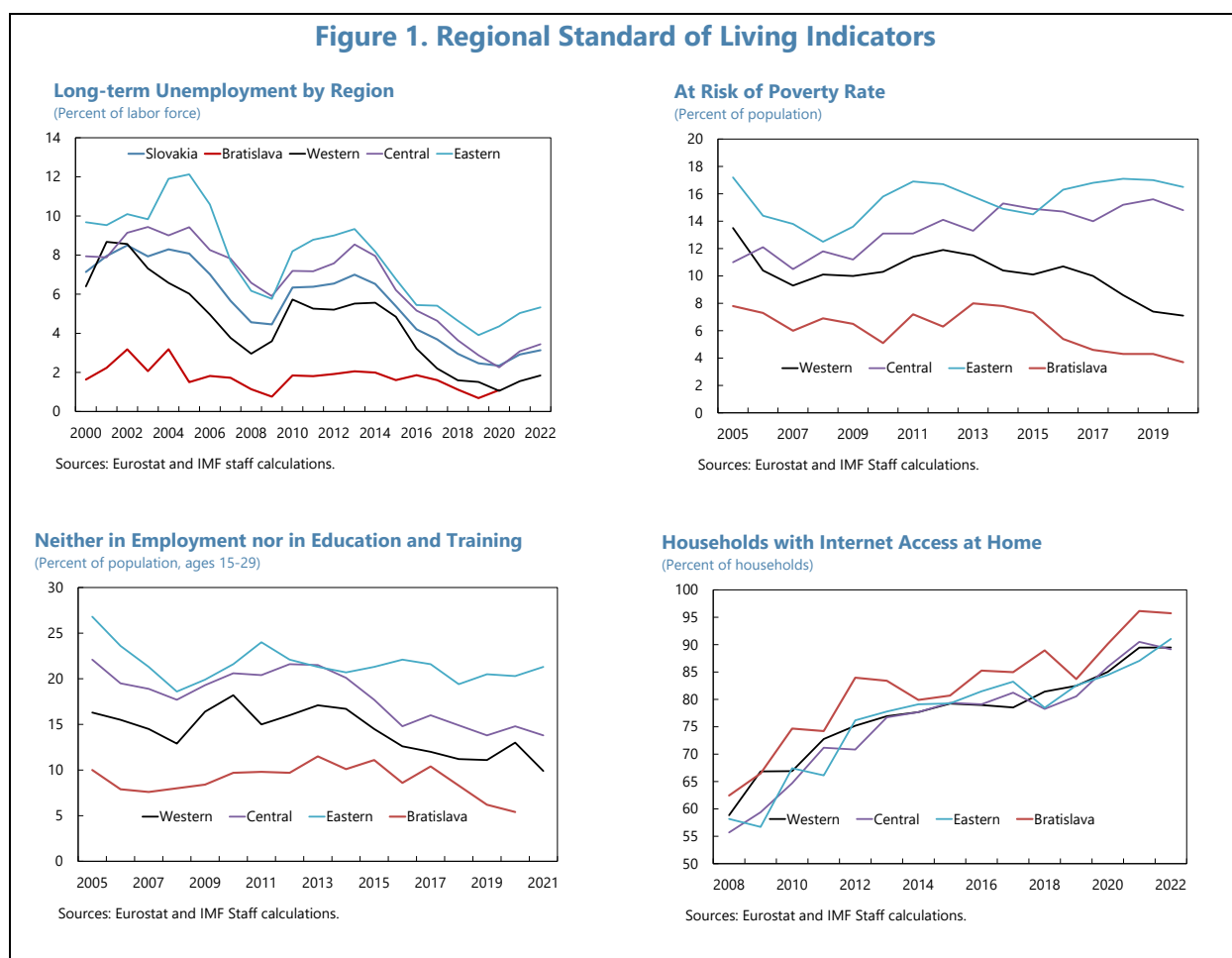[2] The Gini coefficient in Slovakia was 21.2 compared to 29.6 in the EU in 2022 (source: Eurostat).

[3] See for example OECD (2016) and André et al. (2021).

[4] Social transfers as a percent of total disposable income was 7.3 percent in Slovakia in 2022, compared to 8.2 percent in the EU (Source: Eurostat)

production takes place in other regions, which may lead to an overestimation of output in Bratislava.

3.   A variety of metrics indicate lower living standards and a high number of vulnerable households in the East (Figure 1). The long-term unemployment rate was 5.3 percent in the East, compared to 3.1 percent at the national level. Households in the East and the Central regions also had a significantly higher risk of entering poverty. The proportion of young people between the ages of 15 and 29 that is neither in employment nor in education and training (NEET) in Slovakia is in line with the EU average at about 12 percent. It is however significantly higher in the East at 21 percent and even higher for women in the East at 24 percent. While internet access has improved steadily since Slovakia's EU accession, about 10 percent of households outside the capital region do not have internet access at home.

Figure 1. Regional Standard of Living Indicators

Long-term Unemployment by Region
(Percent of labor force)

At Risk of Poverty Rate
(Percent of population)

Sources: Eurostat and IMF staff calculations.

Sources: Eurostat and IMF Staff calculations.

Neither in Employment nor in Education and Training
(Percent of population, ages 15-29)

Households with Internet Access at Home
(Percent of households)

Sources: Eurostat and IMF Staff calculations.

Sources: Eurostat and IMF Staff calculations.

4.   Reducing income inequality could help support higher and more sustainable growth.
Ostry, Berg, and Tsangarides (2014) find lower net inequality, that takes into account taxes and transfers, to be robustly correlated with faster and more durable economic growth. Meanwhile, Dabla-Norris et al. (2015) conclude that growth declines over the medium term when the income share of the top 20 percent increases, while an increase in the income share of the bottom 20 percent is associated with higher GDP growth.

B. Income Convergence

5.   **This section examines convergence in regional GDP-per-capita, labor productivity and household income (β-convergence).** We use annual data from 2000 to 2021 for the 4 Nomenclature of Territorial Units for Statistics (NUTS) 2 regions in Slovakia (Bratislava, West, Central and East). Following Banarjee and Jarmuzek (2010) we test for both conditional and unconditional β-convergence, where the former assumes that all regions converge to the same steady-state, while the latter allows for the regions to have economy-specific steady-states.[5]

6.   **A panel regression without fixed effects is used to test for unconditional β-convergence.** In particular, we estimate the following regression:

$$\Delta \ln(\gamma_{i,t}) = \alpha_0 + \beta(\gamma_{i,t-1}) + \varepsilon_{i,t}$$

Where $\gamma_{i,t}$ is defined as either GDP per capita, labor productivity (regional GDP per hours worked), or household income in region i in year t, while $\Delta \ln \gamma_{i,t}$ represent their respective growth rates. We hence examine how the level of the considered variable affect their respective growth rates in the following year. A negative (and statically significant) β indicates that regions with lower levels of income per capita have higher growth rates, providing evidence of unconditional β-convergence.

7.   **Region-specific and time fixed effects are added to test for conditional β-convergence.** In particular, we estimate the following regression:

$$\Delta \ln(\gamma_{i,t}) = \alpha_i + \alpha_t + \beta \ln (\gamma_{i,t-1}) + \varepsilon_{i,t}$$

Where α_i are region-specific effects that allow for heterogeneity in steady states across regions, while α_t measures time fixed effects that capture the impact of changes in the external environment, technology, and policies over time. The sign and significance of β in this specification will determine the presence of conditional β-convergence.

8.   **Evidence points to significant β-convergence across regions in Slovakia in the past two decades (Table 1).** All regression results have negative β coefficients suggesting that there has been convergence across all variables considered.[6] The results for conditional convergence, that is, convergence to region-specific steady states, are particularly robust and all variables considered have β coefficients significant at the 1 percent level, which is consistent with previous findings in the literature. Evidence of unconditional convergence is significant at the 10 percent confidence level for GDP per capita, at the 5 percent level for productivity, and the 1 percent level for household income. This result contrast with previous findings by Banarjee and Jarmuzek (2010) who look at

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[5] Several factors could explain regional differences in steady state income per capita, including location advantages, differences in human capital endowments, and uneven technical progress (see Banerjee and Jesenko (2015)).

[6] The results are robust across different sample periods.

convergence in GDP per capita over the period 1996–2006 in Slovakia's 8 NUTS3 regions. They find significant positive β coefficients, indicating unconditional income divergence across regions.
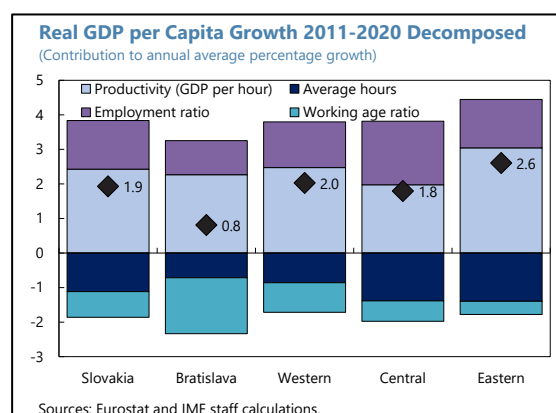
Table 1. Slovak Republic: Testing for β-Convergence Across Slovakia NUT S2 Regions		
	Unconditional converge	**Conditional convergence**
	Coefficient (Standard errors)1/	Coefficient (Standard errors)1/
GDP per capita (2001-2021)		
Constant	0.1700 (0.0785)**	2.8770 (0.9110)***
ln(GDP per capita,t-1)	-0.0156 (0.0083)*	-0.3002 (0.0962)***
Region fixed effects	No	Yes
Time fixed effects	No	Yes
R-squared	0.0410	0.7755
F	3.5088	8.4920
N	84	84
Productivity (2000-2020)		
Constant	0.3637 (0.1316)***	6.1183 (1.1672)***
ln(GDP per capita,t-1)	-0.0339 (0.0135)**	-0.6247 (0.1198)***
Region fixed effects	No	Yes
Time fixed effects	No	Yes
R-squared	0.0748	0.7193
F	6.3067	6.2407
N	80	80
Household income (2000-2020)		
Constant	0.4592 (0.1025)***	3.8510 (0.8561)***
ln(GDP per capita,t-1)	-0.0444 (0.0117)**	-0.4326 (0.0980)***
Region fixed effects	No	Yes
Time fixed effects	No	Yes
R-squared	0.1554	0.8865
F	14.353	19.0249
N	80	80

1/ ***Significant at the 1% level; **significant at the 5% level; *significant at the 10% level.

9.   Growth accounting suggests income convergence has been driven by demographic differences. Annual growth in GDP per capita can be decomposed into productivity growth (GDP per hour) and growth in hours worked per capita. In addition, we decompose hours worked per
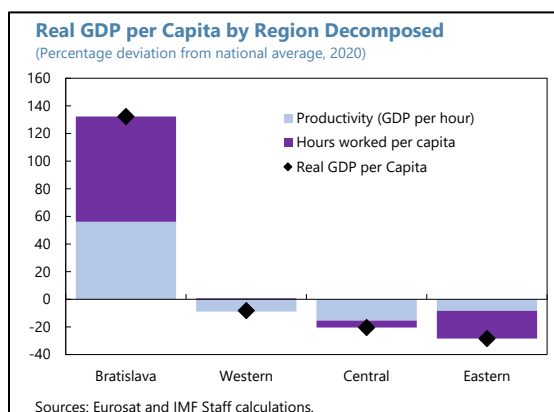
capita into the working age population ratio, the employment ratio, and average hours worked per employed for the period 2011–2020. GDP per capita growth was lowest in Bratislava and highest in the East. Productivity growth was quite evenly distributed across regions and average hours worked declined less in Bratislava than in other regions. However, the working age population in Bratislava declined by an average 1.6 percent per year, compared to only 0.4 percent in the East. The employment ratio also increased more outside of the capital region.

Real GDP per Capita Growth 2011-2020 Decomposed
(Contribution to annual average percentage growth)

Sources: Eurostat and IMF staff calculations.

C. Factors Behind Regional Income Inequality

**10.   While convergence is primarily driven by demographics, differences in the level of
GDP per capita is explained by both labor
productivity and hours worked per capita.**
Productivity (GDP per hour) in Bratislava was
45 percent above the national average and the
number of hours worked per capita was 61
percent higher in 2020. Productivity levels were
lowest in the Central region, while hours worked
in the East were 21 percent below the national
average. Efforts to reduce income inequality
therefore need to focus on both improving
productivity and strengthening labor markets in
the lower-income-regions.

Real GDP per Capita by Region Decomposed
(Percentage deviation from national average, 2020)

Sources: Eurosat and IMF Staff calculations.

**11.   Raising investment ratios in the eastern parts of Slovakia could help boost
productivity.** Investment as a percent of GDP was 25 percent in Bratislava, compared to only
16 percent in the Central
and East regions (Figure
2). Evidence from the
empirical literature
suggest that higher
investment increases
labor productivity
(Heintz (2010) and
Stundziene and
Saboniene (2019)). This
is supported by a simple
panel regression on the
effects of investment per
hour worked and years

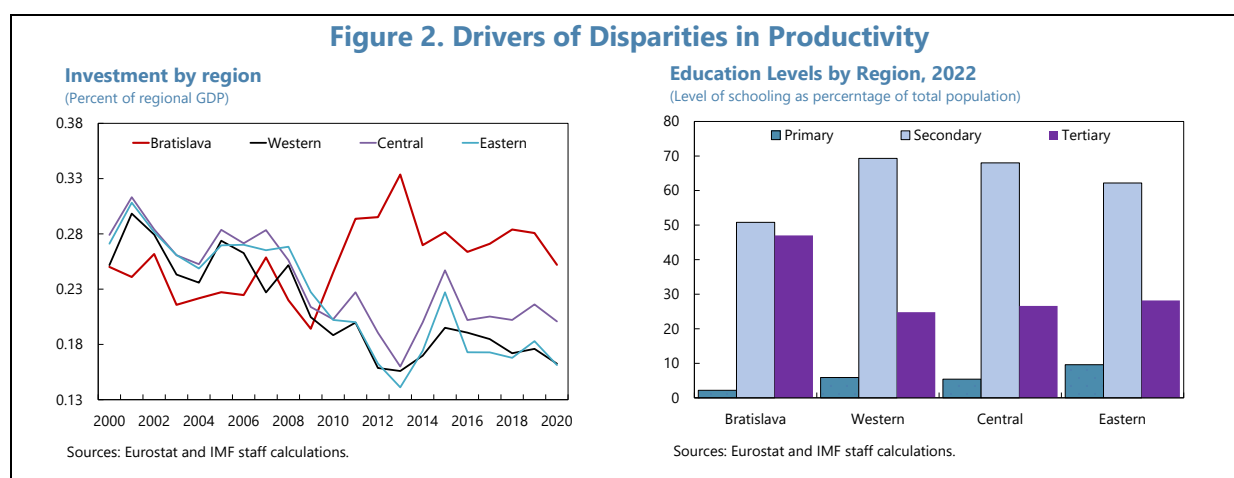### Table 2. Slovak Republic: The Effect of Education and Investment on Productivity

Panel regression without fixed effects (sample 2001-2020)1/	
	Coefficient (Standard errors)2/
Constant	0.7736 (0.1622)**
ln(Productivity,$_{t-1}$)	0.7900 (0.0332)***
ln(Investment,$_t$ / hours worked,$_t$)	0.0396 (0.0062)***
ln(Number of year of schooling,$_t$)	0.6103 (0.1375)**
R-squared	0.987
F	162.53
N	80

1/ Dependent variable ln(Productivity,$_t$)
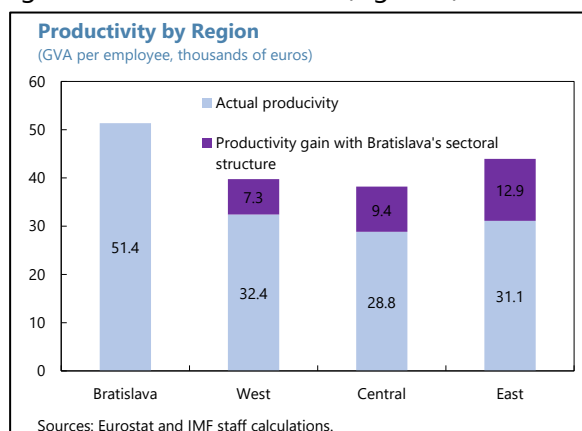2/ ***Significant at the 1% level; **significant at the 5% level; *significant at the 10% level.

of schooling on productivity across NUTS 2 regions in Slovakia (Table 2), which indicate that raising
investment per worker in the rest of the country to the level in Bratislava would increase productivity
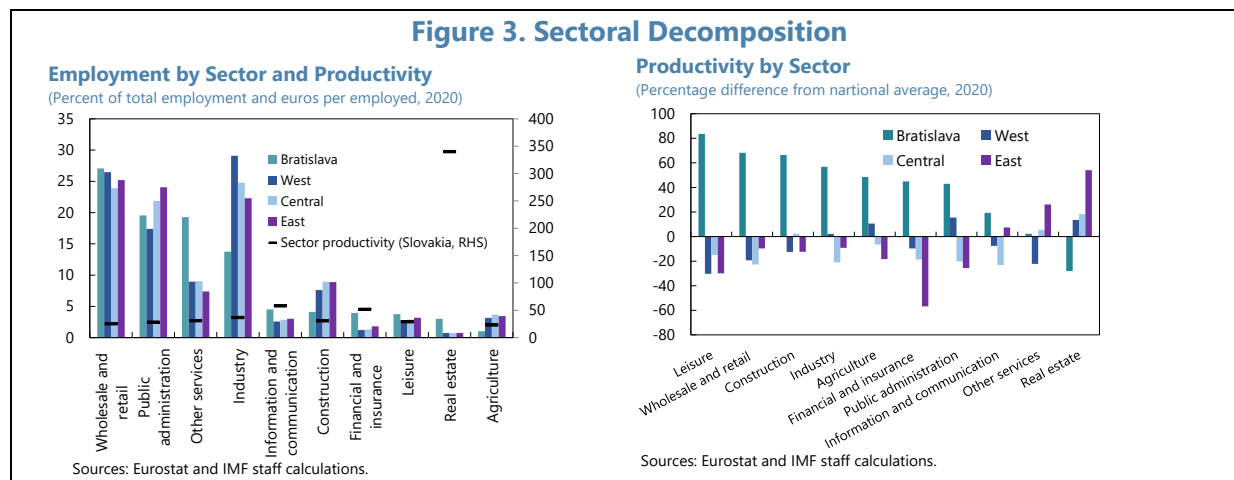by about 4 percent.

12.   Harmonizing levels of schooling across regions would reduce disparities in productivity. Almost half the population have attended tertiary education in the capital region, compared to about ¼ in rest of the country. Almost 10 percent of the population in the East only completed primary education, which is indicative of the higher number of vulnerable individuals. A seminal paper by Psacharopoulos and Patrinos (2004) find that, through its impact on labor productivity, an additional year of schooling raises wages by about 10 percent on average. Our simple panel regression (Table 2) suggests that an additional year of schooling would increase productivity by about 5 percent in Slovakia's regions. On average, people in Bratislava have 1.5 more years of schooling than those in the rest of the country. Raising the level of schooling outside of Bratislava to that in the capital region could therefore increase productivity by 5-10 percent. It would also have positive effects on employment and help reduce labor market mismatches.
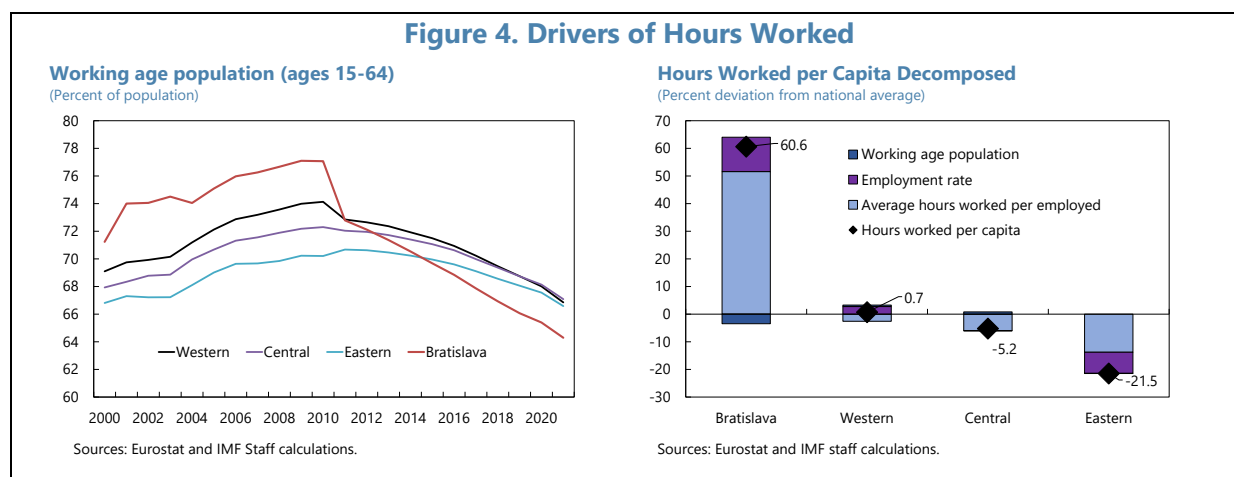
Figure 2. Drivers of Disparities in Productivity

Investment by region
(Percent of regional GDP)

Sources: Eurostat and IMF staff calculations.

Education Levels by Region, 2022
(Level of schooling as percerntage of total population)

Sources: Eurostat and IMF staff calculations.

13.   Differences in sectoral composition explains a large part of regional productivity gaps. Productivity in Bratislava is higher than in the other regions across most sectors (Figure 3). Within-sector-productivity is particularly low in West and Central Slovakia. Efforts are therefore needed to raise productivity at the sectoral level. However, a large part of the disparities in productivity can be explained by sectoral differences across regions. A smaller proportion of people are employed in the agricultural and industrial sectors in Bratislava, while high productivity service sectors, such as financial and insurance activities, real estate, and scientific and technical activities account for a much larger employment share. Changing the employment share in each sector in the rest of the country to that in Bratislava, while keeping the regional within-sector productivity rate constant, would significantly reduce the productivity gap. In the East, productivity would increase by over 40 percent. This is mainly due to the relatively large size of Bratislava's real estate sector, which has a significantly higher labor productivity than other sectors across regions.

Productivity by Region
(GVA per employee, thousands of euros)

Sources: Eurostat and IMF staff calculations.

Figure 3. Sectoral Decomposition

Employment by Sector and Productivity
(Percent of total employment and euros per employed, 2020)

Productivity by Sector
(Percentage difference from nartional average, 2020)

Sources: Eurostat and IMF staff calculations.

Sources: Eurostat and IMF staff calculations.

14.   Differences in hours worked are driven by the employment rate and average hours worked per employee. The working age population ratio has declined across regions since 2011, particularly in Bratislava where it is now about 2.5 percentage points lower than in the rest of the country. The average amount of hours worked is however still higher than in other regions due to a higher employment rate and a more hours worked per employee. Differences in the employment rate are both due to different unemployment and labor force participation rates. The driver behind the disparities in the amount of hours worked per employee are however more difficult to identify as all regions have a similar proportion of part time workers.

Figure 4. Drivers of Hours Worked

Working age population (ages 15-64)
(Percent of population)

Hours Worked per Capita Decomposed
(Percent deviation from national average)

Sources: Eurostat and IMF Staff calculations.

Sources: Eurostat and IMF staff calculations.

D.   Policy Implications

15.   Investment in physical and digital infrastructure to boost productivity. Public infrastructure investments, including improving transportation links, would support productivity growth in low-income regions. Effective absorption of EU funds will be important to achieve this objective. Measures to improve the digital infrastructure, including internet access, in the eastern

regions would also help support medium-term prosperity. Finally, policies to support private sector investment, including reducing the administrative burden of startups, would support R&D and innovation and boost total factor productivity in the East.

16.   Harmonization of education levels to support productivity growth and reduce labor market mismatch. Measures are needed to increase the average number of years of schooling outside of the capital region. Increasing access to tertiary education would help Western and Central Slovakia, while policies to reduce the number of people with only primary education are needed in the East. Programs to support vocational training and to better tailor education to the needs of employers would help reduce labor market mismatch and lower long-term unemployment.

17.   Increasing the housing stock in locations with less labor market slack. To help facilitate the mobility of labor from regions with less economic activity to those with more employment opportunities, the housing stock should be increased in and around the main metropolitan areas.

18.   Efforts to support disadvantaged groups, including the Roma community. In additional to reducing regional income disparity, efforts are needed to address the significant inequality within regions, particularly in the East. Measures should be targeted to foster social inclusion, improve employment opportunities and access to housing and education.

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