



# REPUBLIC OF LITHUANIA

## SELECTED ISSUES

July 2024

This paper on the Republic of Lithuania 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 June 28, 2024.

Copies of this report are available to the public from

International Monetary Fund • Publication Services  
PO Box 92780 • Washington, D.C. 20090  
Telephone: (202) 623-7430 • Fax: (202) 623-7201  
E-mail: [publications@imf.org](mailto:publications@imf.org) Web: <http://www.imf.org>

**International Monetary Fund**  
**Washington, D.C.**



# REPUBLIC OF LITHUANIA

## SELECTED ISSUES

June 28, 2024

Approved By  
European Department

Prepared By Saioa Armendariz and Serhan Cevik (both EUR).

## CONTENTS

### NAVIGATING MINEFIELDS AND HEADWINDS: NATIONAL SECURITY, DEMOGRAPHIC SHIFTS, CLIMATE CHANGE AND FISCAL POLICY \_\_\_\_\_ 3

A. Demographic Dynamics	3
B. Short-Run and Long-Term Expenditure Pressures	5
C. Addressing Long-Term Spending Pressures	10
D. Revenue Measures	14
E. Realigning Fiscal Targets	16
F. Conclusion	18

### BOXES

1. Lithuania's Current Pension System	7
2. Lithuania's Fiscal Rules	17

### FIGURES

1. Demographic Transitions	4
2. Military Spending and Interest Payments	6
3. Public Pension Spending	9
4. Expenditure Efficiency	13

References	20
------------	----

### TOWARDS A NEW NORMAL? PRODUCTIVITY AND COMPETITIVENESS IN LITHUANIA \_\_\_\_\_ 22

A. Stylized Facts	22
B. Disentangling Structural from Cyclical Factors of Recent Developments	30
C. What Can Be Expected In The Future?	38

**BOXES**

1. Wealth Effect of Terms-of-Trade on Domestic Income _____	27
2. The Balassa-Samuelson Effect in the Baltics _____	37

**FIGURES**

1. GDP Per Capita _____	23
2. Real Income Per Capita _____	23
3. External Balance _____	24
4. Terms-of-Trade _____	25
5. Impact of Terms-of-Trade on Domestic Income _____	26
6. Sectoral Composition of Labor Productivity _____	29
7. Export Market Shares _____	30
8. Energy Imports and Energy Mix _____	30
9. Trade Openness and Terms-of-Trade _____	31
10. Manufacturing and Export of Goods _____	32
11. Terms-of-Trade and External Balance _____	33
12. Lithuania Export Market Share _____	34
13. Corporate Sector Developments _____	35
14. Real Effective Exchange Rate _____	36
15. Technology and Economic Structure _____	39
16. Growth Composition: Production Function Approach _____	40

**TABLE**

1. High-Technology Sectors: Lithuania versus EA (2015-17) _____	39
References _____	42

**ANNEXES**

I. Sectoral Shift Share Methodology _____	43
II. Market Share Methodology _____	45

# NAVIGATING MINEFIELDS AND HEADWINDS: NATIONAL SECURITY, DEMOGRAPHIC SHIFTS, CLIMATE CHANGE AND FISCAL POLICY<sup>1</sup>

**1. There are few countries in Europe—or elsewhere—escaping the barrage of shocks in recent years unscathed.** Lithuania stands out with a remarkable performance since the global financial crisis (GFC) in 2008, with appropriate policy responses and strong macroeconomic fundamentals that helped maintain rapid income convergence towards the upper echelons of the European Union (EU). Maintaining the fast pace of income growth into the future, however, will become more difficult, as Lithuania faces mounting fiscal pressures and a shrinking and aging society in a global environment that is more fragmented and volatile. In light of these considerations, this paper examines Lithuania's fiscal challenges in the short run and over the longer term and policy actions necessary to address them.

**2. The immediate fiscal challenges are national security needs and higher cost of borrowing, but these pale in comparison to mounting long-term fiscal pressures.** Long-term spending pressures could be as 'little' as 5 percent of GDP or as much as 10 percent of GDP relative to the 2023 level by 2050. Addressing short-run and long-term spending pressures will require a comprehensive fiscal strategy that should include: (i) structural reforms that would reduce some of these pressures, particularly regarding pensions; (ii) improved spending efficiency in healthcare and education where the quality of outcomes lag peer countries after controlling for spending; (iii) revenue mobilization; and (iv) recalibration of fiscal targets. The final objective of this strategy should be to address long-term pressures without introducing distortions or disincentives that would worsen the growth potential of the economy; preserve fiscal sustainability; and maintain a pro-active fiscal policy that has served the country well.

## A. Demographic Dynamics

**3. The two key indicators to understand the future of Lithuania's demography are (i) the fertility rate and (ii) the median age.** The average number of children per woman fell from 2 in 1991 to less than 1.3 in 2023—far below the fertility-replacement rate of 2.1; and the median age increased by 12.5 years from 31.5 to 44 over the same period (Figure 1). Consequently, the old-age dependency ratio—the share of population at and above 65 to the working age population—surged from 18 percent in 1991 to 33 percent in 2023. For the first time in history, more workers will retire than those entering the labor market in 2024. According to the European Commission, these demographic shifts, albeit subject to uncertainty, will accelerate over the next two and half decades, lowering population by 18.9 percent to 2.3 million in 2050—and further by

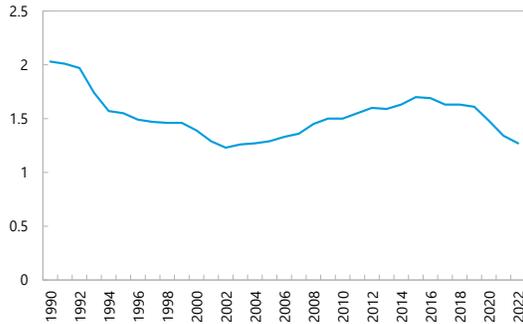
<sup>1</sup> Prepared by Serhan Cevik, who would like to thank Lukas Boer, Borja Gracia, Kazuko Shirono, the Bank of Lithuania, the Ministry of Education, the Ministry of Finance, the Ministry of Health, the Ministry of Social Affairs and Labor, and participants of a conference at Vilnius University for helpful comments and suggestions, and Sadhna Naik for excellent research assistance.

13.7 percent to 2 million by 2070. With shrinking population and increasing life expectancy, the median age of the population will increase over 48 and those aged 65 and above will constitute 57.9 percent of the working age population by 2050.<sup>2</sup>

**Figure 1. Demographic Transitions**

**Fertility Rate**

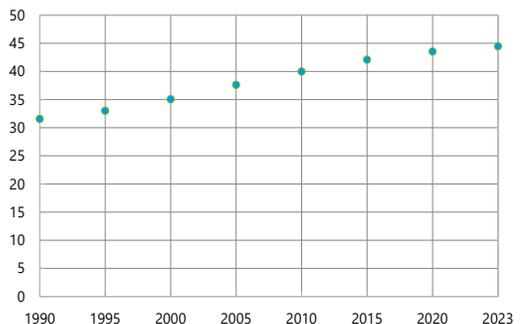
(Measured as births per woman)



Source: World Bank.

**Median Age**

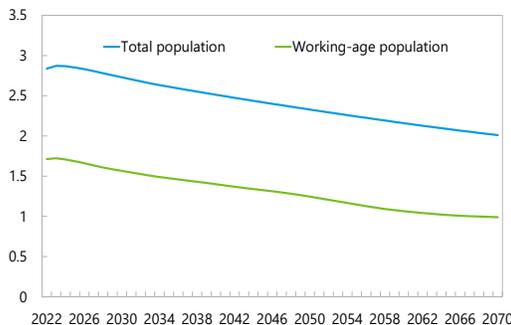
(in years)



Source: United Nations.

**Population and Working-Age Population**

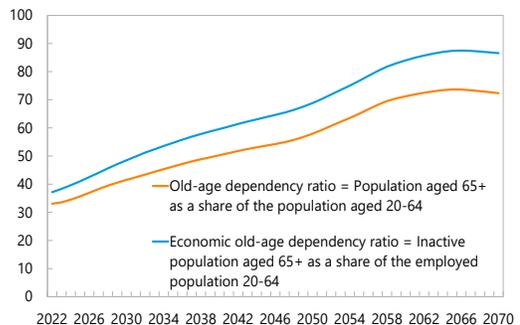
(Millions)



Source: EU.

**Old-Age Dependency**

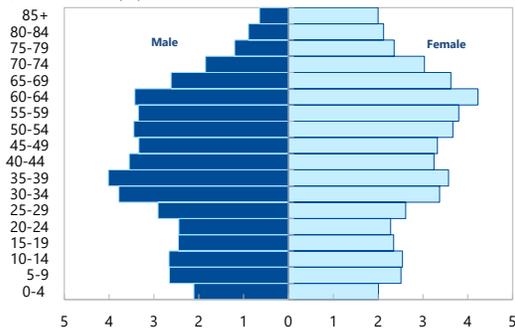
(Percent)



Source: EU.

**Population Pyramid: 2023**

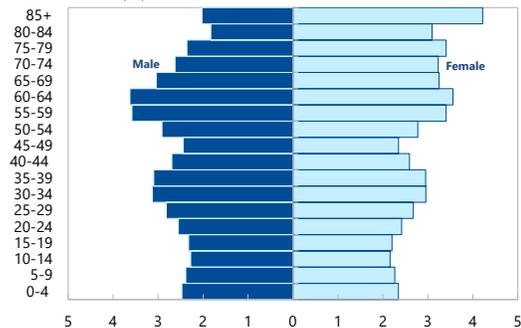
(Percent of total population)



Sources: Statistics Lithuania; Haver Analytics; and IMF staff calculations.

**Population Pyramid: 2050**

(Percent of total population)



Sources: World Population Prospects, 2022, United Nations; and IMF staff calculations.

<sup>2</sup> Life expectancy at birth in Lithuania increased from 70.5 years in 1991 to 75.3 years in 2022, but still stands lower than the EU average of 80.7 years. Furthermore, there is a significant gap in life expectancy between men (71.4 years) and women (80.1 years), which is one of the largest gender gaps in the EU.

**4. Demographic headwinds, along with net emigration, have reduced the size of the workforce by 20.6 percent from 1.9 million in 1991 to 1.5 million in 2023.** By 2050, Lithuania's workforce is projected to shrink further by 27.7 percent to 1.2 million. At the same time, the share of prime-age workers (25-54 years) is projected to decline to 40.1 percent of the total population in 2023 and to 33.1 percent by 2050. Moreover, the share of the economically inactive population aged 65 and above will increase from 38.3 percent of the employed population aged 20-64 in 2023 to 68.8 percent by 2050. The labor force participation of those aged 65 and above is significantly lower than younger cohorts. For example, while 90.3 percent Lithuanians aged between 25 to 54 are either employed or actively looking for work, the participation rate is only 18.7 percent among those aged 65 to 74. Absent policy interventions, this implies that labor force participation will fall in a rapidly aging population. The contracting labor supply will in turn reduce output per capita, depress aggregate fixed investment, and stifle the economy's long-run growth potential (Sheiner, 2014; Bouman *et al.*, 2015; Lee, 2016; Bodnar and Nerlich, 2022; Kotschy and Bloom, 2023; Maestas, Mullen, and Powell, 2023).

## B. Short-Run and Long-Term Expenditure Pressures

**5. Lithuania is facing large spending pressures in the near-term, from security needs and higher cost of borrowing that add to preexisting long-term pressures from ageing.** Altogether, spending pressures over the next 25 years could amount to as 'little' as 5 percent of GDP or as much as 10 percent of GDP relative to the 2023 level.

<b>Expenditure Pressures</b>			
<i>(Relative to 2023 baseline)</i>			
	Lithuania	Euro Area	EU
Defense	0.5 - 0.7		
Interest payments	0.4 - 0.8		
Pensions	3 - 5	0.6 - 0.9	0.4 - 0.7
Healthcare and long-term care	0.7 - 1.7	0.7 - 1.2	0.7 - 1.2
Education	-0.4	-0.4	-0.4
Green transition	1 - 2	0.8	
Total	5.2 - 9.8		

Sources: 2024 Aging Report; and IMF staff calculations.

### Defense Spending

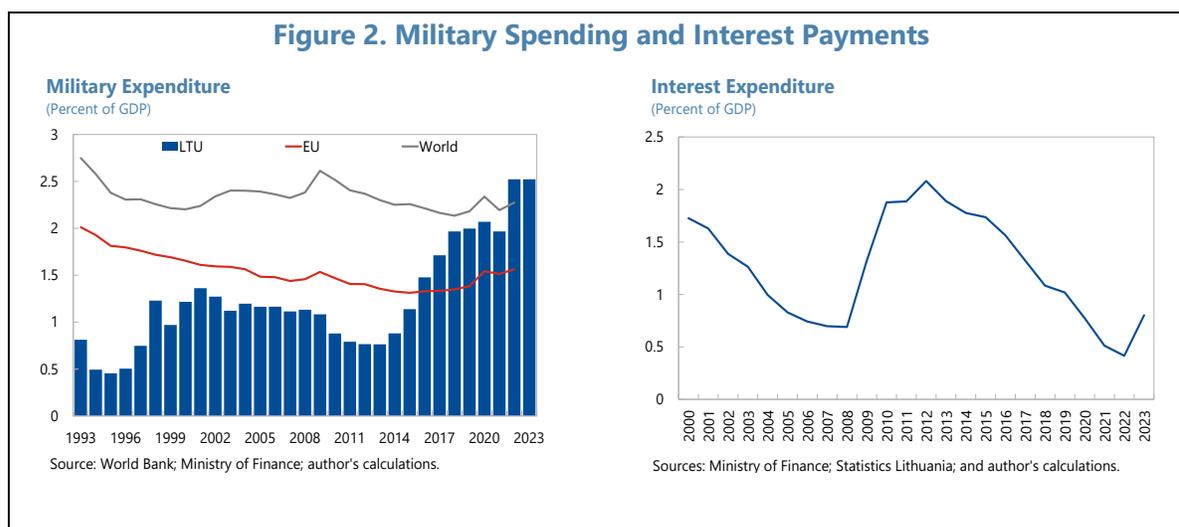
**6. Russia's invasion of Ukraine in 2022 has led to the largest increase in military expenditures in the post-Cold War era.** As a member of NATO, Lithuania has raised its defense spending to 2.5 percent of GDP by 2023 and announced plans to increase it permanently to 3 percent of GDP by 2030 with even higher temporary increases over the next few years to accommodate additional military infrastructure-related spending (Figure 2).<sup>3</sup> Lithuania has been meeting its NATO pledge of 2 percent of GDP in military spending since 2017 so the forthcoming

<sup>3</sup> Some call for increasing military spending to 4 percent of GDP.

permanent increase in defense outlays will amount to about 1 percent of GDP. During 2023 and 2024, the increase in military spending has been largely financed by the 'temporary' levy on banks that has raised around 0.4 percent of GDP in 2023. However, even with its extension for another year, financing for military spending beyond 2 percent of GDP has not been fully identified and approved by parliament yet.<sup>4</sup> There are ongoing discussions in parliament on a more comprehensive package of revenue measures, including a 1 percentage point increase in the corporate income tax rate, that will provide long-term funding.

## Interest Payments

**7. The post-pandemic inflation surge forced central banks to tighten monetary conditions.** In the eurozone, the ECB has raised short-term interest rates from 0 percent in 2022 to 4.5 percent by the end of 2023, pushing the average cost of government borrowing higher. In the case of Lithuania, a low stock of debt, 36 percent of GDP in 2023, with a high average maturity will smooth the pass-through of tighter financial conditions to effective interest rates and interest spending. This will keep financing needs relatively low in the short run but gradually increasing over the medium term even pass the point when policy rates start declining and at the time when other spending pressures become more acute. Thus, interest expenditure is projected to rise from 0.4 percent of GDP in 2022 to 0.7 percent in 2023 and to about 1.2 percent by 2030.



## Pension Spending

**8. The 2018 social security reform aimed to ensure the financial sustainability of the system.** Pensions were indexed to the overall wage bill and the retirement age was gradually increased to 65 by 2026 for both men and women and contributions to obtain a full pension increased from 30 to 35 years by 2027 (Box 1). If the indexation formula results in a deficit, the law established that pensions would be left unchanged, resulting in declining replacement ratios

<sup>4</sup> According to the new EU fiscal rules, defense spending will be regarded as a mitigating factor in assessing whether a country breaches the budget deficit limit. Beyond fiscal and security considerations, however, it should be noted that military spending could have broader macroeconomic effects (Cevik and Ricco, 2018).

over time due to demographic dynamics. Furthermore, given better-than-projected developments in the labor market, discretionary additional increases in benefits (up to 75 percent of short-term surpluses of the social security) have been approved at the cost of permanent long-term entitlements—accrued total pension entitlements have increased from 217 percent of GDP in 2019 to 275 percent in 2021. This reflects the risks from a reform that, while ensuring the financial sustainability in the short run does not ensure its social sustainability with low and decreasing replacement ratios. Lithuania has one of the highest old-age poverty risk in the EU and, given the relatively modest level of pension benefits, more older workers participate in the labor force than EU peers.

### Box 1. Lithuania’s Current Pension System

**1. Lithuania’s pension system has evolved over the past three decades.** The system was established in 1995 with just one pillar—the conventional pay-as-you-go system. In 2000, the government adopted a new pension system, aiming to increase income for pensioners and reduce redistribution effects, followed by the introduction of a quasi-mandatory Pillar II (enrollment is voluntary but once enrolled, participation until retirement is mandatory except for exceptional circumstances) and a voluntary Pillar III in 2004.<sup>1</sup> The 2018 reform aimed to ensure the financial sustainability of the system. Pensions were indexed to the overall wage bill and the retirement age was gradually increased to 65 by 2026 for both men and women and contributions to obtain a full pension increased from 30 to 35 years by 2027.<sup>2</sup> Furthermore, if the indexation formula results in a deficit, the law established that pensions would be left unchanged. Given demographic dynamics going forward, this would have resulted in a declining replacement ratio of Pillar I pensions over time.

**2. Thus, the 2018 reform delivered a pay-as-you-go pension system that does not ensure socially sustainable benefits.** The replacement rate at about 30 percent for those who will retire in the future under Pillar I is already lower than the ILO recommended minimum of 40 percent. Based on the UN median population projections and baseline assumptions, the replacement ratios for workers opting out of Pillar II would decline to slightly above 20 percent by 2050.

**3. The pension system currently consists of three pillars that serve complimentary purposes.** While the design of the first pillar is rather standard, the second and third pillars in Lithuania differ slightly from other European countries.

- **Pillar I is a classic pay-as-you-go system, administered by the State Social Insurance Fund Board (Sodra).** It currently comprises of a base part—a fixed benefit paid to any individual with at least 30 years of contribution expected to increase to 35 years by 2027—the basic part linked to income and length of service, and individual part depending on the accrued number of pension points. Because it exhibits a relatively weak link between contributions and benefits, Pillar I has a large redistributive component, which has been insufficient to address old-age poverty.

<sup>1</sup> Bitinas, Audrius, 2011. “Modern Pension System Reforms in Lithuania: Impact of Crisis and Ageing.”

<sup>2</sup> Since 2022, a full pension (without reduction of the basic part) is paid for everyone with 15 years of contributions. The obligatory period of contributions (30-35 years, depending on the time of reaching retirement age) only affects the basic pension and supplements for the lowest contributory pensions.

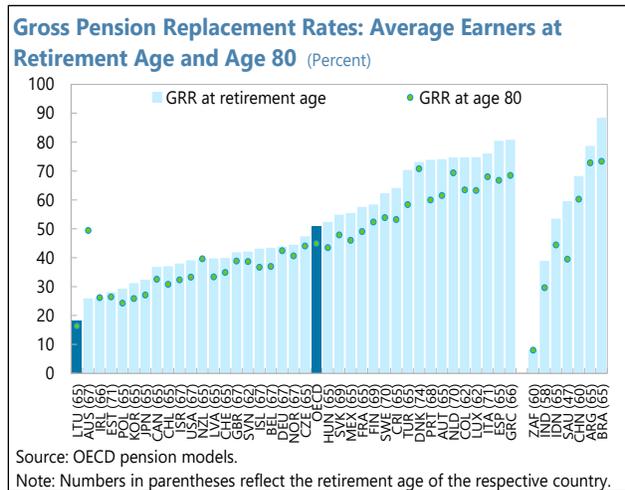
**Box 1. Lithuania’s Current Pension System (Concluded)**

- Pillar II is a defined-contribution pension system based on personal accounts.** Other countries including CEE countries often established Pillar II as a mandatory defined-contribution scheme to complement the defined-benefit Pillar I. In the 2013 reform, while all the new participants were applied the “2+2+2” formula—later changed to “3+1.5” after the 2019 tax reform or the equivalent “4+2” pre-reform—the existing participants, more than 60 percent of all participants as of 2017, could opt out to have only 2 percent of their social contributions transferred to private pension funds. At the time of retirement, individuals can choose to convert pension entitlements into annuities or a lump sum. Those with accumulated returns lower than a certain threshold would only receive lump sum amounts. Having Pillar II allows for diversification of the pension system. Shortfalls in Pillar I contributions due to economic conditions can be partially offset by capital gains in the Pillar II system, including from foreign assets. Because Pillar II entitlements depend solely on the voluntary contribution that are proportional to wages, Pillar II does not have any redistributive effects.<sup>3</sup> In fact, more financially savvy individuals could choose private pension funds with better performance and get higher returns. As of 2023, the number of participants in the system was 760,000 or about half of the labor force.
- Pillar III is a voluntary supplementary pension accumulation system.** Contributions to this are paid by an individual or an employer with accompanying tax benefits. Pillar III is considered regressive, benefiting solely high-income earners.

<sup>3</sup> It should be noted that the state subsidy for Pillar II plays a redistributive role as it is flat. For low-income earners, the amount of state subsidy is larger than a person’s contribution. Also, periods of maternity, paternity and childcare are covered by the state’s contributions.

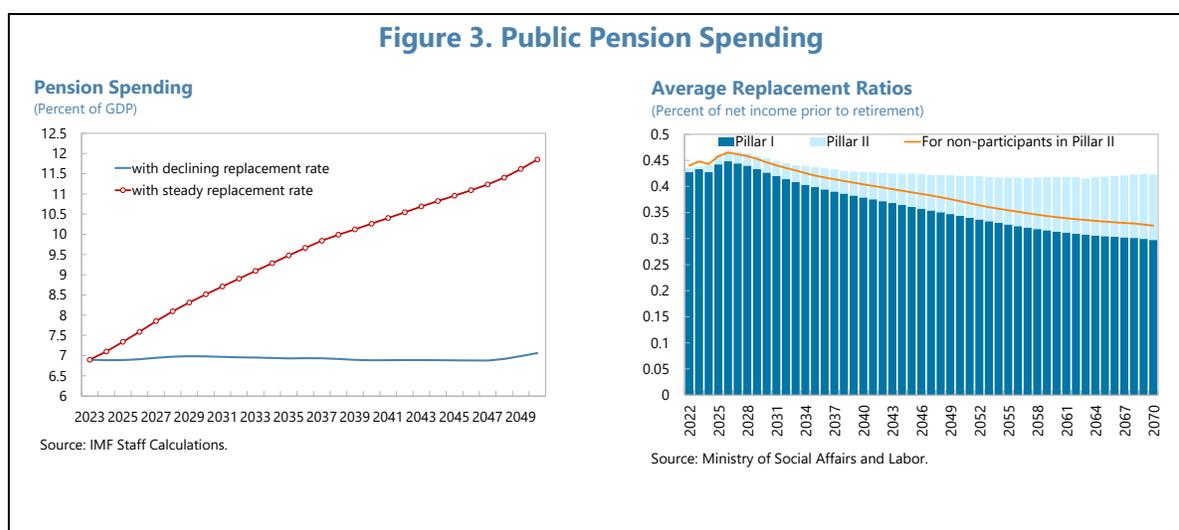
**9. Public pension expenditure as a share of GDP depends on four key components: (i)**

the average pension over average output per worker; (ii) the share of pensioners in the total population above the retirement age; (iii) the share of population above 65 to the working-age population; and (iv) the share of workers in the total working-age population. This implies that that public pension spending grows in line with the old-age dependency ratio, which may increase due to aging and/or a shrinking workforce. For example, assuming constant benefit and coverage ratios, an increase in the population aged 65 and above due to higher longevity would translate into higher public pension spending for the same level of GDP, thereby increasing pension expenditure as a share of GDP.



**10. Under the baseline scenario, pension expenditures could increase by about 3 percent of GDP over the next two decades.** This would be more than double the projected increase of 1.3 percent of GDP in the 2021 Aging Report. Without the gradual increase in the retirement age to 65 by 2026 to absorb the impact of increased longevity, the balance of the pension system

deteriorates rapidly with projected deficits starting by the end of this decade.<sup>5</sup> Spending pressures could be larger if replacement ratios for the pay-as-you-go system were to remain constant around the current level of 30 percent or increase to the ILO recommended level of 40 percent that would require around 2 and 4 percent of GDP, in additional spending respectively compared to no policy change scenario in which the net replacement rate of Pillar I pensions declines from the current 28.9 percent to 20 percent in 2050.



## Other Age-related Spending

**11. A rapidly ageing population has fiscal implications beyond the pension system.** The 2024 EU Ageing Report projects that long-term care and healthcare spending pressures could gradually increase to 0.7 percent of GDP per year over the next two decades with long-term pressures up to 1.7 percent of GDP. At the same time and given the decrease in the population at student age, education spending pressures will fall by around 0.3-0.4 percent of GDP per year over the medium-term and beyond.

## Green Transition

**12. Over the next couple of decades, green transition for climate change adaptation and mitigation will become a growing source of expenditure pressures** (Cevik, 2024). Enhancing structural resilience requires infrastructure and other ex-ante investments to limit the impact of disasters, while building financial resilience involves creating fiscal buffers and using prearranged financial instruments to protect fiscal sustainability and manage recovery costs. According estimates by the European Investment Bank (EIB) study, the gross costs could amount to around 2.2 percent of GDP by 2050.<sup>6</sup> These estimates are highly uncertain, and the authorities are already making investments in this area (e.g., around €900 million of EU funds). Thus, the net

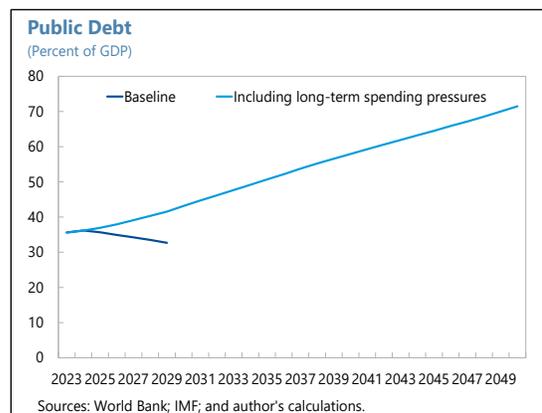
<sup>5</sup> Lithuania has one of the lowest life expectancy rates in retirement, especially for men, among EU countries.

<sup>6</sup> The EIB Investment Report 2020/2021: Building a smart and green Europe in the COVID-19 era.

spending pressures coming from the green transition below what is already in the baseline can be lower than the gross estimates presented in this study.

### C. Addressing Long-Term Spending Pressures

**13. Addressing long-term expenditure pressures will require a comprehensive fiscal strategy.** This strategy should include: (i) structural reforms that would reduce some of these pressures, particularly regarding pensions; (ii) improved spending efficiency in healthcare and education where the quality of outcomes lag peer countries after controlling for spending; (iii) revenue mobilization; and (iv) recalibration of fiscal targets. The final objective of this strategy should be to address long-term pressures without introducing distortions or disincentives that would worsen the growth potential of the economy; preserve fiscal sustainability; and maintain a pro-active fiscal policy that has served the country well.



#### Pension Reform

**14. There are inevitable trade-offs between reigning fiscal costs and reducing old-age poverty, and between increasing redistribution and ensuring participation and compliance.** For example, strengthening the links between contributions and benefits in Pillar I will reduce its redistributive component and potentially affect old-age poverty. On the other hand, a more generous basic pension could reduce labor supply and induce underreporting of income. Increasing pension benefits could be achieved by raising the retirement age; financing SODRA's deficit by higher tax revenues; increasing social security contributions; and increasing the scale and returns of Pillar II. While increasing the retirement age can deliver significant resources, replacement ratios high enough to reduce old-age poverty would likely result in further costs. Since social security contributions are already high, higher budgetary transfers appear inevitable to increase the replacement ratio for Pillar I going forward.

**15. In view of unfavorable demographic trends, increasing fertility, along with migration, would help reduce the old-age dependency ratio.** This will rebalance the ratio of pensioners to workers over the long run. However, given the extent of the negative demographic dynamics, these measures, even if successful, will not be enough to solve the problem. Thus, a new round of social security reforms is inevitable to address Lithuania's fast-aging society.

- *Linking the retirement age to longevity.* The statutory retirement age is set to gradually increase to 65 years for both men and women by 2026. Albeit a step in the right direction, this parametric adjustment is not sufficient even to maintain the current ratio of pensioners to the working-age population in the future. That would require linking the statutory retirement age to longevity. This would have a significant effect on pension spending as a

share of GDP and help maintain actuarial balance over the long-run. For example, everything else held constant, increasing the retirement age for both men and women gradually to 75 by 2070 could close the deficit by 2040.

- **Reducing benefits.** Although pension benefits can be cut to realign public pension spending as a share of GDP in the future, the replacement rate of about 30 percent for the pay-as-you-go system in Lithuania is already one of the lowest in the EU and significantly below the minimum level of 40 percent recommended by the ILO. In this context, means testing of basic pensions would align the level of benefits according to individual economic status and thereby help mitigate the fiscal cost of pension expenditure and enhance the progressivity of social assistance, especially in a country with a shrinking and aging population (Kudrna, Tran, and Woodland, 2022).
- **Incentivizing delayed retirement.** Given the shrinking labor force in Lithuania, it is doubly beneficial to increase labor force participation among older workers who are eligible for pensions. Currently, early retirement would result in a significant penalty and lower benefits thereafter. On the other hand, deferring retirement for five years could raise benefits by almost 8 percent per year. Yet, the effective retirement age is lower than the statutory age where the main early retirees being older workers facing long-term unemployment risks or very low future benefits.
- **Increasing contributions.** Raising the rate of pension contributions or the upper limit of an individual's income that is subject to the payroll tax could be considered. However, to deliver socially acceptable replacement ratios, social contributions, which are already high above 30 percent of gross wages, would have to increase to more than 40 percent by 2050. The existence of a significant informal sector poses an additional challenge to any increase in social contributions and its potential adverse impact on labor force participation (Gruber and Wise, 2002; Liebman, Luttner, and Seif, 2008; Breda, Haywood, and Wang, 2022).
- **Subjecting pensions to the PIT.** Pensions are currently exempt from personal income tax in Lithuania. Subjecting pensions to the standard personal income tax (PIT) system could provide budgetary resources to support non-contributory pensions helping those receiving lower contributory pensions. However, this should be done minimizing labor supply disincentives. The "implicit tax" or the change in net pension wealth from continuing to work has been found to significantly reduce the effective retirement age.<sup>7</sup>
- **Strengthening and providing stability to Pillar II.** Pillar II plays an important complementary role to Pillar I pensions stabilizing the replacement ratio of participants. While returns have been volatile over the last few years, most of the investment of Pillar II funds is made abroad providing a welcome risk diversification. Some of the issues faced in the past, including initial large management fees, are largely transitional while Pillar II funds become big enough to exploit economies of scale or were addressed in the 2019 reform, but

---

<sup>7</sup> Bassanini and Duval (2006).

uncertainty and frequent changes to the system reduce incentives to participate. Thus, strong incentives to participate in, ideally making participation mandatory, and strong disincentives to early withdrawals from Pillar II would help risk diversification and reduce the pressure on the state-funded Pillar I.

**16. Any future reform should aim to reduce the uncertainty around pension entitlements and seek broad consensus.** Regulatory or parametric changes to the pension system are costly to its credibility as they can be viewed as partial default over previous commitments. Any future pension reform should be preceded by broad discussion involving all social agents and political parties and should seek broad consensus to ensure a smooth implementation.

### Education and Healthcare Reforms

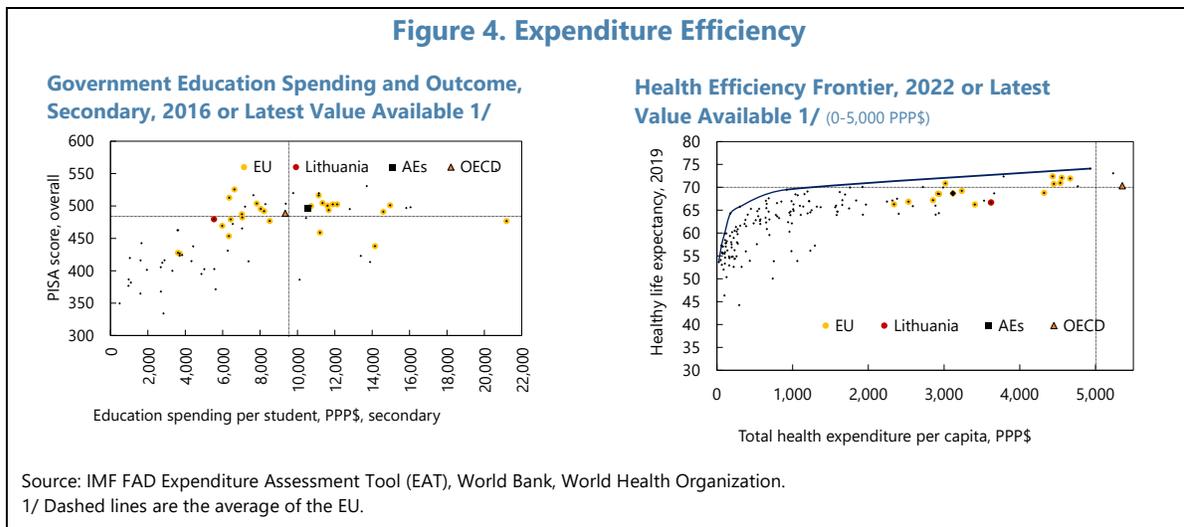
**17. Health expenditure in Lithuania is comparable to that of peers but composition differs and outcomes lag.** Public spending on education and health is evaluated using the Expenditure Assessment Tool (EAT) developed by the IMF, which captures the relative efficiency of a country in translating spending into measurable outcomes (Garcia-Escribano and Liu, 2017). The EAT framework benchmarks a country's public spending and outcomes against comparators and thereby shows how far away any given country is from the efficiency frontier (Figure 5). The share of public expenditure on healthcare is also comparable. However, the share of out-of-pocket spending over the total health expenditure is 15 percentage points higher than its peers', suggesting a high burden of health care costs on patients which could be increasingly difficult for households to shoulder. Within this amount, Lithuania invests significantly more in hospital beds than other countries, with 7.5 beds per 1,000 people while the rest of Europe has on average less than 5 beds per 1,000 people.<sup>8</sup> However, Lithuania has adopted similar policies as other EU countries to gradually reduce this ratio, focusing more on outpatient care.

**18. In terms of staffing, Lithuania has more doctors but fewer nurses per capita than the regional average.** As of 2023, for every 1,000 people, Lithuania employs one additional physician but almost 2 fewer nurses compared to peers. In addition, over the past 10 years, while neighboring countries have had relatively stable ratio of physicians per capita, Lithuania has seen an uptick. This is mainly due to the secular decline in population since independence. There is also a large dispersion in the coverage of medical staff between urban and rural areas and a decline in the number of nurses per capita. Recent reforms have identified the right priorities including the excessive capacities in rural areas, but implementation has failed to deliver in several sensitive areas, particularly network rationalization, due to the lack of buy-in from municipalities and the upfront wage increases adopted.

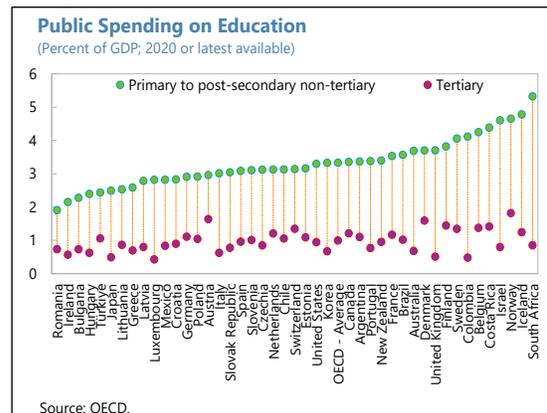
**19. Lithuania is far from the healthy expectancy frontier suggesting that there is substantial scope to improve outcomes within the same spending envelope.** For example,

<sup>8</sup> The number of acute care (or curative) inpatient beds in Lithuania is 5.1 per 1,000 people, broadly in line with 5.5 in Romania, 5.8 in Germany, and 6.6 in Bulgaria.

Lithuania particularly lags in behavior-related diseases and ranks the lowest in the EU in terms of healthy life expectancy.<sup>9</sup> It has higher rates of smoking, alcohol, heart, and circulatory system related diseases as well as suicides. Where Lithuania has achieved better outcomes than the EU average is with regard to lowering the number of maternal deaths. Given the preventable nature of these diseases, the stronger focus on primary care and mental health as envisioned in recent reform plans is appropriate. There is room for more extensive public health initiatives to improve healthy lifestyles, especially among the elderly. Increases in excise taxes, particularly alcohol and tobacco, can be considered to discourage unhealthy behavior. These measures can potentially increase the healthy life expectancy in Lithuania to that of peer countries (some 7 years higher) even within a similar spending envelope. Further, improved health outcomes not only improve public spending efficiency but could support potential growth through a healthier and more productive population.



**20. Education spending in Lithuania is about 0.5 percent of GDP lower than the euro area. Expenditure per student, after adjusting for PPP, is also below the EU average.** Within this budget, compared to its peers, the government has allocated more towards tertiary education. In fact, the share of public spending on primary and secondary education is the seventh lowest among 45 OECD countries while spending on tertiary education is close to the OECD average. It is, however, not clear that tertiary education has a stronger impact on



<sup>9</sup> Healthy life expectancy adjusts standard life-expectancy measures for severity of illnesses and quality of life factors. As of 2021, the average number of healthy life-years lived by the population in Lithuania is 6 years lower than the EU average: 57.6 years vs. and 63.6. The difference in healthy life expectancy for men is 7.7 years: 55.4 years vs. 63.1 years, while women in Lithuania have a longer average healthy life expectancy of 59.8 years—4.4 years behind the EU average of 64.2 years.

productivity than other levels of education while its impact on redistribution is the smallest if not negative.

**21. The education outcome for Lithuania is mixed, with good quantitative outcomes but poor qualitative ones.** Due to the accessibility of schools and classes, enrollment is very high, putting Lithuania right at the frontier. When looking at the performance outcome of the students by international standards such as the PISA scores, Lithuania is among the bottom 25 percent of EU countries. Students in Lithuania also perform worse in financial literacy controlling for performance in mathematics and reading, raising curricular issues. Outcomes of tertiary education also lag those of other EU countries. This is reflected in Lithuania having the third highest level of skills mismatch in the labor market.<sup>10</sup> As rightly emphasized in the education reform package of 2019, Lithuania is focusing on increasing the quality of education as well as the efficiency of the school network. These are steps in the right direction but have not proven ambitious enough to deliver material outcomes. Rationalization of the extensive school network will provide savings that can be redirected to improving school quality, especially for elementary and secondary education. These efforts will help Lithuania catch up with peers and prepare a more productive labor force.

## D. Revenue Measures

**22. There is scope to increase tax revenues while preserving the competitive tax environment.** Lithuania has increased tax revenues in percent of GDP including through improved compliance. However, it still collects less tax revenue as a share of GDP compared to other EU countries. In 2022, the tax-to-GDP ratio amounted to 31.6 percent in Lithuania, but 40.3 percent in the EU. Moreover, Lithuania's tax system is heavily tilted towards the taxation of labor income, which accounts for over 55 percent of total tax revenue. Consequently, a shrinking and aging population will reduce in particular personal income tax (PIT) and social security contributions.<sup>11</sup>

Tax Revenue, 2019 vs. 2022															
(Percent of GDP)															
	Lithuania			Estonia			Latvia			EU-27			Differential with EU		
	2019	2022	Share	2019	2022	Share	2019	2022	Share	2019	2022	Share	2019	2022	Share
Total tax revenues	30.2	31.6	100	33.3	32.9	100	30.7	30.3	100	40.1	40.3	100	-9.9	-8.7	0.0
PIT	7.2	7.6	24.1	5.5	6.3	19.1	6.5	5.8	19.1	9.6	9.6	23.8	-2.4	-2.0	0.2
CIT	1.6	2.3	7.3	1.8	1.7	5.2	0.2	1.0	3.3	2.6	3.3	8.2	-1.0	-1.0	-0.9
VAT	7.9	8.4	26.6	8.9	9.2	28.0	8.6	9.4	31.0	7.2	7.5	18.6	0.7	0.9	8.0
Excise and consumption taxes	3.0	2.4	7.6	...	...	...	3.5	2.9	9.6	2.0	1.5	3.7	1.0	0.9	3.9
Taxes on land, buildings, and other structures	0.2	0.2	0.6	0.2	0.2	0.6	0.7	0.6	2.0	1.1	0.9	2.2	-0.9	-0.7	-1.6
Social security contributions	10.0	10.2	32.3	11.9	11.7	35.6	10.0	9.7	32.0	14.1	13.9	34.5	-4.1	-3.7	-2.2
Other	0.3	0.5	1.6	...	...	...	1.2	0.9	3.0	3.5	3.6	8.9	-3.2	-3.1	-7.4

Source: Eurostat; and European Commission.

<sup>10</sup> [Skills Mismatch and Active Labor Market Policy in Lithuania](#), Lithuania Selected Issues Paper 2019.

<sup>11</sup> The impact of population aging on tax revenue over the long run depends on modelling assumptions (Woodland, 2016). There is empirical evidence indicating a decline in tax receipts due to lower labor force participation and consumption by the elderly relative to the younger cohorts (Jappeli and Pistaferri, 2010; Borrillo, Parraga-Rodriguez, and Perez, 2021).

**23. Consumption-related taxes would follow a similar pattern, but not as steep as the fall in direct taxes due to consumption smoothing over time.** Increasing the tax burden on a smaller base of taxpayers to pay for additional age-related expenditures, without implementing structural reforms, would simply exacerbate economic distortions and cause a further drop in labor force participation. Population aging has the least effect on environmental and real estate taxes, which are currently underutilized in Lithuania compared to other EU countries. Therefore, while shifting the tax base away from labor-related taxation remains an important objective, a balanced revenue mobilization strategy should consider a wide spectrum of measures designed to address the fiscal challenges of aging:

- **Increasing social security contributions and taxing pensions.** There is limited space to increase social security contributions in Lithuania. However, introducing a PIT on pensions, including voluntary pension savings, would generate additional revenue and make the social security system more progressive. This would have to be done in a wider reform of the PIT regime.

- **Raising the CIT rate.** The CIT regime yields around 2 percent of GDP in revenues, compared to an average around 3 percent in the EU. Hence, Lithuania has some room for additional revenue mobilization from CIT by raising the effective tax rate and eliminating exemptions.

	Tax Rates				
	Lithuania	Estonia	Latvia	Sweden	EU-28
VAT	21	20	21	25	21
CIT	15	20	15	22	22
PIT	20	20	23	25	34
Real Estate	0.3 - 3	2.5	3	2.8	4

Source: Eurostat; and IMF staff calculations.

- **Eliminating tax expenditures.** Tax concessions and exemptions (excluding the non-taxable allowance) amount to around 3 percent of GDP, causing significant revenue losses. Some exemptions may benefit vulnerable groups of society, but most of the foregone revenue benefit the wealthy even more. Therefore, simplifying tax expenditures could generate potentially significant additional revenue and also make the tax system more efficient and equitable.

Tax Expenditures in 2022		
	in EUR million	Percent of GDP
Value Added Tax	489	0.7
Excise Duty	337	0.5
Corporate Income Tax	491	0.7
Personal Income Tax	1,702	2.5
<i>of which from non-taxable income</i>	1,030	1.5
TOTAL	3,018	4.5

Source: Ministry of Finance.

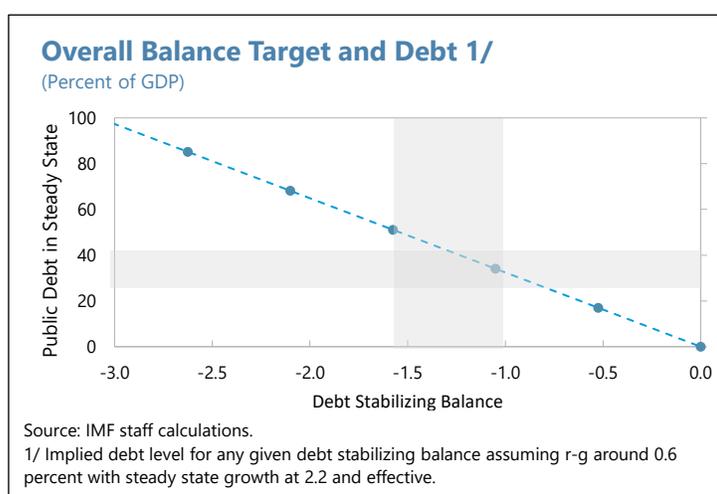
- **Introducing a carbon tax and increasing other environmental taxes.** Currently, environmental taxes in Lithuania amount to 1.5 percent of GDP, but merely 0.2 percent excluding taxes on transportation fuel. Updating environmental taxes and introducing an economy-wide carbon tax of US\$75 per metric ton of CO<sub>2</sub> emissions would raise about 1.5 percent of GDP in revenues and contribute climate change mitigation.
- **Modernizing the property tax regime.** Property taxes in Lithuania are only applied to high-value real estate (buildings and land) and paid by a relatively small fraction of the population.

As a result, property tax revenue amounts to 0.2 percent of GDP, in line with Estonia but three times lower than Latvia and around 0.8 percent of GDP lower than the EU average of around 1 percent of GDP.

- **Indirect taxes.** Lithuania relies heavily on VAT revenues around 8.5 percent, or a fourth of total tax revenues compare to an average of 7.5 percent of GDP in the EU. Thus, there seems to be limited scope to increase VAT further.

## E. Realigning Fiscal Targets

**24. Fiscal targets in Lithuania can be set around current levels, safeguarding fiscal sustainability and preserving the rule's counter-cyclical stance.** The current fiscal rule can be described as a form of structural balance rule with an expenditure correction mechanism and a debt anchor imposed by the EU framework. It targets a structural balance or surplus of the general government except when the output gap is negative when the deficit cannot exceed the medium-term objective (currently at -1 percent of GDP). While overly complex, the rule imposes a welcome counter-cyclical fiscal stance and, since its introduction, has proven effective in consolidating fiscal discipline. In particular, the structural fiscal position in the five years before the recent shocks 2015-19 was a structural surplus of around 0.5 percent of potential GDP as estimated by staff. Given relatively low debt and deficits, Lithuania complies with the reference values in the EU economic governance framework and the domestic rule anchors policy. Hence, the structural fiscal target can be set at the current level—at around -1 percent of GDP even when the output gap becomes positive—that would be consistent with steady state public debt at around the current level (36 percent of GDP) and provide sufficient space to support the economy during downturns without exceeding the 3 percent of GDP deficit under the EU framework.



**25. Importantly, non-climate related capital spending should be preserved.** In the five years prior to the pandemic, public investment was below 3 percent per year, resulting in no growth in capital stock that has resulted in an infrastructure gap. Some spending pressures over the last few years have been largely accommodated by reducing discretionary spending. But with discretionary spending already low, there is little room for further accommodation this way. The

## Box 2. Lithuania's Fiscal Rules

**Fiscal rules are described in the Constitutional Law on the Implementation of the Fiscal Treaty (CLIFT) of 2014 and the Republic of Lithuania Law on Fiscal Discipline (LFD) of 2007.** The CLIFT is consistent with the European Fiscal Compact and has prominence over the LFD in case of conflict. Although the CLIFT is best described as a form of structural balance rule with an expenditure correction mechanism and a debt anchor imposed by the EU framework. Its main provisions can be summarized as follows:

- **Fiscal anchors:** A (structural) balance target in the form of the Medium-Term Objective (MTO) and a debt anchor imposed by the EU framework.
- **Operational target:** Each year, except in exceptional circumstances (an event outside the control of the authorities or a severe economic downturn) at least one of the following conditions must be met:
  - The structural balance of the general government is in surplus.
  - If not in surplus (and below the MTO), it should be improving except when the output gap is negative.
  - When the output gap is negative, the structural deficit can stay below the MTO.<sup>1</sup>
  - If the structural balance is worse than the MTO, the targeted improvement should be met. In this context, the structural adjustment target is to be set if: (i) the deficit (actual or planned) reaches 3 percent of GDP; (ii) the structural deficit is worse than the MTO. The adjustment target is set so that the MTO is reached within two or four years, depending on whether the deviation from the MTO is smaller or bigger than 2 percentage points of GDP.
- **Expenditure growth limit:** If the average general government balance in the previous 5 years is negative, budget appropriations should grow by less than half of the average growth of potential GDP during the same period. The Law specifies five 'escape clauses' under which the expenditure rule would not apply:
  - *Weak economy and significantly weaker economy relative to the EU.* The projected output gap for the budget year is negative or Lithuania's nominal GDP growth is less than the average 5-year GDP growth in the EU plus 2 percentage points.
  - *Strong fiscal position.* The average general government balance during the last 4 years and the projection for the current year is in surplus of at least 0.1 percent of GDP.
  - *No deterioration relative to the original budget.* In case of budget revisions, the balance of the revised budgets is not worse than the original one and if the improvement in the planned nominal general government balance is higher than 1 percentage points of GDP.

**Rules for other parts of the general government.** All general government budgets except the state pension fund (and smaller units) must be planned, approved, amended, and implemented targeting a structural balance (on accrual basis) or surplus. The pension fund's structural deficit can deteriorate only when the projected output gap is negative. For smaller general government units (below 0.3 percent of GDP), expenditures can only exceed revenues (by no more than 1.5 percent) when the output gap is projected to be negative.

<sup>1</sup> The MTO is established by parliament by March 15 of the current year for a three-year period. The MTO is a structural government deficit of 1 percent of GDP if debt is less than 60 percent of GDP and risks to debt sustainability are low, and not higher than 0.5 percent of GDP otherwise.

risk going forward is that some current spending pressures might crowd out already modest capital spending. This risk is small over the short-term given large EU structural and RRF funds. However, over the long-term and as Lithuania continues to converge towards the EU income level, structural funds provided by the EU may decline.

Potential Measures to Address Spending Pressures					
	Measures	Impact	Impact on economic efficiency	Distributional impact	
<b>Pension reform</b>	Link retirement age to longevity	Partially Absorbs the impact of demographic changes on pension spending	Positive impact on participation rate	Not clear, it reduces years of retirement but could support higher pensions	
	Increase payroll contributions	Narrows the pension deficit, but payroll taxes are already high	Decrease participation and increase non-compliance	Negative	
	Subject pensions to PIT	Creates additional revenue that can help support low income pensioners	Neutral	Positive if resources are channeled to low income pensioners	
<b>Efficiency reforms</b>	Education reform	Improving expenditure efficiency would partly address spending pressures in these areas	Would improve human capital and support productivity	Could disproportionately benefit low income households	
	Healthcare reform				
<b>Revenue mobilization</b>	Raise the CIT rate	Up to 1 percent of GDP	Corporate income taxes are relatively inefficient	The ultimate incidence of the tax is unclear	
	Reduce tax expenditures	Up to 3 percent of GDP	Tend to be inefficient and favor specific groups	They also tend to disproportionately favor less well off groups	
	Introduce carbon tax/environmental taxes	Up to 1.5 percent of GDP	It reduces an externality increasing efficiency and generating revenue	Positive if resources rechanneled appropriately	
	Enhance property taxes	Up to 0.8 percent of GDP	This is an economically efficient tax	Given large home ownership design should be careful to avoid negative distributional impact	
	Increase the standard VAT rate	0.3-0.5 percent of GDP per 1pp increase	Relatively efficient from an economic point of view	Tend to disproportionately affect the less better off	
<b>Fiscal targets</b>	Moderately reduce the fiscal target	Up to 1 percent of GDP	None as long as fiscal policy remains counter-cyclical		...

## F. Conclusion

**26. Cyclical fiscal pressures should not be underestimated, and Lithuania has a good track record in dealing with them using fiscal policy pro-actively since the GFC.** However, mounting long-term spending pressures—largely linked to unfavorable demographic shifts with adverse economic and fiscal consequences—that add to short-term extra military spending and higher interest payments, represent the biggest fiscal challenge. Lithuania’s population already declined by almost 25 percent from 3.7 million in 1991 to 2.8 million in 2023, and it is projected to contract by about 20 percent to 2.3 million over the next two decades and a half.

**27. Long-term spending pressures in Lithuania are projected to amount to between 5 and 10 percent of GDP over the long-term.** Absent expenditure and revenue measures, gross public debt would increase by 36 percentage points of GDP from 35.6 percent in 2023 to 71.5 percent by 2050. This increase in public debt would come with greater risks to public debt sustainability and, by limiting the capacity of fiscal policy to react to shocks, macroeconomic stability. Furthermore, the burden of long-term spending pressures will fall on a shrinking workforce. That may not only put public finances under greater pressures, but a shrinking and aging labor force could also limit innovation and productivity growth, increase labor costs and reduce the country’s international competitiveness.

**28. Therefore, addressing these long-run challenges requires a comprehensive strategy** of structural reforms and policy changes to reduce the fiscal burden of pensions and healthcare, increase revenue mobilization, and recalibrate fiscal targets while maintaining a strong fiscal

position. With ample fiscal space and strong macroeconomic fundamentals, Lithuania has an opportunity to pursue small adjustments over an extended period, rather than a 'big bang' approach that could have distortionary and politically contentious effects. Taking everything into account, the long-term sustainability of public finances would be safeguarded with a comprehensive strategy that includes these elements.

## References

- Bitinas, A. (2011). "Modern Pension System Reforms in Lithuania: Impact of Crisis and Aging," *Jurisprudencija: Mokslo Darbu Zurnalas*, Vol. 18, pp. 1055–1080.
- Bodnar, K., and C. Nerlich (2022). "The Macroeconomic and Fiscal Impact of Population Aging," ECB Occasional Paper Series No. 296 (Frankfurt: European Central Bank).
- Borrallo, F., S. Parraga-Rodriguez, and J. Perez (2021). "Taxation Challenges of Population Ageing: Comparative Evidence from the European Union, the United States and Japan," Occasional Paper Series No. 2102 (Madrid: Banco de Espana).
- Bouman, R., R. Horne, S. Milasi, and N. Prasad (2015). "Ageing and Labor Market Implications for Lithuania," ILO Research Department Working Paper No. 6 (Geneva: International Labor Office).
- Breda, T., L. Haywood, and H. Wang (2022). "Equilibrium Effects of Payroll Tax Reductions and Optimal Policy Design," IZA Discussion Paper No. 15810 (Bonn: IZA Institute of Labor Economics).
- Cevik, S. (2024). "Climate Change and Energy Security: The Dilemma or Opportunity of the Century?" *Environmental Economics and Policy Studies*, Vol. 26, pp. 653–672.
- Cevik, S., and J. Ricco (2018). "No Buck for the Bang: Revisiting the Military-Growth Nexus," *Empirica*, Vol. 45, pp. 639–653.
- Cevik, S., N. Ilahi, K. Krogulski, G. Li, S. Mohona, and Y. Zhao (2023). "Climate Change Mitigation and Policy Spillovers in the EU's Immediate Neighborhood," IMF Working Papers No. 23/246 (Washington, DC: International Monetary Fund).
- Dufoil, C., E. Pereira, G. Chêne, M. Glymour, A. Alperovitch, E. Saubusse, M. Risse-Fleury, B. Heuls, J. Salord, M. Brieu, and F. Forette (2014). "Older Age at Retirement Is Associated with Decreased Risk of Dementia," *European Journal of Epidemiology*, Vol. 29, pp. 353–361.
- Garcia-Escribano, M., and C. Liu (2017). "Expenditure Assessment Tool (EAT)," Technical Notes and Manuals No. 17/06 (Washington, DC: International Monetary Fund).
- Gruber, J., and D. Wise (2002). "Social Security Programs and Retirement Around the World: Micro Estimation," NBER Working Paper No. 9407 (Cambridge, MA: National Bureau of Economic Research).
- Jappeli, T., and L. Pistaferri (2010). "The Consumption Response to Income Changes," *Annual Review of Economics*, Vol. 2, pp. 479–506.
- Kotschy, R., and D. Bloom (2023). "Population Aging and Economic Growth: From Demographic Dividend to Demographic Drag?" NBER Working Paper Series No. 31585 (Cambridge, MA: National Bureau of Economic Research).
- Kudrna, G., C. Tran, and A. Woodland (2022). "Sustainable and Equitable Pensions with Mean Testing in Aging Economies," *European Economic Review*, Vol. 141, 103947.

- Lee, R. (2016). "Macroeconomics, Aging, and Growth," in J. Piggott and A. Woodland (eds), *Handbook of the Economics of Population-Aging* (Amsterdam: North-Holland).
- Liebman, J., E. Luttner, and D. Seif (2008). "Labor Supply Responses to Marginal Social Security Benefits: Evidence from Discontinuities," NBER Working Paper No. 14540 (Cambridge, MA: National Bureau of Economic Research).
- Maestas, N., K. Mullen, and D. Powell (2023). "The Effect of Population Aging on Economic Growth, the Labor Force and Productivity," *American Economic Journal: Macroeconomics*, Vol. 15, pp. 306–332.
- Merkle, M., and G. Dolphin (2024). "Distributional Impacts of Heterogenous Carbon Prices in Europe," IMF Working Papers No. 24/x (Washington, DC: International Monetary Fund).
- Nedzinskiene, L., *et al.* (2021). "Structure and Distribution of Health Care Costs Across Age Groups of Patients with Multimorbidity in Lithuania," *International Journal of Environmental Research and Public Health*, Vol. 18, 2767.
- Sheiner, L. (2014). "The Determinants of the Macroeconomic Implications of Aging," *American Economic Review*, Vol. 104, pp. 218–223.
- Woodland, A. (2016). "Taxation, Pensions, and Demographic Change," in J. Piggott and A. Woodland (eds), *Handbook of the Economics of Population-Aging* (Amsterdam: North-Holland).

# TOWARDS A NEW NORMAL? PRODUCTIVITY AND COMPETITIVENESS IN LITHUANIA<sup>1</sup>

**1. Lithuania has faced a series of unprecedented shocks in recent years.** After proving resilient during the pandemic, the energy shock triggered by Russia's invasion of Ukraine has had a significant negative impact on the economy. Since 2022, income convergence has stalled with muted GDP growth, labor productivity has been negative and there has been a loss in international market shares. This has raised concerns about the economy's international competitiveness and long-term growth potential. At the same time, Lithuania is still facing long-standing structural challenges that may drag growth and convergence, such as adverse demographics<sup>2</sup>, low capital deepening, remaining inefficiencies in healthcare, education and the labor market, and risks associated with climate change. These, combined with a global environment that is more fragmented and with heightened geopolitical risks, creates significant challenges for a small open economy such as Lithuania.

**2. This paper looks at competitiveness in Lithuania over the past two decades with particular focus on the recent inflationary shock and the challenges ahead.** The first section presents stylized facts to explain external sector developments focusing on the last two years and contrasting Lithuania's performance with that of Estonia and Latvia. The second section identifies the drivers of recent developments disentangling structural from cyclical factors. The last section discusses implications for the future as well as remaining structural challenges.

## A. Stylized Facts

### Lithuania Experienced Fast Income Convergence Post-GFC Largely Driven by Productivity Growth Until the Recent Inflationary Shock

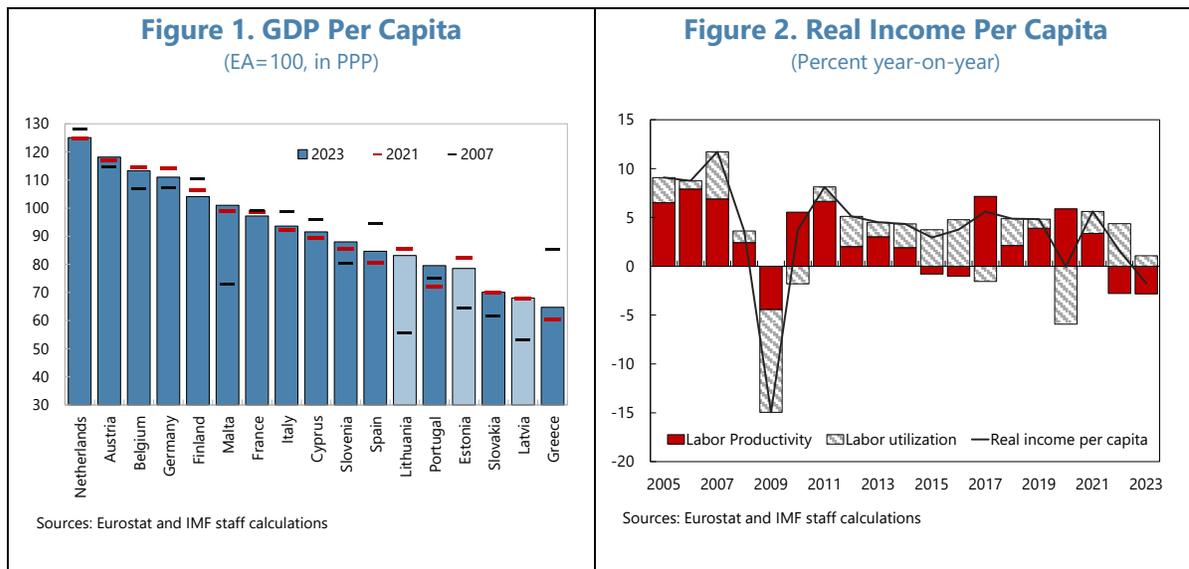
**3. Lithuania achieved fast income convergence towards the eurozone largely driven by productivity growth until the recent energy shock.** Since the global financial crisis (GFC) and until Russia's invasion of Ukraine, Lithuania recorded the largest GDP per capita growth in the euro area (EA), with annual growth close to 3 percent (0.3 percent in EA over the same period). The strong convergence process, with income per capita increasing from 55 to 86 percent of the EA average from 2007 to 2021, was largely driven by robust labor productivity growth (Figures 1 and 2).<sup>3</sup> The positive performance of productivity allowed a large increase in real wages without compromising the competitive position of Lithuania. By the end of 2019, Lithuania's export share was 0.17 percent of global exports, more than three times higher than in

<sup>1</sup> Prepared by Saioa Armendariz, who would like to thank Lukas Boer, Borja Gracia, Kazuko Shirono, the Bank of Lithuania, and participants in a conference at Vilnius University for helpful comments and suggestions, and Sadhna Naik for excellent research assistance.

<sup>2</sup> See Chapter 1.

<sup>3</sup> The analysis is focused on labor productivity growth, except indicated otherwise.

early 2000. This impressive performance—stronger than the other Baltic countries with flat shares since 2010—reflects a strong competitive performance particularly in services based on sustained high productivity growth. The painful but sizeable internal devaluation after the GFC set the basis for a strong export-led recovery that has been maintained until recently. This is the case even after the first set of trade sanctions imposed on Russia in 2015, which resulted in a 10 percent loss of export market share for Lithuania in a single year. This positive performance was not derailed by the pandemic given Lithuania’s strong macroeconomic position by end-2019, with twin current account and fiscal surpluses, low unemployment, and low public and private sector debt. Thus, the economy exited the pandemic with no visible scarring, with GDP recovering to the pre-pandemic trend by end-2021 in large part due to the flexibility of the economy—particularly the labor market, ample buffers, and unprecedented fiscal support.



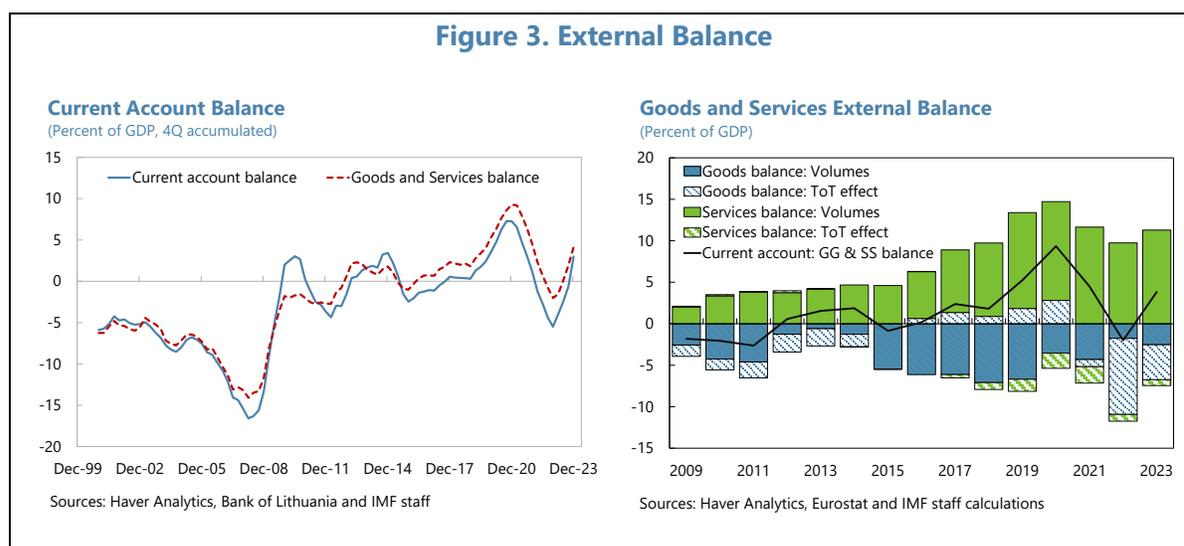
**4. The positive performance of the Lithuanian economy was interrupted by Russia’s invasion of Ukraine in early 2022.** In contrast to the rapid recovery after the pandemic, GDP has flattened since 2022, and so has income per capita. Despite the economic slowdown, and contrary to previous episodes, labor utilization—which comprises the activity rate, the employment rate and the hours worked per employee—has grown above economic activity, resulting in negative labor productivity growth for the last two years (Figure 2).

**The Current Account Strengthened to an All-time High Prior to the Pandemic**

**5. Lithuania moved from a large current account deficit pre-GFC to a sustained large improvement that has led to surpluses since 2018.** After the EU accession in 2004 and before the GFC, there was a built up of large imbalances that led to a real effective exchange rate (REER) appreciation, loss of competitiveness and a large deterioration of the current account—reaching a deficit of 15 percent of GDP in 2007. The post-GFC correction over the 2008-10 implied a significant internal devaluation that led to a quick export led recovery sustained without the reemergence of imbalances. After this period, the economy stabilized at a relatively balanced

external position, with the current account deficit averaging 0.1 percent of GDP in the following decade (Figure 3).

**6. When the pandemic hit, Lithuania’s external position was unprecedentedly strong with large and growing current account surpluses.** The current account in Lithuania jumped from a balanced position by end-2018 to a surplus above 4 percent of GDP in early 2020, supported by favourable terms-of-trade gains and increasing surpluses in services. The external position improved further during the pandemic due to some pandemic-specific exports (components related to vaccine production) that led to a historic, albeit temporary, surplus of around 10 percent of GDP.

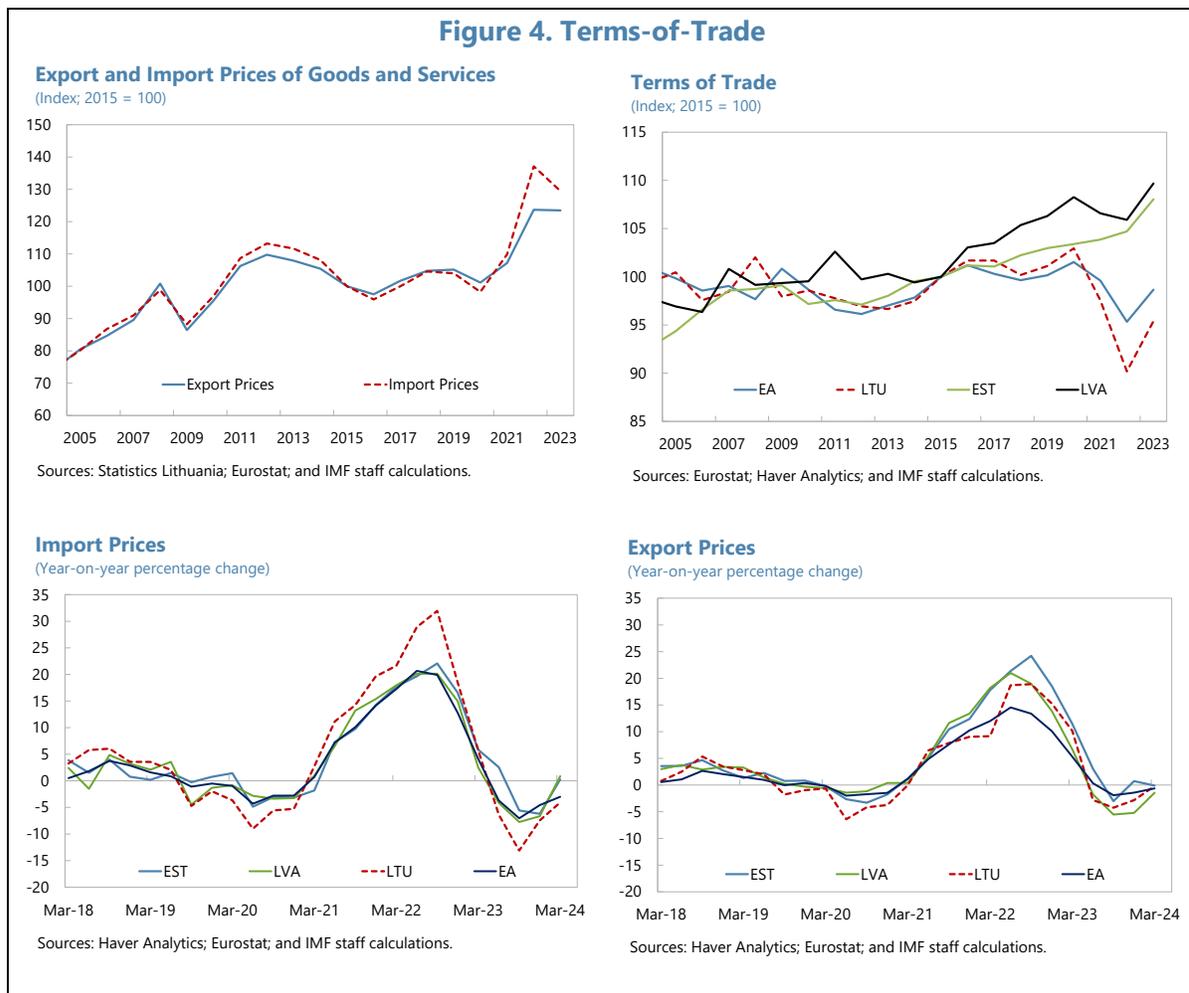


### Lithuania Suffered the Worst Terms-of-Trade Deterioration of the Eurozone in the Last Two Years in Sharp Contrast to the Other Baltic Economies

**7. Over the last two years, Lithuania recorded the largest negative terms-of-trade shock in recent history.** When export prices grow faster (slower) than import prices, the terms-of-trade increases (deteriorates), and the real income of domestic producers improves (worsens) as fewer exports are needed to pay for a given volume of imports (Box 1). Export and import prices in Lithuania have moved in parallel since the EU accession in 2004,<sup>4</sup> keeping terms-of-trade relatively stable and following a similar pattern as other Baltic economies. However, boosted by the large increase in energy prices in mid-2021 and particularly in 2022 after Russia’s invasion of Ukraine, import prices increased considerably above export prices resulting in a significant deterioration of the terms-of-trade. Despite the easing of energy prices, by the end of 2023 the terms-of-trade in Lithuania was still 7.3 percent below its pre-pandemic level.

<sup>4</sup> From 1995 to 2003, the terms of trade improved by 19 percent, and by 30 percent by 2004

**8. The strong external position was interrupted by the terms-of-trade shock in 2022, resulting in the largest current account deficit since the GFC.** The strong external balance recorded by Lithuania since 2019 abruptly deteriorated in 2022, due to the large impact of high energy prices. While there was a strong correction of trade volumes, price effects dominated and led to a large deterioration of the current account to a deficit not seen since 2008 (Figure 3) with a partial correction in 2023. All this resulted in abrupt fluctuations in the current account from a large surplus to a deficit of around 6 percent of GDP in 2022, swinging back into a surplus of close to 3 percent of GDP in 2023 as the terms-of-trade improved and the service balance continued to expand (Figures 3 and 4).

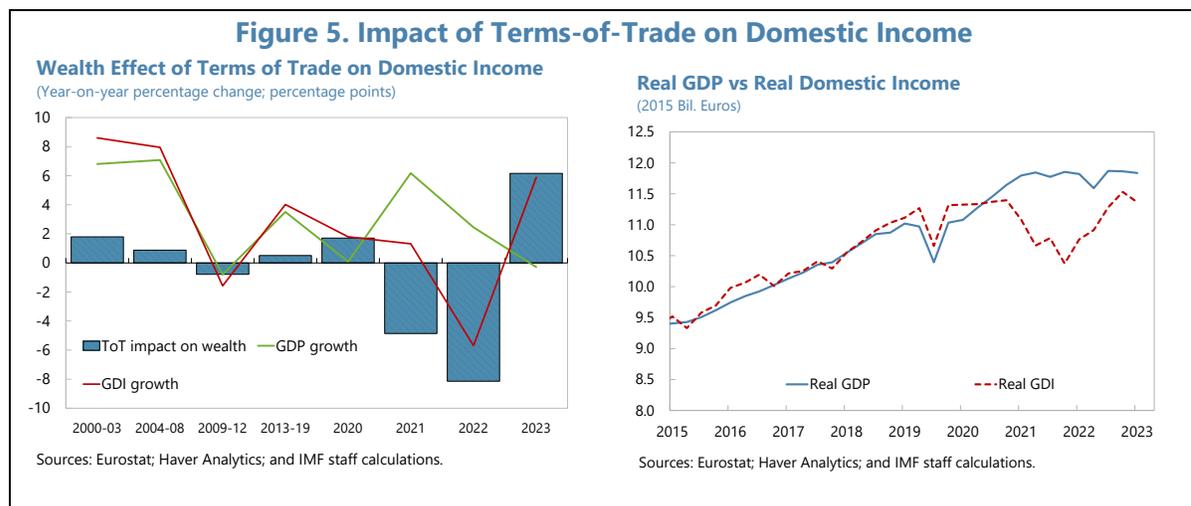


**9. In sharp contrast to Lithuania, the terms-of-trade have not deteriorated in Estonia and Latvia over the last two years due to a larger pass-through of import prices.** Despite following a similar path for more than a decade, the energy shock had a very different impact on Estonia and Latvia’s terms-of-trade (Figure 4). On the one hand, import price growth was more intense in Lithuania than in Estonia and Latvia—at its peak in the third quarter of 2022, the increase in import prices in Lithuania was around 10 percentage points higher. On the other hand, export prices in Lithuania increased later in response to the energy shock (around two

quarters) and the increase was lower than in the other Baltic economies, particularly Estonia. As a result, higher international prices were more than fully passed-through to export prices in Estonia and Latvia, improving the terms-of-trade in these two countries mitigating the impact on domestic income (Box 1).

**10. The terms-of-trade-shock had a big negative impact on real income in Lithuania.**

Total real income of residents is driven not only by real GDP but also by the rate at which exports can be traded for imports. If the terms-of-trade improve, fewer exports are needed to pay for a given volume of imports. Or, put it differently, less exports are needed for the same amount of imports, leaving more domestic production of goods and services for consumption or investment. Historically, real domestic income in Lithuania has been slightly above GDP, highlighting the increased competitiveness of the economy. During 2021-22, on the back of the strong terms-of-trade deterioration, real gross domestic income fell 4.5 percent and was 10 percent below real GDP. This represented a greater drop than that experienced during the pandemic in 2020. With the partial correction of the terms-of-trade in 2023, this has largely reversed although real domestic income still remains 4 percent below GDP.



**Box 1. Wealth Effect of Terms-of-Trade on Domestic Income**

To capture the welfare effect of changing terms of trade, real GDP growth can be complemented with real gross domestic income (GDI). According to the ESA 2015 methodology, real GDI can be derived by adding what is called *trading gain/loss* ( $T$ ) to volume figures on GDP.

$$GDI_t = GDP_t + T_t,$$

with the trading gain/loss from changes in the terms of trade,  $T$ , defined as:

$$T_t = \left[ (X_t - M_t) / P_t - \left( X_t / P_t^x - M_t / P_t^m \right) \right]$$

which is the difference between the current external balance deflated by a price index,<sup>1</sup> and the balance between the deflated value of exports ( $X_t / P_t^x$ ) and the deflated value of imports ( $M_t / P_t^m$ ), with  $X_t$  and  $M_t$  representing nominal exports and imports, and  $P_t^x$  and  $P_t^m$  their respective prices.

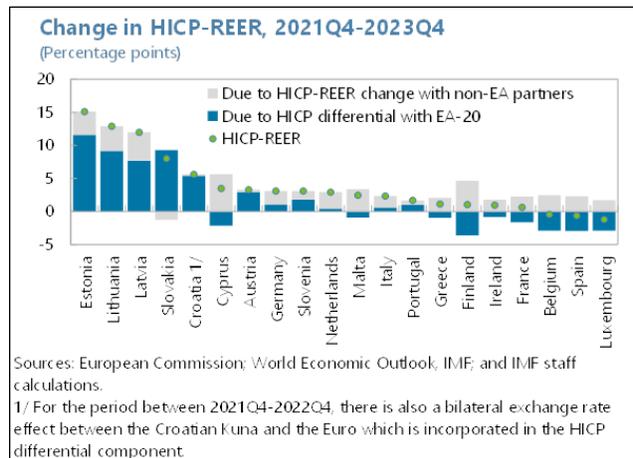
**The terms of trade is driven by both exogenous and endogenous factors.** The terms of trade are usually exogenous for a small open economy, being mainly driven by developments in world prices. The larger the exposure of the economy to international trade flows, the larger the impact of terms-of-trade changes on domestic real income growth. However, terms-of-trade can also reflect endogenous factors, to the extent that the country’s exporters become more competitive, for example, this would improve the country’s terms-of-trade.

<sup>1</sup> The choice of an appropriate deflator P to calculate trade balances is not a simple one. In circumstances in which there is uncertainty about the choice of deflator an average of the import and the export price indices is likely to provide a suitable deflator (ESA 2015).

**High Inflation Differentials and Labor Costs Led to a Significant REER Appreciation Over 2021–22, Similar in All the Baltics**

**11. The large inflation differential with trading partners and high nominal labor costs in the Baltics over the last two years have resulted in a sizeable appreciation of the REER.**

The REER is generally related to a country’s competitiveness by accounting for changes in costs (unit labor cost (ULC) based) or prices (HICP based) relative to other countries. When increases in the REER are not compensated by productivity growth, it signals a loss of competitiveness against trading partners, potentially leading to a deterioration of the external position. The severity of the energy shock in the Baltics, larger than in other countries in Europe, resulted in the highest inflation rates in the eurozone. This combined with large nominal wage growth—broadly similar across the three

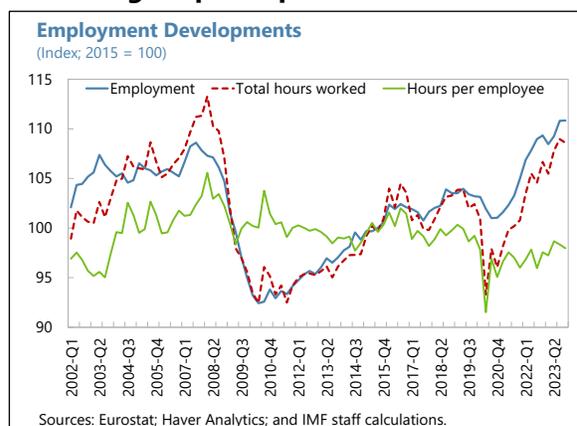


economies too—and negative labor productivity, eroded external competitiveness. This is reflected in the largest REER appreciation in the EU, around 10-15 percent.

### **Labor Productivity Growth Has Declined in the Last Two Years in Lithuania While Labor Intensity Has Increased in Contrast to Previous Downturns**

#### **12. Contrary to previous downturns, negative labor productivity growth in 2022 and 2023 coincided with strong employment growth and higher participation rate.**

Traditionally, economic downturns in Lithuania are characterized by adjustments in employment, with relatively constant hours work per employee, offsetting the impact of lower production on labor productivity—measured as the ratio between production and employment. During the last two years, labor productivity has fallen by 5 percent until end-2023, accumulating 7 quarters of negative growth. However, contrary to the GFC, the fall in labor productivity has been intensified by a



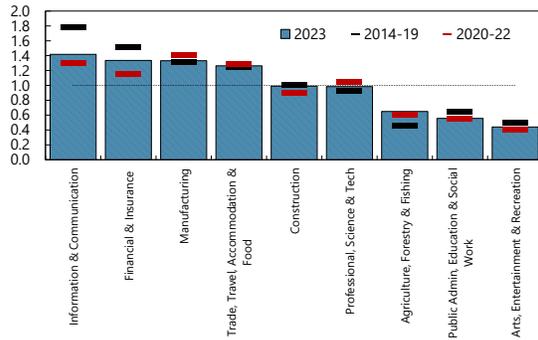
tight labor market with historically high employment and participation rates in 2023. At the same time, labor utilization—measured as hours per employee—has not yet recovered from the decrease experienced during the pandemic. This can be partly explained by the stronger recovery of labor-intensive sectors that were more affected by the lockdowns, the perceived temporariness of the inflationary shock, as well as structural factors in the labor market including large skill mismatches and scarcity of skilled labor, and the acceleration of automation in the manufacturing sector in response to the recent cost-shocks.

#### **13. In Lithuania, labor productivity growth has been driven by sectoral developments with positive contributions from both tradeables and non-tradeables until recently.**

Aggregate productivity results from sectoral productivity developments, weighted by their labor share. The shift-share analysis is a commonly used methodology that allows to break down labor productivity growth into three different effects: labor productivity within industries, the impact of the shift of labor between industries with different productivity and an interaction term between these two factors (the last two terms can be aggregated to measure the total effect of labor shift—shift effect—on productivity) (Annex 1). Until the recent shock, labor productivity in Lithuania was largely explained by positive contributions from both tradables and non-tradeables with little quantitative impact from sectoral labor shifts (away from manufacturing and into services). However, despite the minor effect of labor reallocation on aggregate productivity, it also reflects an increasing allocation of employment in the non-tradeable sectors since 2022 (Figure 6).

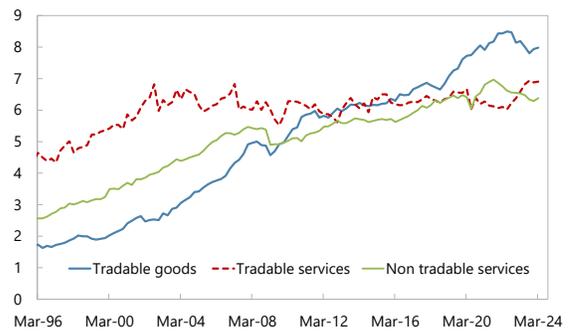
**Figure 6. Sectoral Composition of Labor Productivity**

**Labor Productivity**  
(National average = 1)



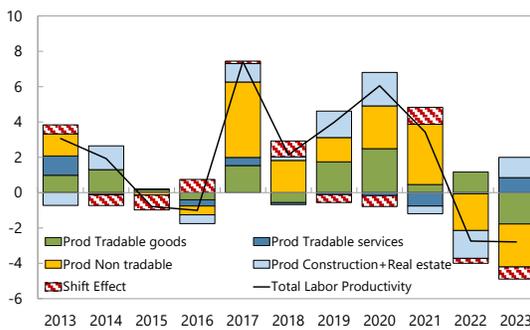
Sources: Eurostat; Haver Analytics; and IMF staff calculations.

**Labor Productivity**  
(2015 constant Euros)



Sources: Eurostat; Haver Analytics; and IMF staff calculations.

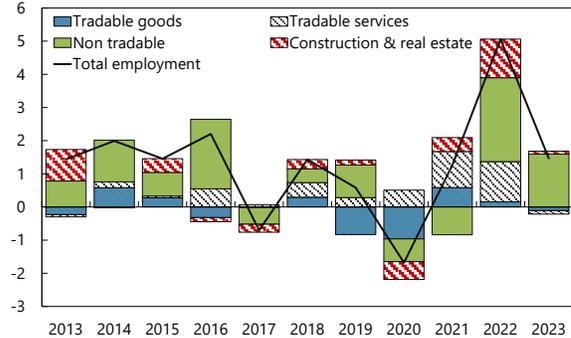
**Labor Productivity Growth: Shift-Share Decomposition**  
(Percent of GDP; period average)



Sources: Eurostat; Haver Analytics; and IMF staff calculations.

**Employment**

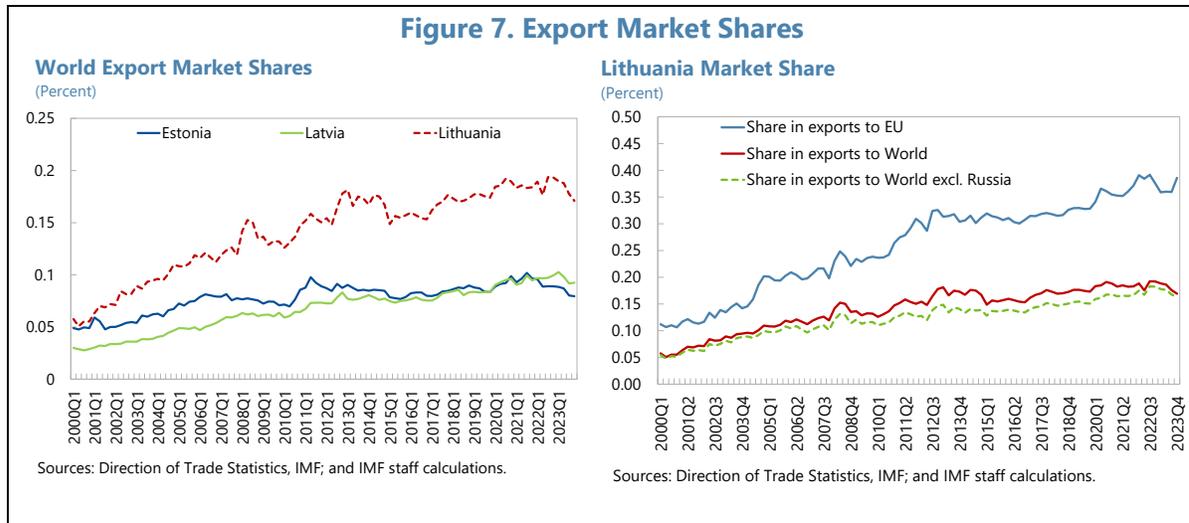
(Percent year-on-year and percentage points)



Sources: Haver Analytics, Eurostat and IMF staff

**Export Market Shares Declined Over 2021-22 For The Three Baltic Countries With Lithuania Suffering The Smaller Decline Despite Facing Larger Terms-Of-Trade Shock**

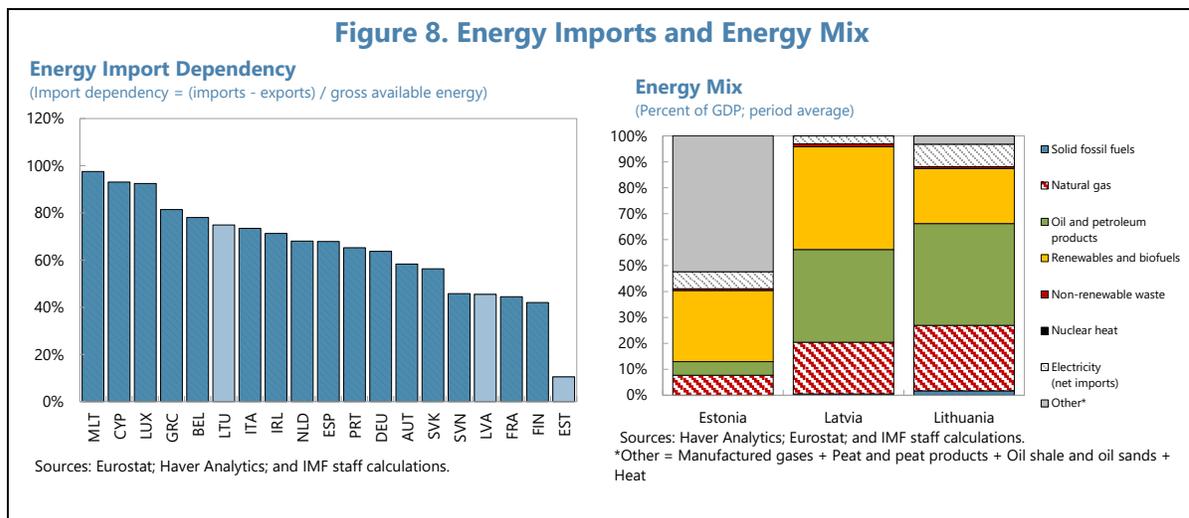
**14. Lithuania’s loss of export market share over the last two years was smaller than in Latvia and Estonia, despite facing worse terms-of-trade shock.** Market share losses over 2021Q3 to 2023Q4 were moderate in Latvia and Lithuania (around 7 percent), and particularly large in Estonia (23 percent). This is the case despite Lithuania suffering a much larger terms-of-trade deterioration and similar inflation differential with trading partners, resulting in similar real exchange rate appreciation, see above. In the case of Lithuania the loss is mostly concentrated outside the EU and comes after a decade of steady gains. In contrast, Estonia and Latvia have experienced relative constant market shares in the decade prior to 2021.



## B. Disentangling Structural from Cyclical Factors of Recent Developments

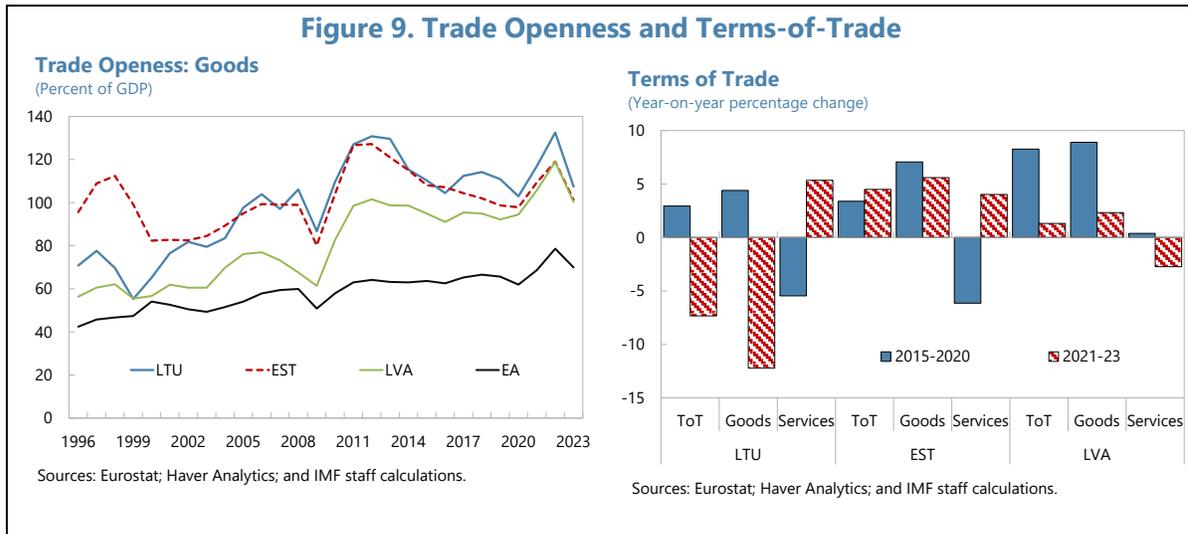
### Factors Behind Different Terms-of-Trade Shocks in the Baltics

**15. The energy mix helps explain the higher growth of import prices in Lithuania in 2022 amongst the Baltic countries.** With one of the largest energy import dependency ratios in the eurozone, Lithuania was more exposed to the strong increase of energy prices. In addition, the energy mix in Lithuania is more reliant on gas, oil and electricity; while Latvia and Estonia show a more diversified profile, including a larger use of renewables and other energy sources with less volatile prices over this period.



**16. A high trade-openness has made Lithuania more vulnerable to external price shocks.** Lithuania made significant gains in competitiveness since independence, with trade

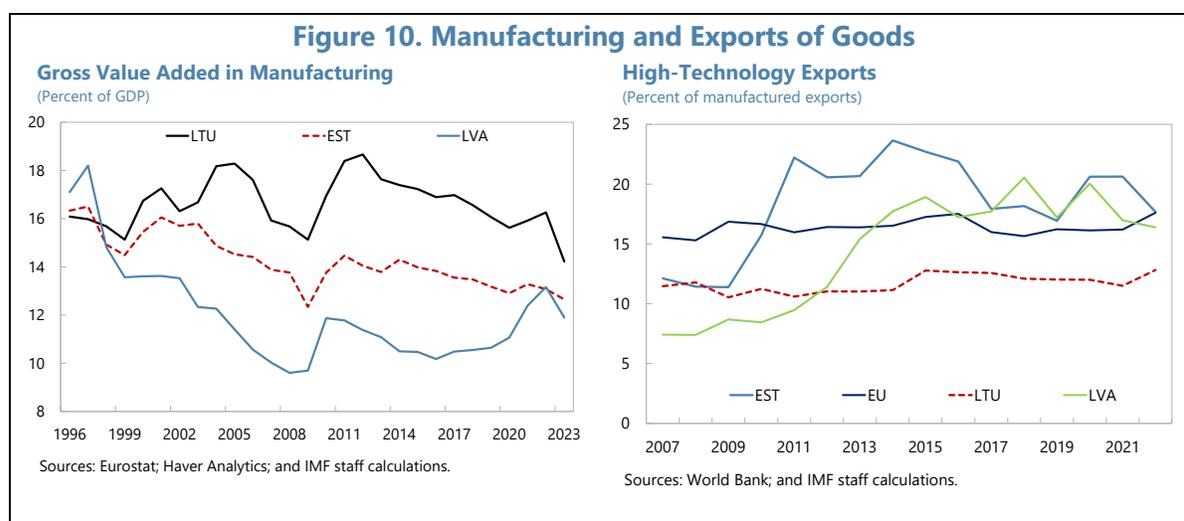
openess<sup>5</sup> over 1995-2013 moving from 84 to 154 percent of GDP, remaining at around that level since<sup>6</sup> catching up to Estonia and leaving Latvia behind. Moreover, the large trade openness in Lithuania is particularly higher than in Estonia and Latvia in goods (110 percent of GDP vs 104 and 94 in Estonia and Latvia, respectively), where the deterioration of Lithuania’s export-to-import price ratio was concentrated.



**17. A larger share of manufacturing in Lithuania combined with lower technological content made exported goods more reliant on price-competitive factors.** While the bulk of the negative terms-of-trade shock was initially concentrated in overall goods, the effects have been more intense and persistent for the manufacturing sector, where the terms-of-trade remain 15 percent below its prepandemic level. This factor helps explain the larger and more persistent impact in Lithuania compared to Estonia and Latvia, with a larger share of the manufacturing sector in domestic value added. In addition, non-price competitive factors may have also helped Estonian and Latvian exporters pass-through higher import costs into final goods prices, with a larger technological content of manufacturing exports than Lithuania (Figure 10).

<sup>5</sup> Measured as the share of exports and imports on GDP.

<sup>6</sup> The 2022 peak is related to booming external prices as the trade openness is measured in nominal terms.



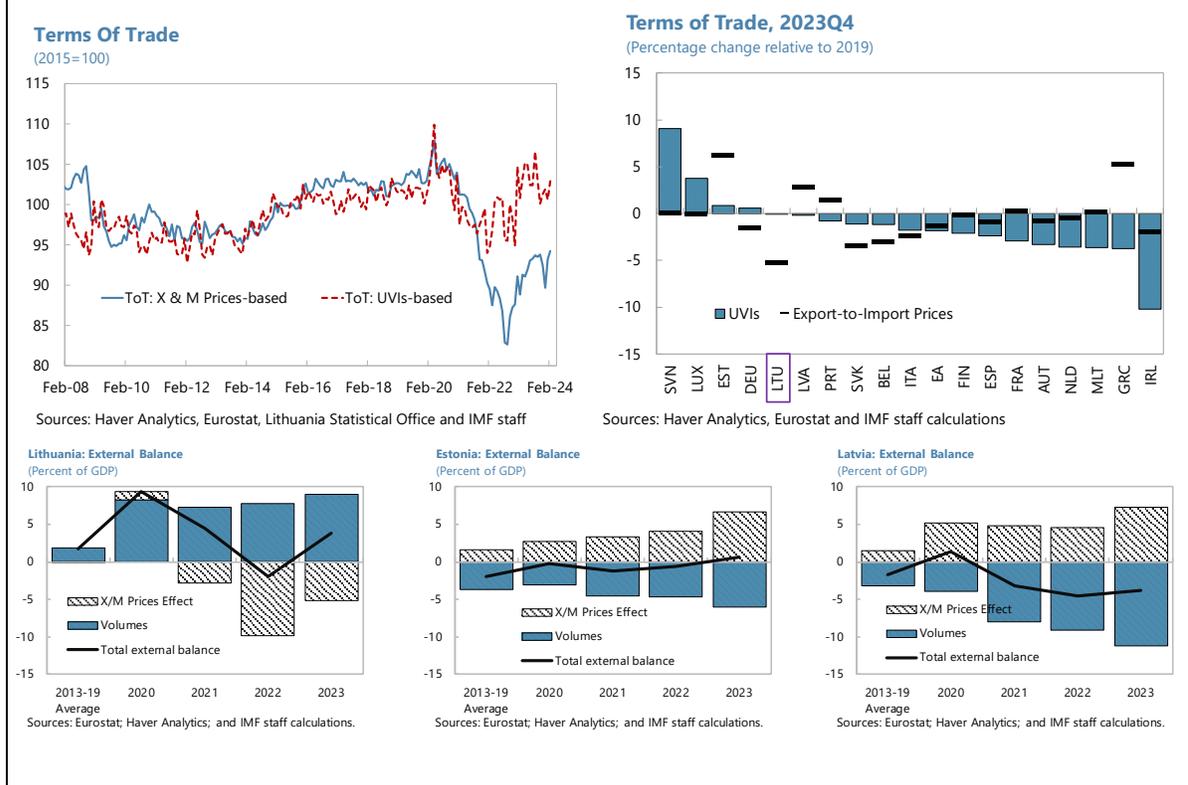
### The Economy Has Already Largely Adjusted to New Relative Prices

**18. In contrast to Estonia and Latvia, price effects explain most of the deterioration of the trade balance in Lithuania during 2021-22.** Large relative price movements have triggered shifts in demand both at home and abroad. The deterioration of the trade balance by 6 percent of GDP in 2022 in Lithuania is largely driven by price developments, while volume effects helped narrow the deficit. This is in contrast with Estonia and Latvia, where given the mild improvement in the terms-of-trade over this period, price effects tend to improve the trade balance while volumes push in the opposite direction—Latvia experienced a moderate overall trade balance deterioration of 1.2 percent of GDP and Estonia a small improvement of 0.6 percent of GDP (Figure 11).

**19. The endogenous demand adjustment that has already taken place in Lithuania has largely absorbed the permanent component of the terms-of-trade shock.** This is reflected in an alternative indicator to the terms-of-trade based on administrative data, the so-called *Unit Value Indexes (UVIs)*. The UVIs are not price indexes since their changes include price and quantity changes. Thus, the UVIs provide a contemporaneous measure of the direct impact of the terms-of-trade shock on the economy.<sup>7</sup> Under this measure, the terms-of-trade in Lithuania was fully restored by end-2023. In Estonia and Latvia, the observed improvement in the terms-of-trade measured with export and import prices is mostly eliminated when using UVIs itsbalance. This is consistent with the higher pass-through of import to export prices in these two countries that has resulted in a larger increase in import than export volumes and lower export shares.

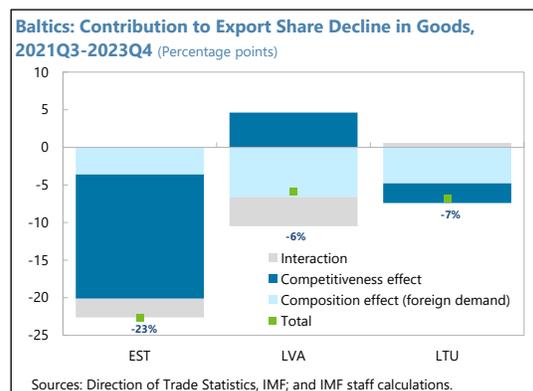
<sup>7</sup> Unit value indices are compiled from detailed import and export merchandise trade data derived from administrative customs documents. Export and import prices are compiled price indices using data from surveyed establishments on the prices of representative items exported and imported. The surveyed prices should be of items that are defined according to detailed specifications, so that the change in price of the same item specification can be measured over time ([Source](#)).

**Figure 11. Terms-of-Trade and External Balance**



**The Decline in Market Shares in Lithuania Is Mostly Driven by Cyclical Factors Unrelated to Competitiveness**

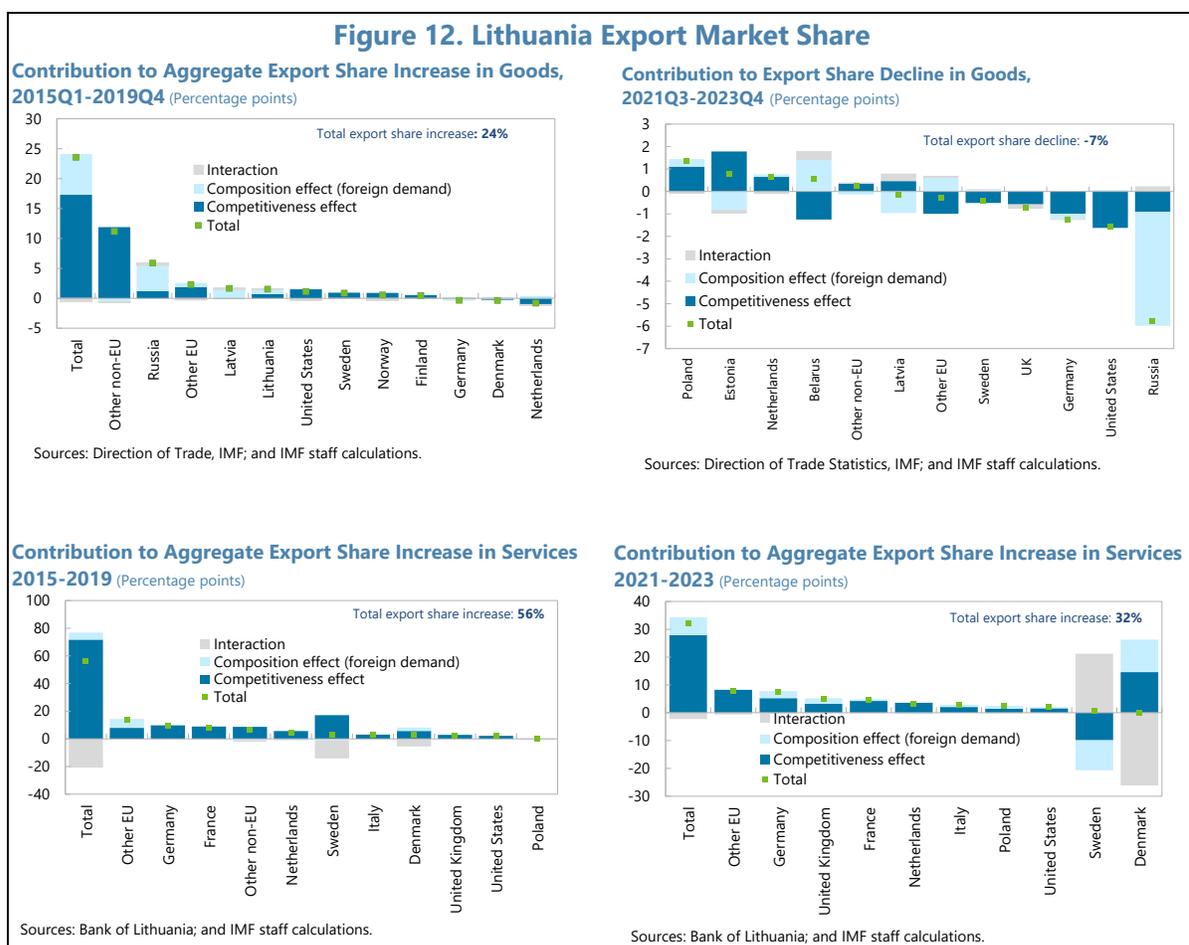
20. The moderate loss in export shares of goods in Lithuania mostly reflects demand developments in trading partners, particularly sanctions to Russia and Belarus. Using a market-shift methodology, we decompose changes in market shares into three different components: *intensive margins*—or competitiveness effect, that measures the portion of the change of market share that is attributable to a change in penetration margins—*extensive margins*—or composition effect, that measures the portion of the change in market share that is attributable to the change in demand from trading partners relative to the rest of the world—and the *interaction* of both factors.<sup>8</sup> The results for Lithuania suggest that the loss in export shares of goods reflects mostly demand developments in trading partners—particularly the impact of sanctions on Russia and Belarus, a large share of which are re-exports with little value added—



<sup>8</sup> See Annex II.

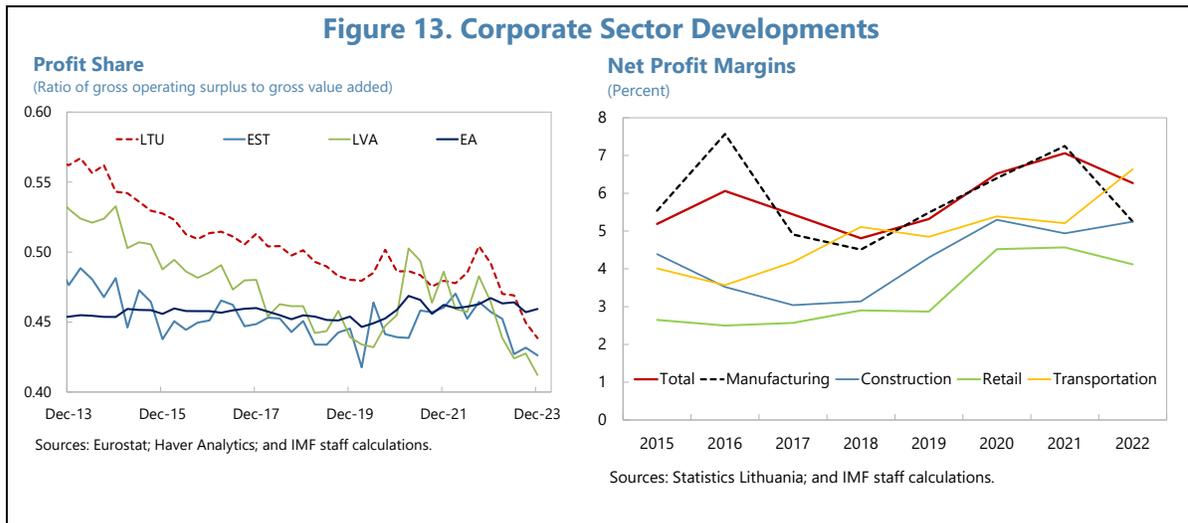
rather than competitiveness factors. In fact, around two thirds of the market share loss is attributed to depressed external demand with only one third driven by competitiveness. This contrasts with the strong deterioration of the market share in Estonia, mostly explained by losses in competitiveness.

**21. The loss of export shares was concentrated on goods, while services continued the strong pre-pandemic trend.** Despite the negative environment in 2021-23, Lithuania continued to make gains in external markets of services, where its export share increased by 32 percent mostly in the EU and the UK (Figure 11). As it was the case in the pre-pandemic period, exports of services have experienced a robust expansion mostly driven by competitiveness gains. This has translated into a gradual structural shift of the economy towards higher value-added services, such as Information and Communication and Financial Services (Table 1) from low-tech manufacturing, helping absorb the impact of the recent terms-of-trade shock (Figure 8).



## Corporates Capacity To Absorb The Cost Shock In Lithuania Helps Explain The Moderate Loss In Market Shares

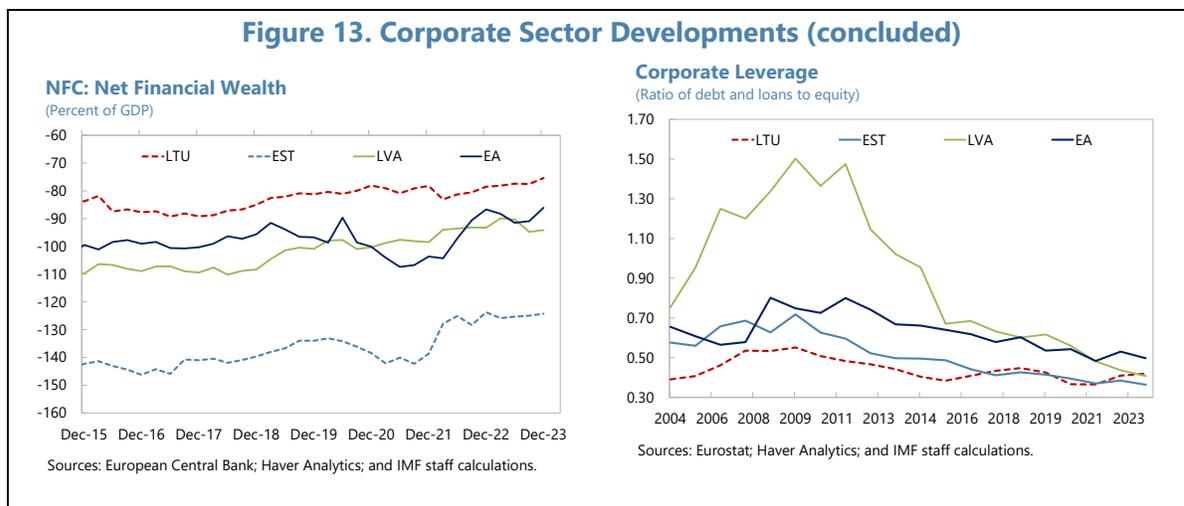
**22. A stronger financial position of Lithuanian corporates has helped absorb a larger shock than Latvia and Estonia and preserve market shares.** Lithuanian non-financial corporates strengthened their balance sheet significantly since the GFC.<sup>9</sup> Furthermore, with a strong resilience to the impact of the pandemic and unprecedented public support in 2020 and 2021, corporates reduced their leverage and improved their liquidity and solvency compared to 2019.<sup>10</sup> Thus, they enjoyed a strong balance sheet position and historically high profitability when the inflationary shock occurred. This allowed exporters to partially absorb the shock avoiding a big impact on price-competitiveness—as can be seen by the larger negative impact on manufacturing profit margins. Despite the expected continued deterioration of profitability in 2023, net profit margins in 2022 were, on average, still above pre-pandemic levels. In the case of the manufacturing sector, the strong correction in 2022 has largely undone the increase in profitability observed in 2020-21.



<sup>9</sup> See Country Report No. 2019/252, Annex II, “A Stock-Flow Analysis of the Boom, Bust, and Recovery”.

<sup>10</sup> See Country Report No. 2021/192.

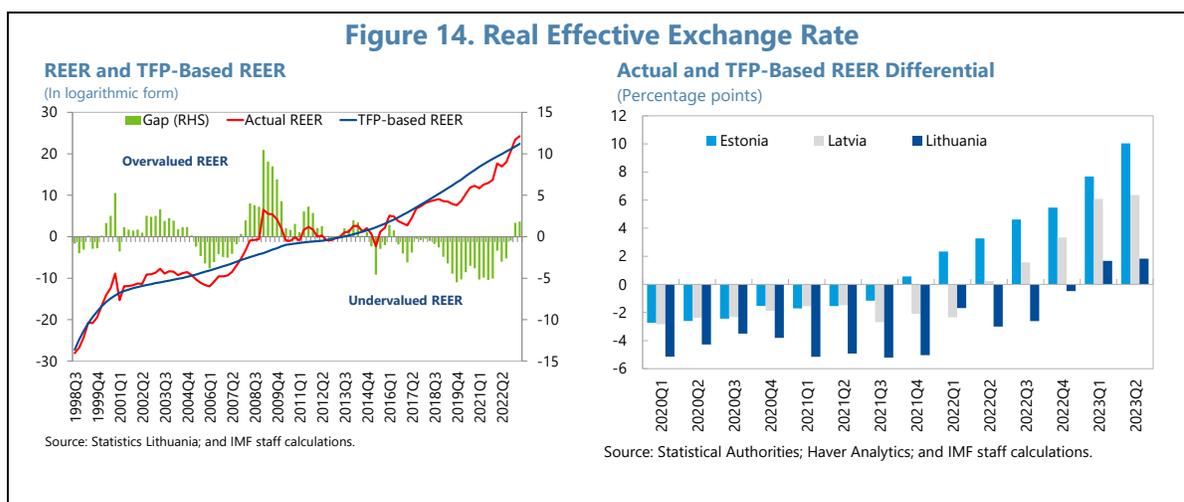
**Figure 13. Corporate Sector Developments (concluded)**



**An Undervalued REER Has Helped Absorb Permanently Higher Input Costs, Including Labor, in Lithuania but Created an Overvaluation in Estonia and Latvia**

**23. The appreciation of the REER in Lithuania over the last two years has eliminated the overvaluation with which it entered the energy shock moving it close to equilibrium.** In the case of Lithuania, the large current account surplus recorded before the pandemic was, partly, a result of an undervalued REER given productivity dynamics and other fundamentals (Box 2). Thus, the appreciation of the last two years, while having a negative impact on competitiveness, has moved Lithuania’s external position closer to equilibrium. From a macroeconomic perspective, the initial undervaluation of the REER allowed Lithuania to absorb the cost-shock with significantly less pass-through to export prices than Estonia and Latvia which, at the same time, resulted in a lower decline in market shares as discussed above. While the appreciation of the REER for Latvia and Estonia is quantitatively similar, it resulted in a significant overvaluation, particularly for Estonia.

**Figure 14. Real Effective Exchange Rate**



### Box 2. The Balassa-Samuelson Effect in the Baltics<sup>1</sup>

Using estimates of TFP and potential GDP for the three Baltic economies by imposing a standard Cobb-Douglas production function, we assess the Balassa-Samuelson hypothesis testing whether there is a long-run relationship between TFP and REER.

- Impose a Cobb-Douglas production function on quarterly data to estimate a series for TFP. In particular, the TFP series is obtained as a residual from:

$$\ln a_t = \ln y_t - (1 - \alpha) \ln k_t - \alpha \ln l_t,$$

Where  $a_t$ ,  $y_t$ ,  $k_t$  and  $l_t$  are the levels of TFP, real GDP, the stock capital, and the labor input, respectively, components  $y_t$  and  $k_t$  are both in millions of 2015 euros, while  $l_t$  is measured in thousands of hours-worked per quarter. The stock of capital was obtained using quarterly investment flows and estimates of the (annual) capital stock and its depreciation rate from the European Commission. The resulting series was then multiplied by a measure of industrial capacity utilization to produce an estimate of the effective capital stock,  $k_t$ . The labor input was constructed by multiplying the total number of employees ( $e_t$ ) by the average number of hours-worked per employee ( $h_t$ ). For the labor share,  $a_t$ , a smooth trend of the ratio of compensation of employees to GDP was used.

- Apply a *Kalman-based multivariate filter on real GDP data and indicators of economic slack*. The TFP series obtained in step 1 contains both cyclical (e.g., short-term developments such as labor hoarding, short-term skills mismatch etc.) and structural (i.e., low-frequency effects of institutions, business environment and practices, education, R&D etc.) elements. To isolate the structural component of TFP, an estimate of potential GDP ( $\bar{y}_t$ ) was obtained from a state-space decomposition of cycle and trend in GDP using as signal variables monthly confidence indices (in consumption, industry, construction, and retail sales), the unemployment rate, and industrial capacity utilization to help pin down the cyclical component. The structural TFP series,  $\bar{a}_t$ , resulted from the production function equation applied to HP-filter trends for effective capital ( $\bar{k}_t$ ), employment ( $\bar{e}_t$ ), and hours-worked ( $\bar{h}_t$ ).
- Estimate a *cointegration relationship between the TFP and the REER to assess the Balassa-Samuelson Effect*. After confirming that both series are integrated,<sup>2</sup> Johansen cointegration tests found at least one cointegrating relationship between the two variables in several different specifications about exogenous regressors in the cointegration vector and/or short-term dynamics equations. This result, confirmed for all three Baltic countries, is consistent with the Balassa-Samuelson hypothesis, indicating a long-run relationship between TFP and REER. It also indicates that a cointegration relationship between TFP and the REER can be estimated, where the fitted values can be used to construct a measure of the TFP-based REER as the implied long-term relationship between the two series. The comparison between actual and TFP-based REER can provide an indication of how large deviations of the Balassa-Samuelson hypothesis are with implications for external price-competitiveness. For instance, negative (positive) gaps between actual and TFP-based REER indicate a price-competitiveness edge (disadvantage).

<sup>1</sup> Prepared by Carlos Alberto de Resende and Alice Fan.

<sup>2</sup> Augmented Dickey-Fuller tests with a test specification including both a constant and a deterministic linear trend, and lags selected automatically based on Schwartz information criteria.

## C. What Can Be Expected In The Future?

### 24. Some of the factors that explain the negative performance are expected to partially correct going forward:

- With external demand recovering, market share losses in countries other than Russia or Belarus, should recover. For the latter, the loss in market access is likely to be permanent.
- As the economy recovers, labor productivity is expected to grow again. The strong performance of the labor market in the last few years is largely explained by labor hoarding by companies. Going forward, as the economy recovers, so will hours work resulting in output growing faster than employment. With low unemployment and negative demographic pressures on the labor force over the medium-term, hours worked may increase closer to pre-pandemic levels.
- Inflation is now below the euro area average. While below euro area inflation is projected to persist for a few months, it will only partly compensate for the permanent price level shock experienced over the last two years. With inflation moderating and strong wage growth slowing down, real wages are starting to ease to rates more consistent with productivity.
- With the reversal of the terms-of-trade shock, real domestic income is recovering and the gap with real GDP is narrowing. This correlates with the recovery of real disposable income, supported by high wage growth and easing inflation since mid-2023.

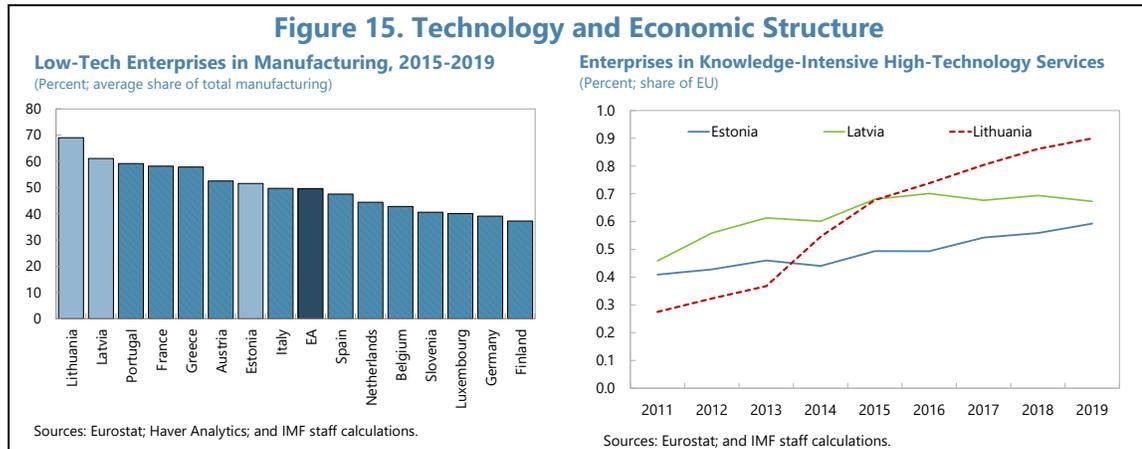
### 25. While there is little expected impact of the recent shock on the growth potential, Lithuania faces significant global and domestic structural challenges. International structural headwinds (gloeconomic fragmentation and heightened geopolitical risks) add to long-standing domestic structural issues:

- *The economic structure remains less sophisticated than the euro area.* As it the case also in Estonia and Latvia, Lithuania is gradually transitioning towards a more service-oriented economy. The share of services in the economy has gradually but steadily increased since the GFC reaching a historical high in 2023. However, the share of manufacturing in GDP is still above the euro area.<sup>11</sup> Moreover, the manufacturing sector in Lithuania is dominated by low-tech industries with a larger share on GDP, employment and concentration of enterprises than the eurozone average, and a smaller share of high and medium high-technology intensive industries.<sup>12</sup> This explains the large manufacturing technological gap with peers in the euro area. By contrast, high-tech and knowledge intensive services have shown remarkable dynamism since 2013—the number of enterprises in this sector more than

<sup>11</sup> In 2023 the share of manufacturing in Lithuania was slightly below the EA due to temporary factors.

<sup>12</sup> See Eurostat for the detailed classification of activities ([here](#) and [here](#)).

double over 2013-2019 recording the largest growth in the EU. This has supported aggregate productivity growth and partly explains the increasing trade surpluses in services.

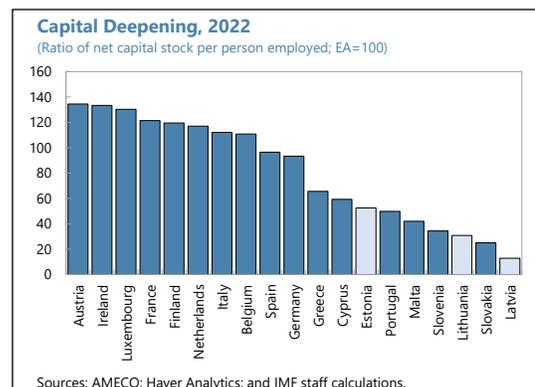


### Table 1. Lithuania: High-Technology Sectors: Lithuania versus EA (2015-17)

	Share over total GVA		Share over total employment	
	LTU	EA	LTU	EA
<b>MANUFACTURING</b>	<b>19.1</b>	<b>17.1</b>	<b>15.6</b>	<b>15.5</b>
High-technology	1.2	2.6	0.4	1.1
Medium-high-technology	3.4	6.8	1.9	4.9
Medium-low-technology	3.6	3.7	3.4	4.1
Low-technology	10.2	3.9	10.0	5.3
<b>SERVICES</b>	<b>66.9</b>	<b>73.5</b>	<b>67.0</b>	<b>72.6</b>
High-tech knowledge-intensive services	3.8	4.9	2.8	3.2
Knowledge-intensive market services*	5.7	9.1	5.7	6.5
Knowledge-intensive financial services	2.1	4.9	1.7	2.9
Other knowledge-intensive services	16.5	23.4	25.3	28.2
Less knowledge intensive services	39.1	31.2	32.1	32.0

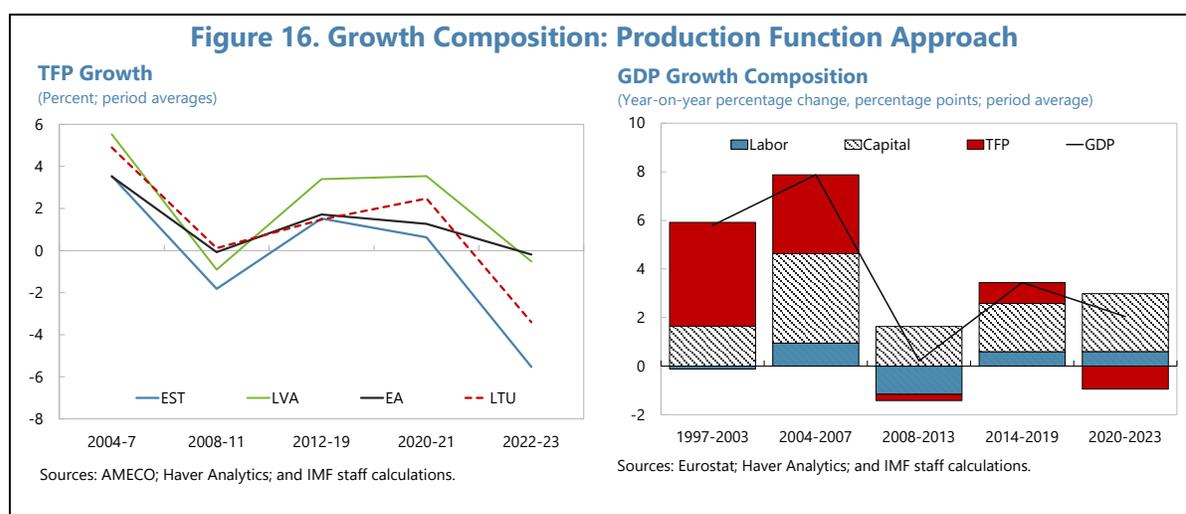
\*Exc knowledge-intensive financial services and high-tech serv

- Capital investment has been growing fast, but capital deepening is still low. Despite the strong performance over the last decades, the capital intensity of the economy—a necessary but not sufficient condition for economic development—remains low compared to European peers.<sup>13</sup>



<sup>13</sup> Capital intensity or capital deepening is defined as the stock of capital per unit of labor used in production.

- *Lithuania has one of the highest skill mismatches in Europe.* Lithuania suffers from labor shortage of high-skilled workers and oversupply of medium and low skilled workers, with shortcomings in the education system playing a key role in this. In particular, there is a gap between educational outcomes and the skills demanded by the labor market. Finding workers with the right skills appears to be a significant constraint for over 40 percent of firms (IMF, 2019). High emigration and certain restrictions on non-EU workers, as well as limited participation in life-long learning also explain the lack of suitable labor in Lithuania (OECD, 2018a). Addressing inefficiencies in education, healthcare and the labor market in the context of a rapidly aging population remains key.
- *TFP growth has slowed down since the GFC.* As in other EU economies, TFP growth has eased in Lithuania during the last decades from averaging around 5 percent before the GFC to 1.5 percent in 2013-19. This trend was even more pronounced on the back of the the energy shock, with TFP growth falling by -4 percent in 2022-23.



**26. Some factors play a key role in shaping TFP growth.**<sup>14</sup> First, TFP growth is largely driven by the extent to which countries are involved in scientific and technological innovation. Second, the technological gap—measured by a country’s TFP distance to the frontier—is a highly significant factor determining TFP growth as countries move towards the technological frontier by adopting innovations. Third, increased investment in information and communication technology (ICT) capital and research and development (R&D) reinforces TFP growth. Finally, the effect of human capital skills—measured by the intensity of high-skilled labor at the industry level—becomes more important as a country gets closer to the technological frontier, especially in non-tradable sectors. From a policy perspective, the priority is to create a conducive environment to raise business investment and improve capital allocation by modernizing regulations, lowering trade barriers, increasing public investment in physical infrastructure,

<sup>14</sup> Cevik, S., S. Naik, and K. Primus (2024). “Chasing the Dream: Industry-Level Productivity Developments in Europe,” IMF Working Paper No. 24/x (Washington, DC: International Monetary Fund).

strengthening capital accumulation through education and healthcare, and provide incentives for capital investment and R&D.

**27. Maintaining the competitiveness of the economy and ensuring fast income convergence will require productivity-enhancing structural reforms.** Lithuania has experienced an impressive income convergence towards Western Europe, but the process is not complete and structural issues—most of which pre date recent shocks—persist. This adds to eroded buffers used over the last two years including lower corporate profitability and a real effective exchange rate that is now in line with fundamentals. Thus, the economy has limited further ability to absorb shocks. This combined with adverse demographic trends, make reinforcing productivity growth key to ensure balanced and sustainable growth. Thus, reforms are key to enhance private sector-led growth, promote investment to support further capital deepening and mitigate or reverse negative demographic dynamics.

## References

- Bogužas, Ž. Et al. "Anatomy of inflationary shock in Lithuania: causes, effects and implications". Bank of Lithuania, Occasional Paper Series No50 (2024).
- Cevik, S., S. Naik, and K. Primus (2024). "Chasing the Dream: Industry-Level Productivity Developments in Europe," IMF Working Paper No. 24/x (Washington, DC: International Monetary Fund).
- European Bank for Reconstruction and Development. "The Baltic States Report" (2023)
- Eurostat. European System of Accounts (ESA) 2010.
- ECB Occasional Paper. No 268 / September 2021. "Key factors behind productivity trends in EU countries".
- DG ECFIN. Assessment of the labor productivity developments in Lithuania and the EU 2022.
- IMF Country Report No. 2019/252, Annex II, "A Stock-Flow Analysis of the Boom, Bust, and Recovery".
- IMF Country Report No. 2021/192.
- Kostinas, A. and Vilniškis, M. "Non price competitiveness of Lithuanian exports". Bank of Lithuania, Occasional Paper Series No38 (2021).
- Vasiliauskas, K. "Factors affecting price developments in Lithuania in 2004-2022 based on national accounts data". Bank of Lithuania, Occasional Paper Series No53 (2024).

## Annex I. Sectoral Shift Share Methodology

**1. Given that aggregate productivity can be represented as a weighted average of individual sectors' productivity with weights determined by labor shares, productivity growth can be decomposed into the following component parts:**

- *Intra-industry productivity growth effect.* This component is equal to the sum of productivity growth rates of individual sectors in the absence of changes across sector employment shares.
- *Structural shift effect (changes in labor shares).* This effect quantifies the contribution to overall productivity growth of a shift of labor resources across sectors. When labor moves from low- to high-productivity growth sectors, this shift contributes positively to aggregate productivity growth and vice versa.
- *Interaction effect.* This is a residual term that measures the correlation between productivity and employment changes, as well as additional productivity gains associated with qualitative factors. It is positive when the intra-industry effect and structural shifts across sectors are complementary, this is, when productivity growth is positive in expanding activities and negative in contracting sectors. It is typically negative when an increase in productivity is related to a decrease in labor use.

**2.** Formally, we define (hourly) labor productivity (LP) of the overall economy as the output (Y, measured with gross value added) divided by labor input (L, measured as hours worked). Since output and labor figures result from the aggregation of individual sectors, we can also define:

$$LP_t = Y_t / L_t = \frac{\sum_i Y_{i,t}}{\sum_i L_{i,t}}$$

Alternatively, productivity can be written as a weighted sum of the intra-industry productivity rates:

$$LP_t = \sum_i LP_{i,t} \frac{L_{i,t}}{L_t}$$

This gives, in the first difference:

$$\Delta LP_t = \sum_i \Delta(LP_{i,t}) \frac{L_{i,t-1}}{L_{t-1}} + \sum_i LPH_{i,t-1} \Delta\left(\frac{L_{i,t}}{L_t}\right) + \sum_i \Delta(LPH_{i,t}) \Delta\left(\frac{L_{i,t}}{L_t}\right)$$

To calculate the growth rate, we divide this expression by labor productivity ( $LP_{t-1}$ ) and, after some rearrangements, we reach the expression:

$$\begin{aligned} \frac{\Delta LP_t}{LP_{t-1}} = & \sum_i \frac{\Delta LP_i}{LP_{i,t-1}} \frac{Y_{i,t-1}}{Y_{t-1}} + \\ & \sum_i \frac{LP_{i,t-1}}{LP_{t-1}} \left( \frac{L_{i,t}}{L_t} - \frac{L_{i,t-1}}{L_{t-1}} \right) + \\ & \sum_i \frac{\Delta LP_{i,t}}{LP_{i,t-1}} \left( \frac{L_{i,t}}{L_t} - \frac{L_{i,t-1}}{L_{t-1}} \right) \end{aligned}$$

3. **The first component is the intra-industry effect, calculated as the sum of individual sectors' productivity growth rates** weighted by the output share in the initial period, i.e., assuming there is no change in the economic structure.
4. **The second component is the shift effect**, which captures the change in the labor shares of each industry weighted by the relative productivity level, this is, the ratio of the industry productivity to average productivity.
5. **The third term is the interaction component**, that measures the correlation between productivity and employment changes, as well as additional productivity gains associated with qualitative factors affecting TFP. It is positive when the intra-industry effect and the structural shift are complementary, while negative when an increase in productivity is related to a decrease in labor use.

## Annex II. Market Share Methodology<sup>1</sup>

1. To illustrate the idea of constant share decomposition, let us consider the special case of an economy,  $r$ , that exports one product to one partner economy,  $p$ . Let total exports of the economy be  $X_r$  and total world exports be  $X_W$ . Then the economy's share of world exports is  $X_r/X_W$ . Letting  $X_{Wp}$  be world exports to country  $p$ ,  $r$ 's export market share can be rewritten as:

$$\frac{X_r}{X_W} = \frac{X_r}{X_{Wp}} \frac{X_{Wp}}{X_W}$$

In words, the country's export share is equal to its share of world exports to country  $p$  multiplied by the share of  $p$  in world exports.

Now, let:  $\theta_r = X_r/X_W$ ,  $\theta_{rp} = X_r/X_{Wp}$ , and  $\delta_p = X_{Wp}/X_W$ .

Then, substituting, the expression becomes:  $\theta_r = \theta_{rp} \times \delta_p$ .

Let the change between any two periods be denoted by  $\Delta$ , so  $\Delta\theta_r$  is the change in the export share, and so on. Then, it must be the case that:

$$\Delta\theta_r = \Delta\theta_{rp}\delta_p^0 + \Delta\delta_p\theta_{rp}^0 + \Delta\theta_{rp}\Delta\delta_p$$

where the shares  $\delta$  and  $\theta$  are evaluated at their initial values. This is the simplest version of the export market share growth decomposition.

**2. The economy in this simple example can increase its export market share by getting a larger share of its partner market**, by having the partner market grow overall, or both. The decomposition allows us to disentangle these effects.

**3. The expression shows that it is possible to decompose the change in the export market share into three components:**

- The first term is the effect on the share of expanding into in the partner market, holding the size of the partner constant. This *intensive margin*, or competitiveness effect, measures the portion of the change of  $r$ 's export share that is attributable to a higher penetration of  $r$ 's exports in the destination market, holding the size of the destination market constant; that is, it approximates the gains in  $r$ 's export share that are attributable to competitiveness gains;
- The second term is the effect of the growth in the size of the export partner, holding relative penetration constant. This *extensive margin*, or composition effect, measures the portion of the change of  $r$ 's export share that is attributable to the change in the size of the destination market. By weighting the change in the size of an export destination market in world trade

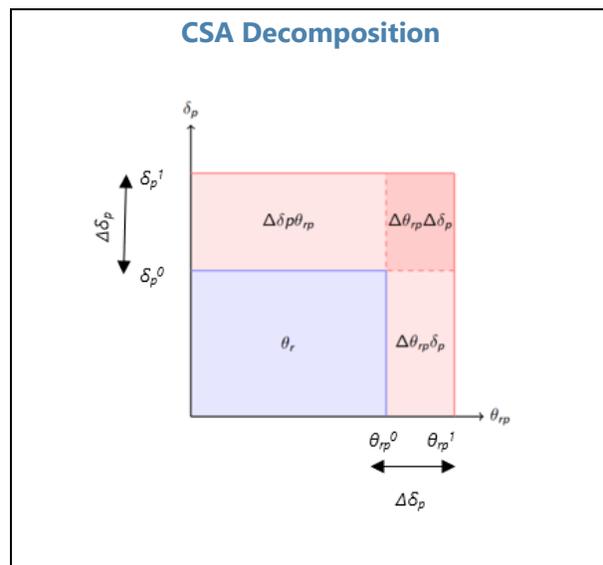
<sup>1</sup> Prepared by Gianluigi Ferrucci.

by the average share of  $r$ 's exports to that particular export destination, we are able to approximate what would have happened to the overall share if  $r$ 's share had remained constant and only the size of the export market had changed;

- The third term is the interaction of the two effects above.

#### 4. [Gilbert \(2017\)](#) provides an intuitive geometric exposition of the CSA breakdown

(**Figure 3**). A detailed description of the methodology and an example of how it is applied to measuring competitiveness is provided in [di Mauro et al. \(2005\)](#). Although the methodology is beset by several well-documented theoretical problems, it remains informative for our purposes.<sup>2</sup>



<sup>2</sup> Among the limitations, CSA assumes that the market structure remains unchanged over the analyzed period, ignoring the effects of technological advancements, changes in consumer preferences, and regulatory changes. It focuses on changes in market share attributable to internal factors such as price competitiveness and product quality, but it does not account for external factors, such as global economic conditions, exchange rate changes, and competitor actions. It assumes that products within the market are homogeneous, ignoring product differentiation, which can impact market share independently of price or volume changes. Finally, CSA provides information on changes in market share but does not offer insights into the underlying causes of those changes. Disentangling the effects of different factors influencing market dynamics requires additional analytical techniques or qualitative research. For a comprehensive discussion of these, and other, limitations of CSA, see Richardson, J.D. (1971), Constant-Market-Shares Analysis of Export Growth, *Journal of International Economics* 1, no. 2 (May), pp. 227-39.i