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REPUBLIC OF LATVIA

SELECTED ISSUES

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August 31, 2026

Approved By
European Department

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PUBLIC SPENDING IN LATVIA: OUTCOMES AND EFFICIENCY IN EDUCATION AND HEALTH[1]

This paper assesses the outcomes and efficiency of public spending on education and healthcare in Latvia. It highlights opportunities to strengthen service delivery, improve spending efficiency, and enhance outcomes. For example, the efficiency of spending in both sectors could be improved through measures such as streamlining school and hospital networks. However, efficiency gains alone are unlikely to be sufficient to achieve better outcomes, which will likely also require more spending. In education, more resources should be directed toward tertiary education and expanding the use of digital tools. In health, where Latvia's outcomes continue to lag those of its peers, more investment is needed in prevention to support a healthier and more productive population. Priority should be given to high-value reforms, including strengthening preventive care, addressing workforce shortages, improving access to healthcare, and enhancing primary and community-based care.

A. Overview

1. Latvia's public sector plays a central role in delivering education and healthcare services, but outcomes remain comparatively weak and public spending could be more efficient. Although Latvia has made progress in both sectors and is undertaking reforms, key outcome indicators continue to lag those of many European peers. Improving the effectiveness and efficiency of public spending on education and health is therefore essential to raise living standards and strengthen long-term growth. Healthier and better-educated populations contribute to higher productivity, improved labor market outcomes, and greater economic resilience.[2] At the same time, health spending pressures are expected to increase over the medium-to-long term, driven by population aging and growing demand for healthcare and long-term care services. These pressures reinforce the importance of ensuring that additional resources are used effectively to achieve better outcomes. More broadly, effective public spending on education and health is also important for supporting income convergence and reducing inequalities.[3]

[1] Prepared by Keyra Primus and Can Ugur. The authors would like to thank Luis Brandao-Marques, Nick Carroll, and the Latvian Authorities for their helpful comments.

[2] General equilibrium models show that public spending on education and healthcare supports long-run growth and welfare by building human capital, raising productivity, and improving workforce health (Angelopoulos et al., 2007; Dissou et al., 2016; Parui and Prettner, 2025). Education spending can generate substantial gains through stronger skills and human capital accumulation, while healthcare investment improves productivity and welfare, with benefits becoming more pronounced over the medium to long run (Dissou et al., 2016; Fournier and Johansson, 2016; Parui and Prettner, 2025). In advanced economies, equal access to education and health lifts pre-redistribution incomes for those at the bottom of the distribution (Chancel, 2021). However, the effect of higher public education spending on income inequality is ambiguous depending on who benefits most from higher human capital accumulation—low-income workers through higher wages or business owners through higher profits (Artige and Cavenaile, 2023).

[3] As noted by Hallaert and Primus (2022), public spending on education and health is crucial for achieving income convergence and reducing inequalities, as it supports human capital accumulation, innovation, and productivity growth.

2. Despite progress in some areas, important challenges remain in both the health and education sectors. Health outcomes in Latvia compare unfavorably with those of many EU peers, with relatively low life expectancy, high mortality rates, and wide health inequalities. Latvians tend to live shorter and less healthy lives, reflecting the burden of chronic diseases and persistent shortcomings in healthcare access and prevention. These poor health outcomes result in a substantial loss of healthy and productive working years, reducing labor force participation, increasing absenteeism and disability, and weighing on productivity and long-term economic growth. In education, while student performance is in line with international standards, significant disparities persist across regions and schools. Larger urban schools generally outperform smaller rural schools in basic skills, pointing to unequal learning opportunities. Teacher shortages are also widespread, particularly in STEM subjects, while an aging teaching workforce raises concerns about the system's long-term capacity to maintain educational quality and support future productivity growth.

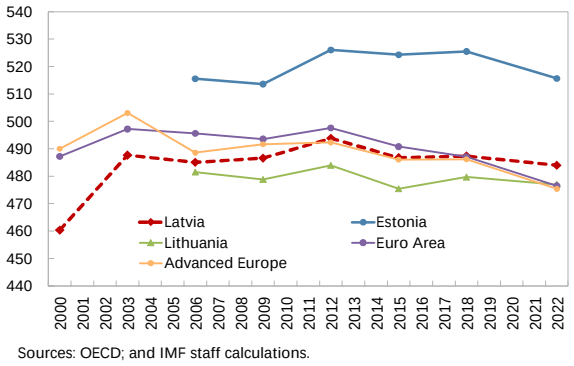
3. This paper examines Latvia's performance in the health and education sectors, focusing on both outcomes and the efficiency of public spending. In education, the analysis examines student outcomes, skills alignment, staffing issues, and the effectiveness of education spending in supporting human capital development. In health, it examines population health outcomes, the efficiency of health spending, and key factors contributing to Latvia's low life expectancy.

B. Education

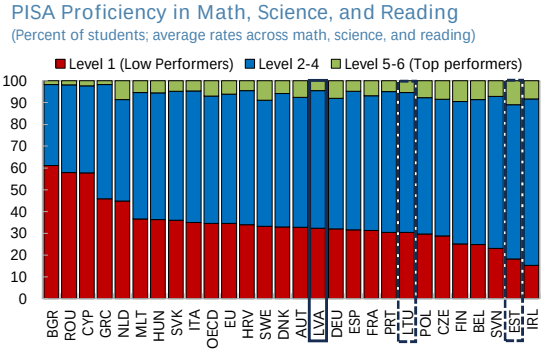
Education Outcomes and Challenges

4. Latvia has made notable progress in educational outcomes, but important quality challenges remain. Student performance in the PISA assessments has improved over time, with average scores now exceeding those of the euro area and broadly matching or surpassing those of advanced European economies (Figure 1). The distribution of student achievement points to persistent weaknesses: about one-third of students are low performers in mathematics, science, and reading, a larger share than in Estonia and several other high-performing European countries, while the share of top-performing students remains relatively small. Also, basic skills proficiency varies significantly by location, with larger urban schools, particularly in Rīga, outperforming smaller rural schools (EC, 2026). These challenges extend to the adult population, with the OECD's 2023 Programme for the International Assessment of Adult Competencies (PIAAC) results showing that Latvian adults perform below the OECD average in literacy and adaptive problem solving (OECD, 2025). Together, these findings suggest that, despite considerable progress, further efforts are needed to reduce the proportion of low-achieving students, improve educational quality, and strengthen basic skills and lifelong learning.

Figure 1. Europe: PISA Scores



Sources: OECD; and IMF staff calculations.

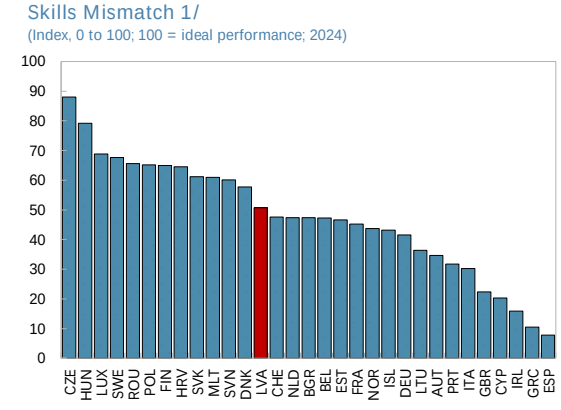


Sources: OECD; and IMF staff calculations.
Note: OECD consideres Level 2 as the baseline level of proficiency required to participate fully in society.

5. Despite improving educational performance, skills mismatches indicate scope to better align education and training with labor market demand. According to the skills index by the European Centre for Development of Vocational Training (Cedefop), Latvia ranks about average among European countries regarding skills mismatch, reaching about 50 percent of ideal performance and having room for improvement (Figure 2). Among the contributors to this ranking, Latvia performs below European peers regarding the rate of workers with tertiary education working in low-wage jobs, suggesting that educational attainment is not always translating into well-paid employment, commensurate with workers' qualifications. Although Latvia has a relatively low share of tertiary-educated employees who are overqualified for their current jobs, Latvia underperforms when it comes to qualification mismatch within the broader economy, indicating room to improve the allocation and utilization of human capital. These findings suggest a need to better align education and training systems with labor market demand, improve the matching of workers' skills to job requirements, and support the creation of higher-value-added jobs that can make fuller use of workers' skills and qualifications.

Figure 2. Europe: Skills Mismatches

Latvia continues to face notable skills mismatches and ranks roughly average among European peers.



Latvia has a relatively high share of tertiary-educated workers employed in low-wage jobs.

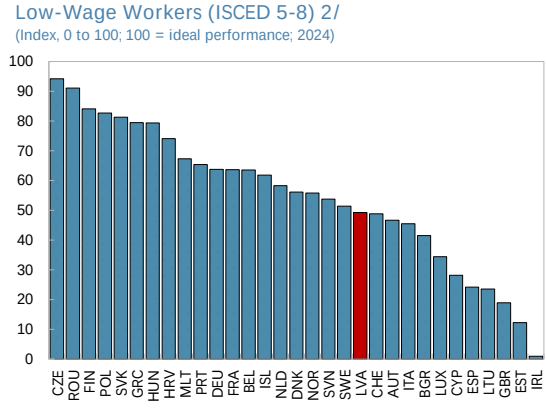
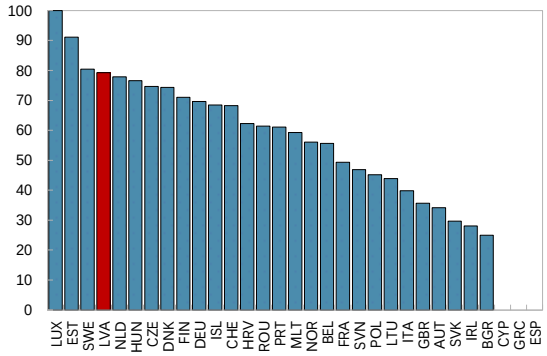


Figure 2. Europe: Skills Mismatches (Concluded)

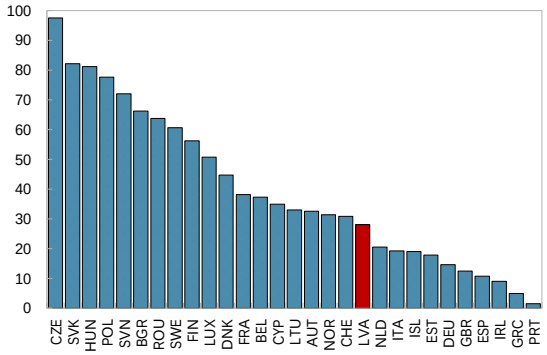
Latvia has relatively low rates of over-qualification among tertiary graduates in Europe…

Over-Qualification Rate (Tertiary Graduates) 3/
(Index, 0 to 100; 100 = ideal performance; 2024)



…but many workers remain either overqualified or underqualified for their occupations.

Qualification Mismatch 4/
(Index, 0 to 100; 100 = ideal performance; 2024)



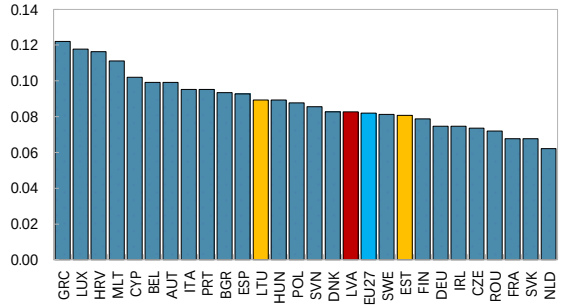
Source: European Centre for Development of Vocational Training (Cedefop).
1/ The skills mismatch score is composed as an aggregate of the performance in the three other displayed indicator scores, as calculated by Cedefop. The scores measure countries' "distance to the ideal" performance, which is chosen as the highest achieved by any country over a period of 7 years. The ideal performance is scaled to be 100 and the scores of all countries are then computed and compared to that.
2/ A low wage is defined as "those employees (excluding apprentices) earning two-thirds or less of the national median gross hourly earnings in that particular country". The indicator assesses the proportion of low wage earners out of all employees of the International Standard Classification of Education (ISCED11) level 5-8 qualification level (signifying tertiary education). A lower proportion translates to a higher performance score.
3/ The overqualification rate measures the share of employed people aged 25-34 with high education, ISCED level 5 to 8, that occupy jobs that are not corresponding to the International Classification of Occupations (ISCO) 1, 2 or 3. A lower rate translates to a higher performance score.
4/ The qualification mismatch measures the education attainment level for each occupation in each industry and assessing whether each employee's education attainment level matches it, considering both underqualification and overqualification. A lower value of mismatch translates to a higher performance score.

6. Despite a declining student population, Latvia's teacher-to-student ratio has been falling due to teacher shortages, which creates opportunities and challenges for the education system. The number of teachers has declined faster than the decline in student enrollment over the past decade, resulting in a smaller number of teachers and academic staff per student than in many EU countries (Figure 3). Although Latvia continues to have a higher teacher-to-student ratio than Lithuania, it has converged with the EU average and Estonia. While lower teacher-to-student ratios can help contain fiscal pressures and encourage a more efficient allocation of resources, persistent teacher shortages may strain teaching capacity. Continued adaptation of the school network to demographic trends, alongside measures to address teacher shortages, could improve resource allocation and support educational quality. Although consolidation may temporarily disrupt learning outcomes, these effects tend to diminish over time, while the resulting efficiency gains can be redirected to improving educational quality and learning outcomes.[4]

[4] There is evidence of a short-term disruption effect, in which the physical relocation of students and changes to their learning environment can lead to temporary declines in achievement (see Beuchert et al., 2018 for the effect of schools' closure in Denmark). However, the negative effects tend to diminish after four years.

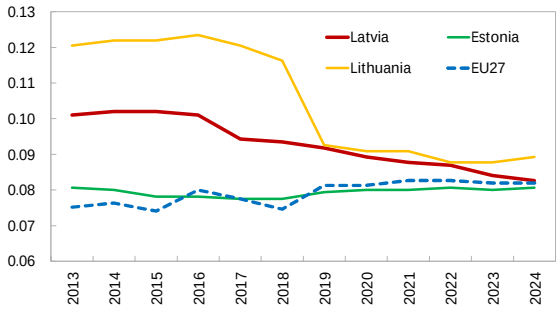
Figure 3. EU: Teacher-to-Student Ratio

Ratio of Teachers and Academic Staff to Students, Primary to Upper Secondary Education, 2024
(Ratio)



Sources: Eurostat; and IMF staff calculations.

Ratio of Teachers and Academic Staff to Students, Primary to Upper Secondary Education
(Ratio)



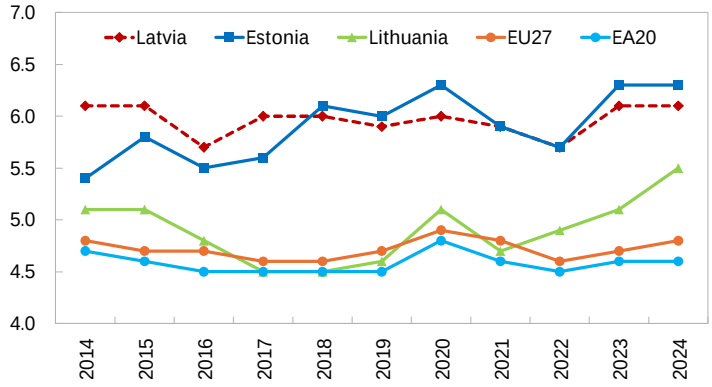
Sources: Eurostat; and IMF staff calculations.

7. Latvia continues to face teacher shortages and an aging teaching workforce. Shortages in general education are significant across both the capital and rural areas, particularly in STEM subjects. The teaching workforce is aging, and more than half of young teachers intend to leave the profession within five years (EC, 2026). Latvia has taken positive steps to address these challenges by increasing salaries, attracting new entrants, and strengthening teacher induction and training programs. Further efforts to increase teachers' salaries, improve teachers' working conditions, expand professional development opportunities, and increase the supply of STEM graduates could help strengthen the recruitment and retention of qualified teachers.

Public Spending on Education

8. Public spending on education in Latvia has remained broadly stable as a share of GDP over the past decade. Education spending was 5.7–6.1 percent of GDP over 2014–2024, placing Latvia above both the EU and the euro area averages. Although Latvia spent more on education as a percent of GDP than Lithuania in recent years, spending has been below Estonia. Spending per student has increased gradually over time, but it remains below the levels observed in both Lithuania and Estonia, placing Latvia in the lower half of EU countries (Figure 4). This suggests that, despite relatively high spending as a share of GDP, there may be scope to improve the efficiency of educational spending and strengthen educational outcomes.

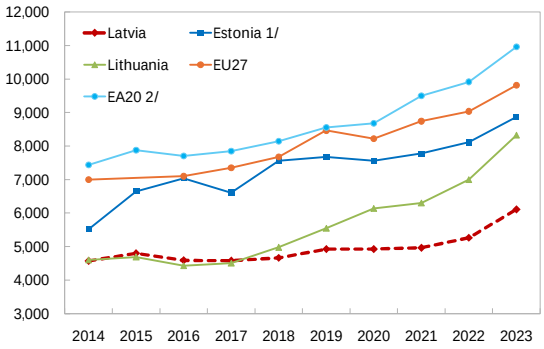
General Government Education Spending
(Percent of GDP; defined as in classification of the functions of government (COFOG))



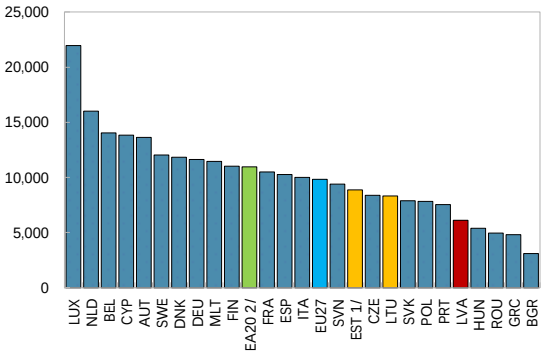
Source: Eurostat.
Note: Education spending includes pre-primary to tertiary education, as well as those not definable by level and subsidiary services.

Figure 4. EU: Public Education Spending Per Student

Spending on Public Educational Institutions Per Student
(Purchasing power standards; pre-primary to tertiary education)



Spending on Public Educational Institutions Per Student
(Purchasing power standards; pre-primary to tertiary education; 2023)

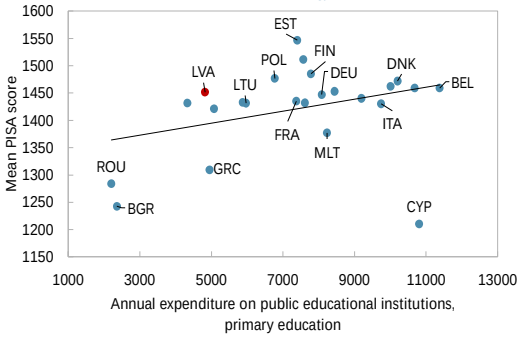


Sources: Eurostat; and IMF staff calculations.
Note: the calculations are based on full-time equivalent (FTE) students.
1/ Due to missing data for pre-primary, Estonia is calculated as a simple average of primary, lower secondary, upper secondary and post-secondary non-tertiary, and tertiary education.
2/ EA20 is a simple average of members with available data.

9. Latvia achieves relatively good educational outcomes at the primary and secondary levels. Latvia's PISA scores are broadly in line with, and in some cases exceed, those of countries that devote similar amounts of resources per student on education. In primary and lower secondary education, Latvia attains learning outcomes comparable to several higher-spending European countries, suggesting that the educational system delivers relatively good outcomes given the available resources (Figure 5). At the same time, Estonia combines both higher spending and stronger PISA performance, indicating that there remains scope for Latvia to further improve educational quality and student achievement. These findings suggest that while Latvia's education system performs relatively well overall, reforms aimed at raising educational quality and reducing the share of low-performing students could help strengthen outcomes further.

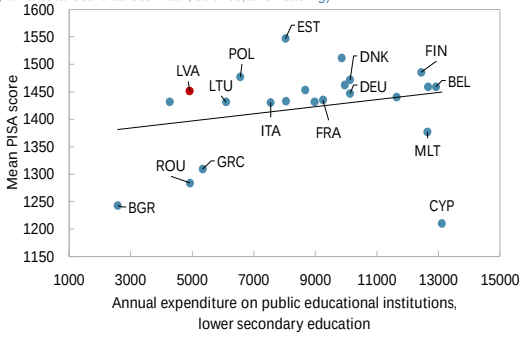
Figure 5. EU: PISA Results and Education Spending

Primary Education Spending and PISA Scores, 2022
(X-axis: Purchasing power standard (PPS) per student, based on full-time equivalent; y-axis: total score across math, science, and reading)



Sources: Eurostat; and OECD.

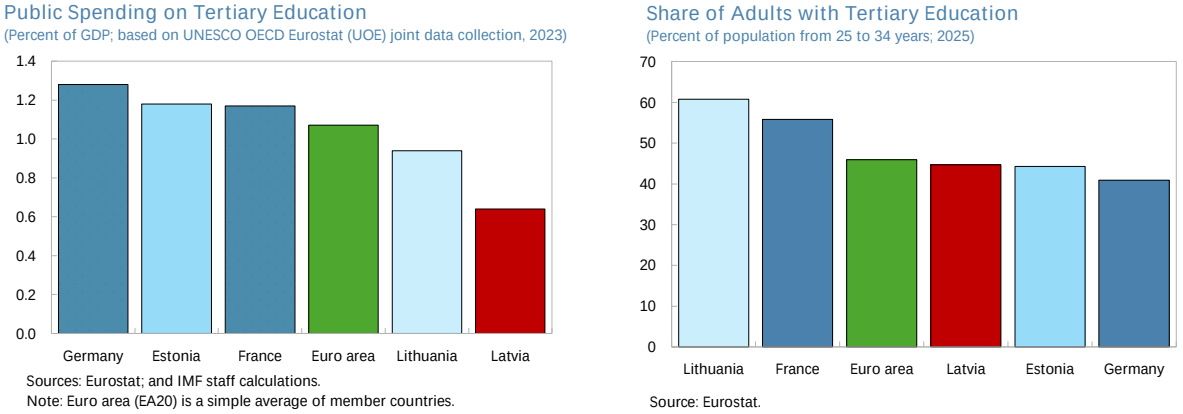
Lower Secondary Education Spending and PISA Scores, 2022
(X-axis: Purchasing power standard (PPS) per student, based on full-time equivalent; y-axis: total score across math, science, and reading)



Sources: Eurostat; and OECD.

10. Latvia has made progress in expanding access to higher education but continues to spend less on tertiary education than most peer countries. The share of adults aged 25-34 with tertiary education in Latvia reached 44.7 percent in 2025, which is slightly below the euro area average of 45.9 percent, but notably lower than in Lithuania (60.8 percent) (Figure 6). Public spending on tertiary education is comparatively low in Latvia relative to peers, which could limit the ability of tertiary institutions to respond effectively to changing labor market demands. Moreover, persistent skills and qualification mismatches suggest that the education and training programs could be more closely aligned with labor market needs, particularly in terms of the skills and competencies valued by employers.

Figure 6. Euro Area: Tertiary Education Spending and Tertiary-Educated Adults



Sources: Eurostat; and IMF staff calculations.
Note: Euro area (EA20) is a simple average of member countries.

Source: Eurostat.

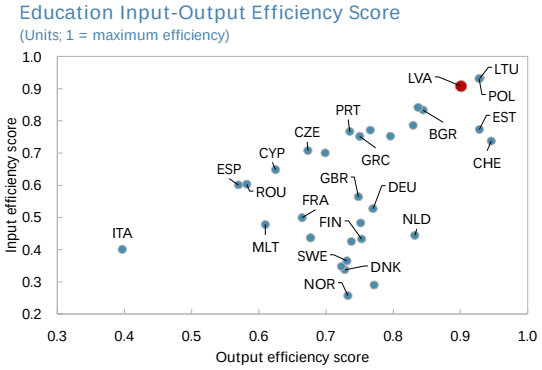
Education Expenditure Efficiency

11. The amount that Latvia spends on education appears broadly aligned with outcomes, but the efficiency analysis suggests some room to improve value for money. The input-output efficiency analysis shows Latvia close to the efficiency frontier, indicating that its educational outcomes are broadly in line with the resources used (Figure 7). However, Latvia is not among the most efficient performers, and savings estimates suggest potential fiscal gains of 0.6 percent of GDP from improving education spending efficiency, although the scope appears more limited than in many higher-spending European countries.[5] This suggests that the focus should be less on broad expenditure cuts and more on improving efficiency through better alignment of the school network

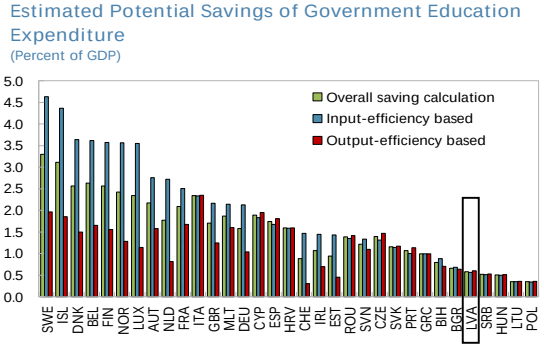
[5] Methodologically, an efficiency frontier is constructed, and countries are benchmarked against it. The analysis examines two dimensions: (i) input efficiency, which measures the extent to which inputs (budget spending) could be reduced while maintaining current output levels; and (ii) output efficiency, which measures the extent to which outputs could be increased while holding inputs constant (i.e., by using inputs more efficiently). The results should be interpreted as illustrative rather than prescriptive, as structural and institutional factors may not be fully captured. In addition, as with any benchmarking exercise, the findings are sensitive to the composition of the sample used to construct the efficiency frontier.

with demographic trends and more effective targeting of educational resources. Any efficiency gains should be redirected toward high-priority areas that strengthen learning outcomes and overall educational performance.

Figure 7. Europe: Education Expenditure Efficiency



Source: IMF staff calculations.



Sources: World Bank Education Statistics; and IMF staff calculations.

C. Healthcare

Challenges in the Health Sector

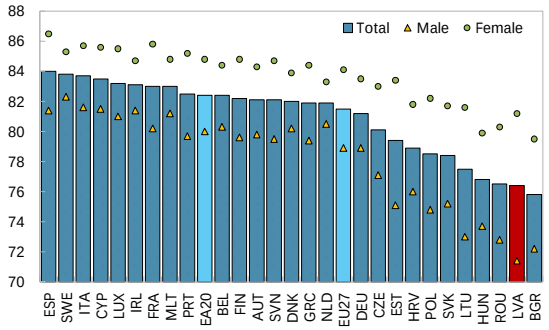
12. Latvia needs to improve health outcomes and strengthen access to quality healthcare services. Key challenges include:

- *Low life expectancy and healthy life years.* Latvia has one of the lowest levels of life expectancy in the EU, both at birth and at age 65 (Figure 8). Women in Latvia have a life expectancy around 10 years longer than men, one of the largest gender gaps in the EU. In 2024, life expectancy at birth in Latvia was below all EU peers, with both male and female life expectancy notably lower than both the euro area and EU27 averages. Life expectancy at age 65 is also among the lowest in the EU, pointing to persistent challenges in population health, longevity, and the effectiveness of prevention and treatment. Moreover, Latvia also has relatively low healthy life years, indicating that a large share of the additional years of life is spent with health limitations. This has implications for labor force participation and productivity, as well as healthcare and long-term care needs, particularly as the population ages.

- *High death rates.* Latvia's mortality rates exceed euro area averages across most categories, contributing to the country's relatively weak health outcomes (Figure 9). Importantly, Latvia records substantially higher maternal mortality than the euro area average. The mortality gap is also pronounced for cardiovascular diseases, which remain a leading cause of death, as well as for behavioral health indicators such as alcohol and substance use disorders. High mortality is partly associated with the high rates of unhealthy behaviors and lifestyles, including harmful alcohol consumption, smoking, poor diet, and low physical activity. At the same time, preventive measures

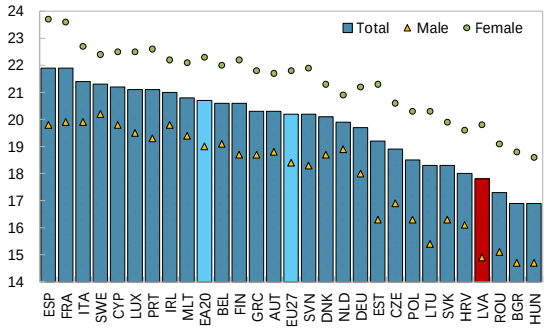
Figure 8. EU: Life Expectancy and Healthspan

Life Expectancy at Birth
(Years, 2024)



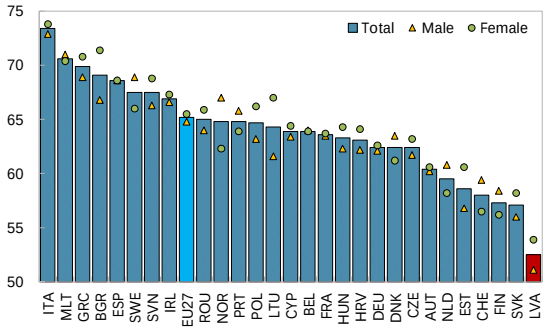
Source: Eurostat.

Life Expectancy at 65
(Years, 2024)



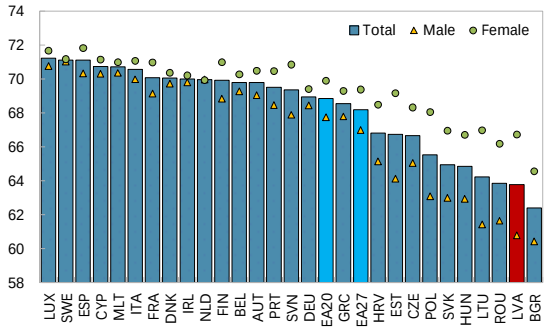
Source: Eurostat.

Healthy Life Years at Birth
(Years, 2024)



Source: Eurostat.

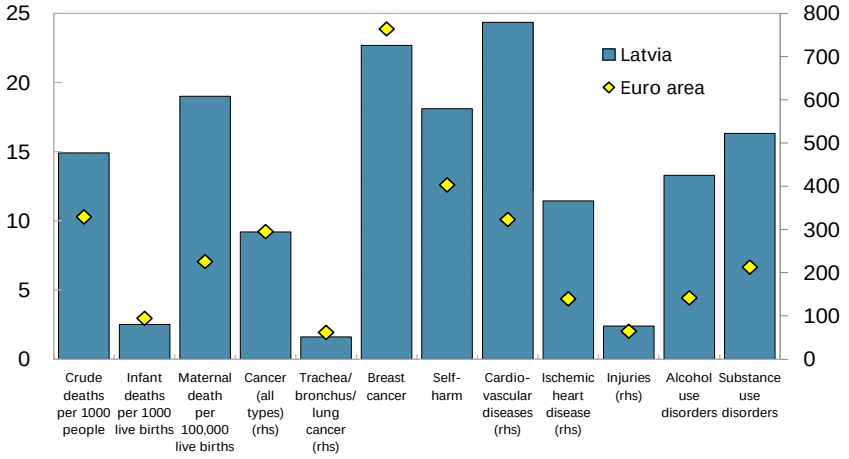
Health-Adjusted Life Expectancy at Birth
(Years, 2021)



Source: WHO, Global Health Observatory.

Figure 9. Latvia: Death Rates by Cause

Death Rates by Cause, 2023
(Death rate per 100,000 in the population, unless specified otherwise)

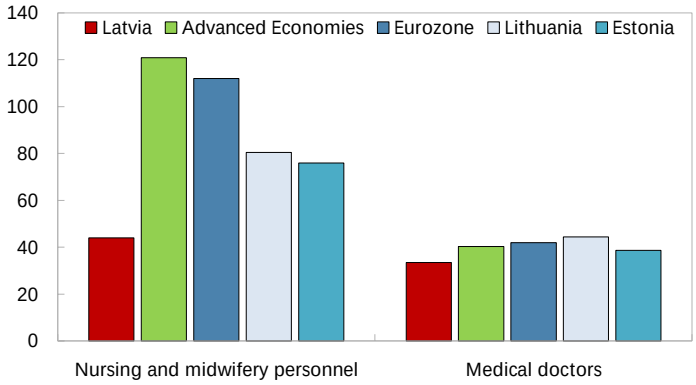


Sources: WHO; World Bank; IHME; IMF WEO; and IMF staff calculations.

and early diagnosis are not sufficiently developed, contributing to delayed detection and intervention, particularly for cardiovascular and other chronic conditions. Latvia needs stronger prevention efforts, better management of chronic diseases, and improvements in healthcare delivery to reduce avoidable mortality and improve population health (OECD and European Observatory on Health Systems and Policies, 2023). In this context, greater emphasis should be placed on investment in prevention, early risk identification, and lower-level health services, including primary and community-based care.

- *Staff shortages.* Latvia faces persistent shortages of health professionals, which constrain the capacity of the healthcare system to deliver timely and quality services. The number of practicing nurses and midwives per 1,000 people in Latvia is well below the averages for the euro area and advanced economies, as well as those of Baltic peers.[6] The number of practicing doctors is also lower than in peer countries, reflecting persistent workforce constraints across the health sector. Working conditions are a major deterrent to entering the national health service, especially low pay. A significant proportion of doctors (46.9 percent) and nurses (39.1 percent) are aged 55 and over, raising concerns about the long-term accessibility of health services (EC, 2025). Addressing workforce shortages through better retention, training, and recruitment of healthcare professionals will be important to improve access to healthcare services and health outcomes. At the same time, Latvia's relatively high availability of diagnostic equipment suggests scope to rebalance investment towards workforce capacity.

Medical Professional Density, 2020
(Professionals per 10,000 people in population)



Sources: WHO GHO; and IMF staff calculations.

- *Limited access to services.* Limited access to healthcare services remains a significant challenge in Latvia. In 2025, unmet healthcare needs are substantially higher than the EU average. Some 7.6 percent of the Latvian population reported unmet needs for a medical examination, one of the highest rates in the EU, compared with an EU average of 2.4 percent (EC, 2026).[7] Addressing barriers to access, including shortages of healthcare professionals and capacity constraints in

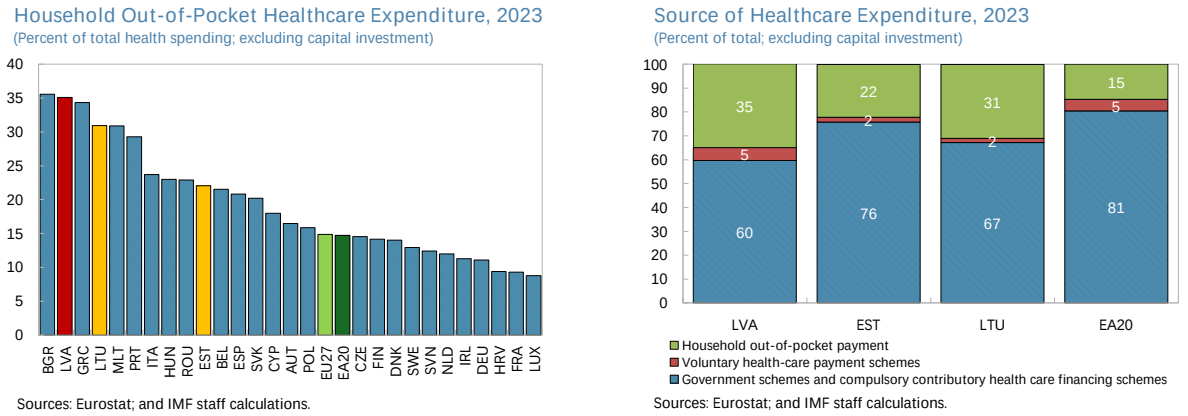
[6] The reported number of practicing nurses is likely to understate the size of Latvia's nursing workforce, as some nursing functions are performed by physician assistants and nurse assistants who fall outside the OECD definition of "practicing nurses" and are therefore excluded from the reported figures.

[7] Unmet need for medical care measures the share of people who needed medical examination or treatment but did not receive it.

service delivery, will be important for improving health outcomes and ensuring more equitable access to care.

- *Large out-of-pocket costs.* Latvia has one of the highest levels of out-of-pocket healthcare spending in the EU, which makes healthcare less affordable for many and can limit access to services (Taube et al., 2018; EC, 2026). Out-of-pocket payments accounted for 35 percent of total health spending in 2023, among the highest shares in the EU and substantially above the euro area average of 15 percent (Figure 10). At the same time, government and compulsory health insurance schemes financed only 60 percent of spending, compared with 81 percent in the euro area, indicating relatively limited public coverage and raising concerns about affordability and access to healthcare services.

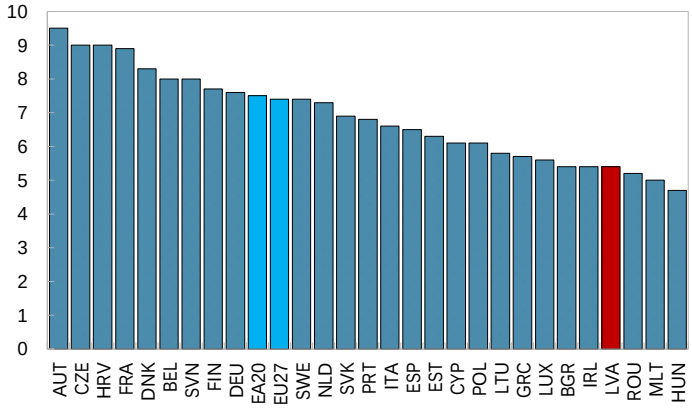
Figure 10. EU: Out-of-Pocket Healthcare Expenditure



Public Spending in the Health Sector

13. Public spending on healthcare in Latvia remains low relative to peer countries. During 2014–2020, general government spending on health in Latvia was below the averages of the euro area and EU, as well as Baltic peers (Figure 11). Although spending increased temporarily during the COVID-19 pandemic, it declined afterward and remained below comparator levels, reaching 5.4 percent of GDP in 2024. The low level of public funding for healthcare limits access to services, contributing to long waiting times, high levels of unmet healthcare needs,

General Government Health Spending, 2024
(Percent of GDP; defined as in classification of the functions of government (COFOG))

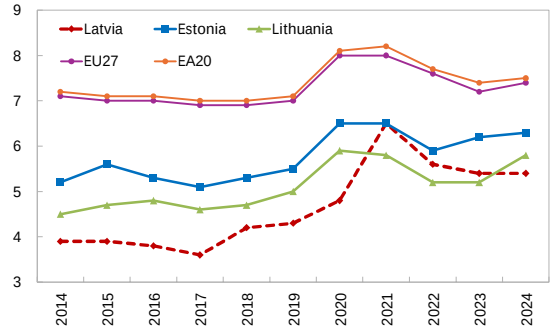


Source: Eurostat.

and high out-of-pocket spending for healthcare (EC, 2025). At the same time, current funding allocations may not be sufficient to meet rising healthcare demand associated with population aging.

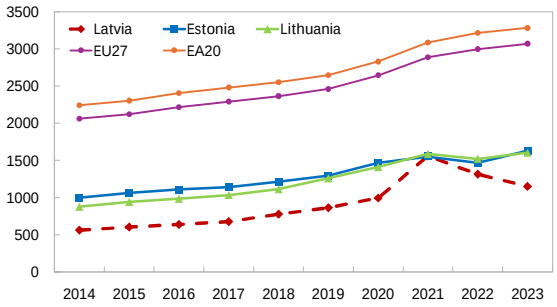
Figure 11. EU: Public Spending on Health

General Government Health Spending
(Percent of GDP; defined as in classification of the functions of government (COFOG))



Source: Eurostat.

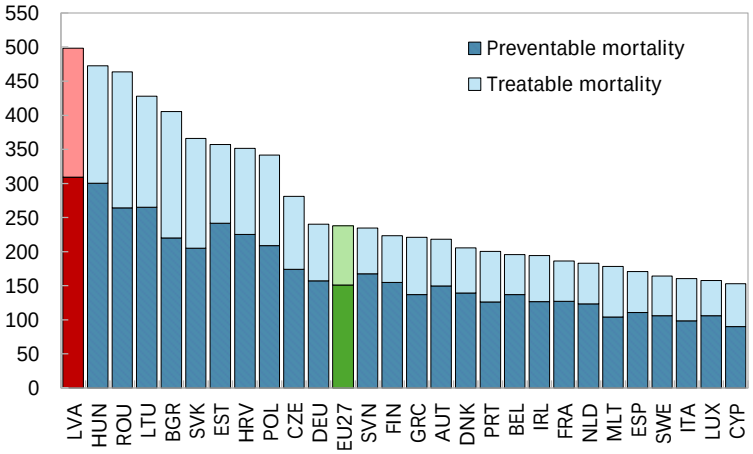
Government and Compulsory Contributory Expenditures on Healthcare
(Purchasing power standard (PPS) per capita)



Source: Eurostat.

14. Latvia has high rates of preventable and treatable mortality. In the EU, there is a negative correlation between healthcare spending and avoidable mortality (Figure 12). Latvia's rate of treatable mortality is among the highest in the EU, suggesting shortcomings in the effectiveness and timely delivery of healthcare services (EC, 2025). At the same time, the high rate of preventable mortality points to weaknesses in disease prevention and public health interventions and is linked to the high prevalence of behavioral risk factors (EC, 2025). The low level of spending on prevention may contribute to these outcomes: prevention accounted for only 2.8 percent of total health spending in 2022, compared with 5.5 percent on average in the EU (EC, 2025). In addition, the share of working-age people among total deaths is among the highest in the EU, exacerbating the effects of population aging on a shrinking labor force.

Deaths from Preventable and Treatable Diseases
(Standardized death rates per 100,000 inhabitants aged less than 75 years; 2023)

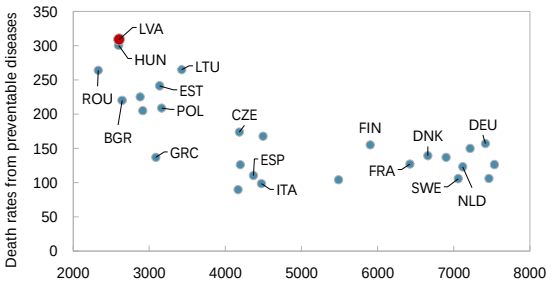


Source: Eurostat.

Figure 12. EU: Healthcare Expenditure and Avoidable Mortality

Preventable Diseases, 2023

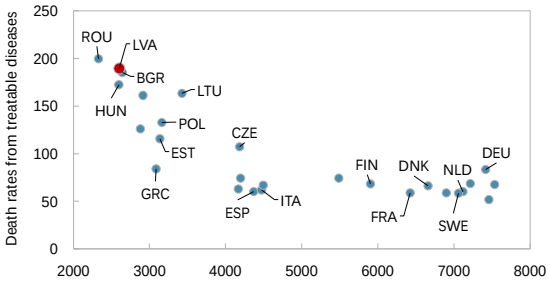
(Y-axis: standardized deaths per 100,000 inhabitants aged less than 75 years; x-axis: PPP, 2021 intl. USD)



Sources: World Health Organisation, Global Health Observatory; IMF, World Economic Outlook; Eurostat; and IMF staff calculations.

Treatable Diseases, 2023

(Y-axis: standardized deaths per 100,000 inhabitants aged less than 75 years; x-axis: PPP, 2021 intl. USD)



Sources: World Health Organisation, Global Health Observatory; IMF, World Economic Outlook; Eurostat; and IMF staff calculations.

Health Spending Efficiency

15. The health efficiency frontier analysis suggests that Latvia achieves lower health-adjusted life expectancy than the best-performing countries for a given level of health spending. With per capita current health expenditure (including both public and privately financed spending) of about PPP-adjusted US$3,100, Latvia's health-adjusted life expectancy is around 66 years, which is below both the euro area average and the estimated health efficiency frontier (Figure 13)[8]. Countries with similar spending levels tend to achieve health-adjusted life expectancy of roughly 69–71 years. Latvia's health efficiency score is about 0.92, compared with roughly 0.96 for both the euro area and advanced economies (Figure 13).[9] This suggests that Latvia is less efficient at converting health resources into health outcomes than its peers, indicating scope to improve the effectiveness of healthcare spending through better resource allocation and service delivery. The analysis therefore suggests that addressing current inefficiencies could help Latvia achieve better health outcomes with its existing level of resources.

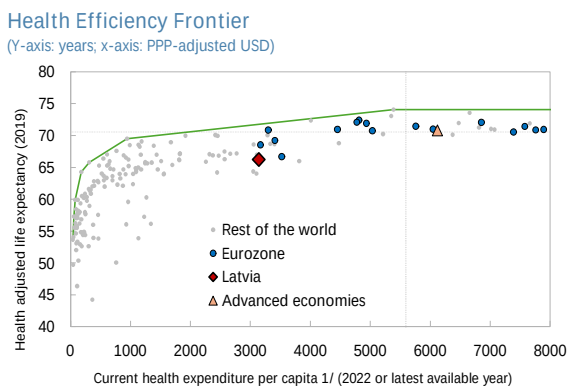
16. Both higher spending and improved spending efficiency are important for improving health outcomes in Latvia. Although additional resources will likely be needed given Latvia's relatively low level of health expenditure compared with advanced European economies, reforms aimed at improving the allocation and effectiveness of spending, along with strengthening primary and preventive care, could help narrow the efficiency gap. A combination of additional investment

[8] Health-adjusted life expectancy (HALE) is a measure estimated by WHO, explained as follows: "the equivalent lost healthy year fractions required for the HALE calculation are estimated as the all-cause years lost due to disability (YLD) rate per capita, adjusted for independent comorbidity, by age, sex and country. Sullivan's method uses the equivalent lost healthy year fraction (adjusted for comorbidity) at each age in the current population (for a given year) to divide the hypothetical years of life lived by a period life table cohort at different ages into years of equivalent full health and equivalent lost healthy years."

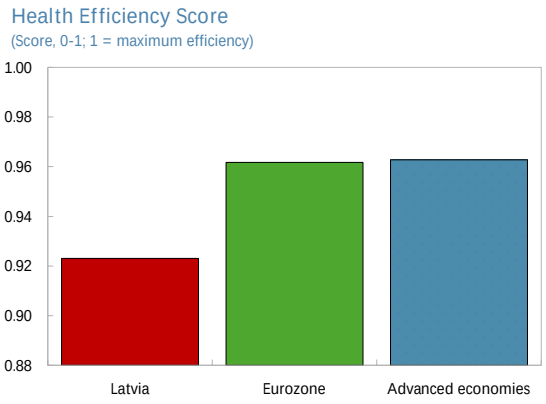
[9] Health efficiency is defined by input-efficiency scores that measure the gap between the resources employed by a given country and that of the most efficient countries that achieve a similar output using a data envelopment analysis (DEA) model. The input used in this analysis is current health expenditure PPP per capita and output is health-adjusted life expectancy (HALE).

and reforms to improve the effectiveness of existing resources will therefore be important to improving health outcomes in Latvia.

Figure 13. World: Health Spending Efficiency



Sources: World Health Organization, Global Health Observatory; and IMF staff calculations.
1/ Includes public, private, and external expenditures.



Source: IMF staff calculations.

Empirical Analysis

17. We use a panel dataset encompassing 28 European countries from 2000 to 2021 to examine the drivers of life expectancy at birth using a fixed effects panel regression analysis. To empirically assess the variables that correlate with life expectancy, we first estimate the following baseline regression model focused on the effects of health spending:

$$\boldsymbol{LE_{it} = u_i + \beta_1 CHE_{it} + \varepsilon_{it}} \qquad (1)$$

where LE_{it} is life expectancy at birth, u_i is the country fixed effect, CHE_{it} is the current health expenditure (log share of GDP, including both public and privately financed spending), and ε_{it} is the error term. β_1 is the coefficient of interest that captures the estimated relationship between health spending and life expectancy across the sample, indicating the change in life expectancy associated with a marginal increase in health spending. For robustness, we include a specification with macroeconomic controls:

$$\boldsymbol{LE_{it} = u_i + \beta_1 CHE_{it} + \beta_2 X_{it} + \varepsilon_{it}} \qquad (2)$$

where X_{it} is a set of time-varying control variables that include GDP per capita (log PPP constant 2021 international USD, in lag), Gini coefficient (market-based income), tertiary enrollment, and population growth. The model is estimated with the conventional within estimator. However, to obviate a potential endogeneity problem,[10] we also estimate (2) using an instrumental variables (IV) approach. Specifically, we instrument healthcare spending with a dummy variable that signals

[10] It is plausible that a longevity shock (e.g., a pandemic) reduces life expectancy and, as consequence, increases healthcare spending. This would create an attenuation bias. At the same time, higher life expectancy increases spending demands for old-age care, which would bias the results in the opposite direction.

whether a country in the sample each year is under the European Union's excessive deficit procedure (EDP). We argue that a variable that captures a country being under the EDP, which proxies for binding fiscal constraints that make healthcare spending cuts more likely, is both exogenous and excludable.[11] To complement the baseline, we also incorporate a specification with an interaction between current health expenditure and country dummies:

$$\boldsymbol{LE_{it}} = \boldsymbol{\beta}_i[\boldsymbol{CHE_{it}} * \boldsymbol{C_{it}}] + \boldsymbol{\varepsilon_{it}} \qquad (3)$$

The specification does not include separate country fixed effects, but the coefficient of interest β_i will indicate the relationship between life expectancy and marginal health spending at the country level. Again, we include a robustness check with macroeconomic controls:

$$\boldsymbol{LE_{it}} = \boldsymbol{\beta}_i[\boldsymbol{CHE_{it}} * \boldsymbol{C_{it}}] + \boldsymbol{\beta}_2\boldsymbol{X_{it}} + \boldsymbol{\varepsilon_{it}} \qquad (4)$$

18. The empirical analysis provides a useful benchmark of the relationship between health spending and life expectancy, but several limitations should be considered when interpreting the results. Life expectancy at birth is a broad and slow-moving outcome that may not respond contemporaneously to changes in health spending. It reflects the cumulative effects of many factors over the life cycle—including past health investments, early-life conditions, behavioral risks, institutional factors, and broader socioeconomic conditions—many of which may not be fully captured by the variables included in the panel regression. As a result, the estimated association between current health spending and life expectancy may not fully capture the longer-term effects of health spending and may also reflect other determinants of population health. Reverse causality is also possible, as higher life expectancy and evolving healthcare needs may influence health spending. The results should therefore be interpreted as associations that provide a broad benchmark of the relationship between health spending and life expectancy, rather than as causal estimates of the effect of additional spending on population health.

19. The regression analysis suggests that health spending alone does not fully explain differences in life expectancy, with broader economic and demographic factors also contributing to these differences. Current health expenditure as a share of GDP is positively associated with life expectancy in the baseline fixed effects specification (Table 1, column 1). After controlling for GDP per capita and other country characteristics, the relationship continues to be positively significant, but the magnitude decreases by more than half (Table 1, column 2). Moreover, the IV results show a consistently positive effect of healthcare spending on life expectancy (Table 1,

[11] The EDP instrument is exogenous because countries have been placed under EDP usually because of a breach of the 3 percent deficit rule and budget deficits are mostly influenced by cyclical conditions. Moreover, a large shock to longevity like a pandemic or epidemic would not trigger an EDP because it would likely allow the activation of the general or national escape clauses. The instrument is excludable because an EDP would affect longevity only through its effect on healthcare spending.

column 3), although the specification with the full set of controls delivers a statistically insignificant result (Table 1, column 4).[12]

Table 1. Europe: Estimating Life Expectancy at Birth
(Years)

	(1) Baseline	(2) Baseline (with controls)	(3) EDP IV	(4) EDP IV (with controls)	(5) Interaction	(6) Interaction (with controls)
Current health expenditure as % of GDP (log)	6.9691***	3.0561***	11.2010**	13.3600		
	(1.3766)	(1.1421)	(4.6086)	(8.9868)		
Real GDP per capita (PPP constant 2021 intl. USD, lag of log)		4.1317***		1.6387		4.2775***
		(0.5467)		(2.4324)		(0.5436)
Gini (market income-based, growth)		-0.1760		-0.5813		-0.1843*
		(0.1130)		(0.3959)		(0.1091)
Tertiary gross enrollment rate		0.0238***		-0.0099		0.0203***
		(0.0072)		(0.0298)		(0.0071)
Population (growth)		0.0728		0.3615		0.0699
		(0.1397)		(0.3153)		(0.1332)
Constant	64.0184***	26.2051***			64.5428***	25.4979***
	(3.1985)	(6.2136)			(3.2307)	(5.9289)
Country fixed effects	Yes	Yes	Yes	Yes	No	No
Current health expenditure x country interaction	No	No	No	No	Yes	Yes
Observations	616	560	616	560	616	560
R^2 (overall)	0.855	0.928	0.166	0.199	0.850	0.929
R^2 (adjusted)	0.848	0.924	0.127	0.152	0.843	0.925

Note: Robust standard errors clustered by country in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

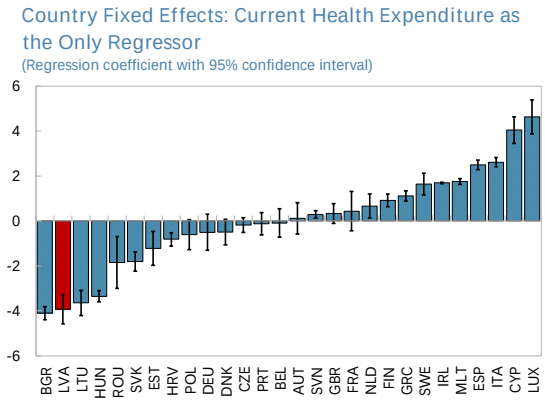
Sources: World Health Organization, Global Health Observatory; World Development Indicators, World Bank; IMF, World Economic Outlook; European Commission; and IMF staff calculations.

[12] It is possible that the IV estimation suffers from a weak instrument problem, which would explain the inflated estimates of the coefficient of interest and loss of statistical significance in Table 1, column 4. The Kleibergen-Papp statistic (not reported) suggests that the instrument is weak. Hence, the IV results should be interpreted with caution.

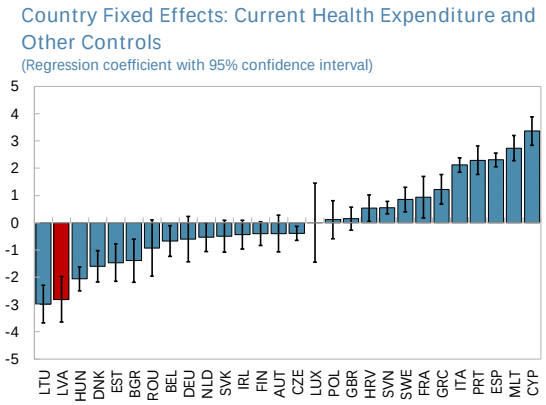
20. The country-specific regression results show that Latvia consistently has a significant life expectancy gap in relation to European peers (EU27 plus UK). In the baseline model (Table 1, column 1), Latvia's country fixed effect is very negative and significant at -3.9 years relative to the sample mean – the second lowest among all countries after Bulgaria (Figure 14, top left). After controlling for macroeconomic variables, Latvia's country fixed effect moderates to -2.8, remaining the second lowest in the sample (Figure 14, top right). This indicates that there is a Latvia-specific life expectancy shortfall that cannot be explained by current health spending alone or by an assembly of aggregate development characteristics like average income levels, income inequality, education level, or population growth. Instead, Latvia's life expectancy deficit could be explained by factors not fully captured by these controls, including health system effectiveness, lifestyle-related risk factors such as smoking and alcohol consumption, and other determinants of health.

Figure 14. Europe: Country-Specific Coefficients for Estimating Life Expectancy at Birth

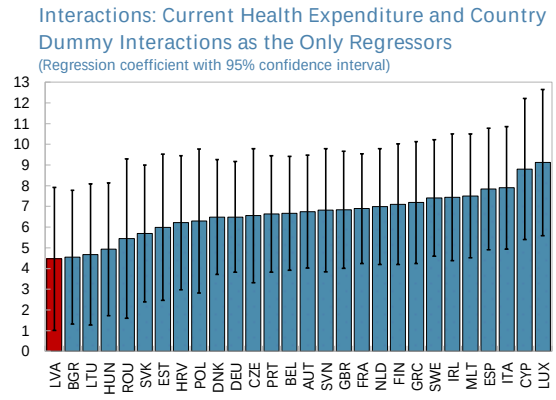
Latvia has a substantial structural deficit of life expectancy after controlling for health spending, and it stands out among European peers.



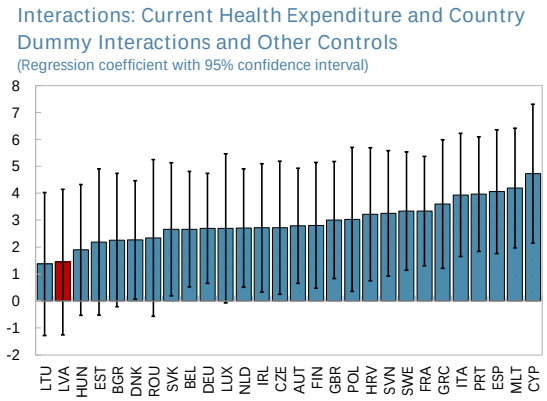
Even after incorporating macroeconomic controls, Latvia's laggard position remains.



Marginal health spending is associated with the lowest magnitude of life expectancy gains in Latvia.



With controls, Latvia's relative standing remains towards the bottom but the coefficient becomes insignificant.

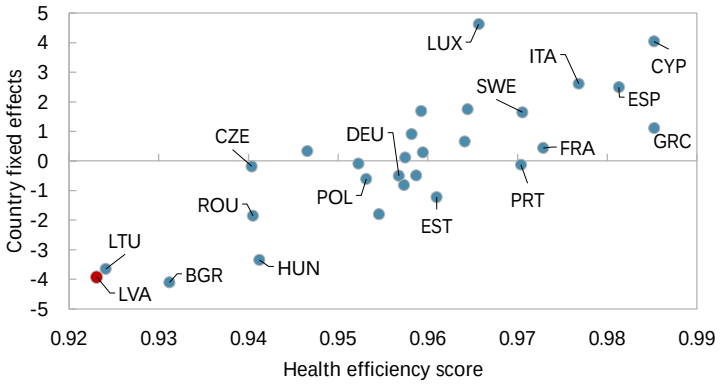


Sources: World Health Organization, Global Health Observatory; World Development Indicators, World Bank; IMF, World Economic Outlook; and IMF staff calculations.

21. The interaction models also indicate that Latvia has structurally low gains from marginal health spending. Without any controls (Table 1, column 5), a 1 percent increase in health spending is associated with 0.045 years, or roughly 16 days, higher life expectancy in Latvia – the lowest in the sample (Figure 14, bottom left). When controls are incorporated (Table 1, column 6), the effect remains positive and significant, though with a smaller magnitude. However, Latvia's disadvantageous position relative to other European countries remains consistent: with or without macroeconomic controls, marginal gains in life expectancy associated with increased health spending are lower for Latvia than for any European peer. Therefore, closing Latvia's health gaps relative to the rest of Europe will not only require increased spending, but also better allocation of resources.

22. Latvia appears to underperform both in health spending efficiency and in life expectancy outcomes relative to underlying economic and demographic characteristics. Latvia has both a low health-efficiency score and a large negative country fixed effect in the baseline life expectancy regression (Table 1, column 1). This suggests that Latvia achieves weaker life expectancy outcomes than the other countries in the sample for a given amount of health spending. Compared with most European peers, including neighboring Lithuania and Estonia, Latvia's health system appears less effective at translating healthcare resources into longer and healthier lives. The results point to structural challenges that extend beyond the level of health expenditure alone, including potential shortcomings in access to care, preventive healthcare, management of chronic diseases, and the organization and delivery of health services. Taken together, the findings suggest that improving health outcomes in Latvia will likely require both additional resources and reforms aimed at increasing the efficiency and effectiveness of healthcare spending.

Health Efficiency and Country Fixed Effects for Life Expectancy
(X-axis: score, 0-1; y-axis: country fixed effect coefficients, based on regression with current health spending as the only regressor)



Sources: World Health Organization, Global Health Observatory; World Development Indicators, World Bank; IMF, World Economic Outlook; and IMF staff calculations.

D. Ongoing Reforms in Education and Healthcare

23. The Ministry of Education is implementing ongoing initiatives to address identified shortcomings in the education sector. These reforms include: (i) implementing targeted professional development programs for educators; (ii) enhancing the use of digital platforms and tools to support teaching and learning resources; (iii) strengthening teacher training to address shortages and skills mismatch in STEM education; (iv) undertaking measures to improve education outcomes; and (v) consolidating large school network and implementing *Programma skolā*, a new funding model for schools.

24. To address the weaknesses in the healthcare sector, the Ministry of Health is advancing a range of reforms. These reforms include: (i) reorganizing the hospital network to improve efficiency and service delivery; (ii) strengthening primary healthcare and outpatient care; (iii) introducing performance-based budgeting to better align funding allocations with policy objectives and measurable results; (iv) promoting evidence-based addiction prevention and mental health programs to delay the initiation of substance use and improve youth mental well-being; (v) reducing patients' spending on prescription medicines; and (vi) expanding the digitalization of healthcare services.

E. Conclusions and Recommendations

25. Latvia achieves relatively good educational outcomes given its available resources, but there is scope to improve outcomes further and enhance education quality. Achieving these improvements will require realizing efficiency gains and redirecting resources toward high-priority areas, complemented by targeted additional funding to support reforms and raise educational performance. Addressing these challenges will require the following:

- *Improving the efficiency of the education network and resource allocation.* The declining teacher-to-student ratio suggests that ongoing school network consolidation is helping to improve resource allocation. Building on this progress, continued efforts to consolidate the school network, particularly in regions with declining student populations, could further improve the efficiency of resources and teacher allocation, while maintaining access to quality education. Efficiency gains from these measures could be redirected toward areas with greater impact on education quality and learning outcomes.

- *Translating education spending into stronger labor market outcomes.* This will require: (i) improving educational quality by reducing the share of low-performing students; (ii) closing skills gaps and ensuring highly educated workers are employed in jobs that make effective use of their qualifications; and (iii) continuing to invest in digital tools and expanding their integration into teaching and learning to help improve the quality, accessibility, and effectiveness of education.

- *Increasing education spending and improving the allocation of educational resources.* This will require (i) increasing targeted spending to strengthen the alignment of tertiary education and vocational training programs with labor market needs and foster closer collaboration between educational institutions and employers; and (ii) increasing investments to support the creation of higher value-added jobs that make more effective use of the skilled workforce and contribute to productivity growth.

26. Addressing teacher shortages will require a combination of measures to improve both recruitment and retention. Continued efforts to raise teacher compensation would help make the profession more attractive, particularly given that teachers' salaries remain below those of other tertiary-educated workers. Improving working conditions, including by reducing administrative burdens, providing greater classroom support, and strengthening professional development

opportunities, could help retain experienced teachers and encourage younger teachers to remain in the profession. Continuing efforts to strengthen teacher training and support for early-career teachers can help address persistent shortages and skills mismatches in STEM education. In addition, increasing the supply of STEM graduates could help renew the aging teaching workforce and maintain an adequate supply of qualified educators.

27. Latvia's weak health outcomes reflect both low levels of health spending and inefficiencies in the health system. Limited public funding for healthcare constrains access to services, contributing to long waiting times, high levels of unmet healthcare needs, and substantial out-of-pocket spending (EC, 2025). At the same time, inefficiencies in the allocation and use of public health resources limit the impact of existing spending on health outcomes. Simply increasing health expenditure is therefore unlikely to yield the expected improvements in health outcomes unless spending is used more efficiently (Garcia-Escribano et al., 2022). Improving health outcomes will therefore require both increased and better-targeted health expenditure and greater efficiency in public health spending.

28. Latvia should improve the efficiency of healthcare delivery to achieve better health outcomes. This includes strengthening the organization and coordination of healthcare services and ensuring that available resources are directed toward interventions and services that deliver the greatest health benefits. Rationalizing hospital networks, expanding primary care, and reducing avoidable hospitalizations could make more effective use of available resources. It also includes accelerating digital health reforms by integrating health databases, expanding the coverage of patient records in the e-health system, and strengthening data reporting requirements for healthcare providers. Although improving efficiency is essential to enhance the effectiveness of healthcare spending, it is unlikely to generate savings to meet Latvia's healthcare needs. Any efficiency gains should be redirected toward high-priority areas within the healthcare sector. Additional spending is needed to improve access, address unmet needs, and improve health outcomes.

29. Improving health outcomes is particularly important for enabling older and experienced workers to remain healthy and active for longer, thereby increasing domestic labor supply. Healthy life expectancy in Latvia remains relatively low compared with the EU average, highlighting the need for greater investment in the health sector to support healthier aging and enable people to remain in work at older ages. Healthier aging can help expand labor supply by extending working lives and improving worker productivity (Primus, 2025). Measures to increase healthy life expectancy are also important for ensuring that retirement reforms aimed at encouraging longer working lives are both sustainable and socially acceptable (Giupponi and Sebold, 2024).

30. Inadequate funding within the healthcare system hinders efforts to improve population health outcomes. Addressing this challenge will require additional resources targeted toward high-value reforms, including:

- *Strengthening preventive care by expanding screening and prevention programs.* The relatively high share of maternal mortality among total deaths suggests that a significant proportion of deaths may be attributable to conditions that can be prevented or treated through effective public health interventions and healthcare services. These areas should therefore remain priorities for health policy and resource allocation. Strengthening prevention, improving the management of chronic diseases, and enhancing healthcare delivery could help reduce avoidable mortality and improve population health.

- *Addressing shortages of doctors and nurses.* Improving working conditions, including by reducing patient-to-nurse ratios, shortening work shifts, strengthening career pathways, expanding opportunities for nurses to take on broader responsibilities, and reducing administrative burdens on physicians, could make these professions more attractive. At the same time, facilitating the recruitment and retention of skilled foreign healthcare workers could help expand access to healthcare services (OECD, 2026).

- *Strengthening primary and community-based care to reduce hospitalizations.* Earlier detection and treatment can improve health outcomes, reduce avoidable hospitalizations, and lower long-term healthcare costs. Further strengthening outpatient and community-based care would improve access to healthcare, support higher quality treatment, and increase spending efficiency.

- *Improving access to healthcare and medication to reduce mortality and improve overall health outcomes.* Ensuring timely access to healthcare services is essential for the early diagnosis and treatment of medical conditions. Expanding the coverage of publicly financed healthcare services and reducing out-of-pocket costs would help address financial barriers to care and encourage more timely use of healthcare services. High out-of-pocket spending can discourage patients, especially lower-income households, from seeking necessary treatment. Reducing the financial burden on patients should therefore form part of a broader strategy to improve access to healthcare and strengthen health outcomes. There is also room to improve access to pharmaceuticals by strengthening competition in the pharmacy and wholesale market (OECD, 2026).

References

Angelopoulos, Konstantinos, Jim Malley, and Apostolis Philippopoulos, 2007, "Public Education Expenditure, Growth and Welfare." *SSRN Electronic Journal*.

Artige, Lionel, and Laurent Cavenaile, 2023, "Public Education Expenditures, Growth and Income Inequality." *Journal of Economic Theory,* 209: 105622.

Beuchert, Louise, Maria Knoth Humlum, Helena Skyt Nielsen, Nina Smith, 2018, "The Short-Term Effects of School Consolidation on Student Achievement: Evidence of Disruption?" *Economics of Education Review*, 65, 31–47.

Chancel, Lucas, 2021, "Ten Facts About Inequality in Advanced Economies," in Olivier Blanchard and Dani Rodrik (eds.), *Combating Inequality – Rethinking Government's Role*. Cambridge, MA: The MIT Press and Peterson Institute for International Economics, pp. 4–30.

Dissou, Yazid, Selma Didic, and Tatsiana Yakautsava, 2016, "Government Spending on Education, Human Capital Accumulation, and Growth." *Economic Modelling, 58*, pp. 9–21.

European Commission (EC), 2026, "2026 Country Report – Latvia." Commission Staff Working Document No. 214.

European Commission (EC), 2025, "2025 Country Report – Latvia." Commission Staff Working Document No. 214.

Fournier, Jean-Marc, and Åsa Johansson, 2016, "The Effect of the Size and the Mix of Public Spending on Growth and Inequality." OECD Economic Department Working Papers No.1344.

Garcia-Escribano, Mercedes, Pedro Juarros, and Tewodaj Mogues, 2022, "Patterns and Drivers of Health Spending Efficiency." IMF WP/22/48, International Monetary Fund.

Giupponi, Giulia, and Arthur Seibold (eds), 2024, *Rethinking Pension Reform*, CEPR Press, Paris & London.

Hallaert, Jean-Jacques, and Keyra Primus, 2022, "Strengthening Public Expenditure Efficiency—Investment and Social Spending in Bulgaria." IMF WP/22/100, International Monetary Fund.

OECD, 2026, "OECD Economic Surveys: Latvia 2026." OECD, Paris.

OECD, 2025, "Survey of Adult Skills 2023 Technical Report, OECD Skills Studies." OECD, Paris.

OECD and European Observatory on Health Systems and Policies, 2023, "State of Health in the EU: Latvia—Country Health Profile 2023." OECD Publishing, Paris/European Observatory on Health Systems and Policies, Brussels.

Primus, Keyra, 2025, "Ensuring Adequate and Affordable Pensions in Latvia." SIP/2025/134, International Monetary Fund.

Parui, Pintu, and Klaus Prettner, 2025, "Public Provision of Healthcare and Basic Research: What Are the Joint Effects on Economic Growth and Welfare?" *Journal of Economic Growth, 30*, 383–415.

Taube, Maris, Edmunds Vaskis, and Oksana Nesterenko, 2018, "Can People Afford to Pay for Health Care: New Evidence on Financial Protection in Latvia." World Health Organization.

CORPORATE INCOME TAX REFORM AND FIRM INVESTMENT IN LATVIA[1]

This paper assesses the effects of distributed-profit-based corporate income tax regimes on firm investment, focusing on Latvia's 2018 reform. It uses firm-level Orbis data and a difference-in-differences framework with event-study extensions to examine investment rates in Latvia and Lithuania, before and after 2018. The results suggest that average investment rates neither increased nor declined after the reform, despite the uncertainty due to the COVID-19 pandemic and Russia's war in Ukraine, but balance sheets may have strengthened as firms started to hold more cash, retain more profits, and reduce leverage. The reform effect varies by types of firms, with more beneficial effects found for firms that were likely more financially constrained before the reform.

A. Introduction

1. Corporate income tax (CIT) policy plays an important role in shaping firms' investment and financing decisions. By affecting the after-tax return to capital and the availability of internal funds, the design of the corporate tax system can influence both the level and composition of private investment. A large empirical literature documents that higher effective corporate taxation is associated with lower investment and entrepreneurial activity, particularly when firms face financing frictions (e.g., De Mooij and Ederveen 2008, Djankov and others 2010, and Fuest and Neumeier 2023).

2. Latvia provides a distinctive policy setting for analyzing the link between corporate income taxation and firm investment. Although Estonia pioneered a distributed-profit tax regime in 2000, Latvia adopted a similar system in 2018, under which corporate income tax is levied primarily upon profit distribution rather than on an accrual basis. Under this framework, retained earnings are exempt from immediate taxation, allowing firms to defer tax liabilities as long as profits remain undistributed. This design offers a useful contrast to conventional corporate income tax systems and enables a comparative assessment of investment responses.

3. The policy rationale for distributed profit taxation is that exempting retained earnings lowers the effective cost of capital and improves firms' liquidity positions, thereby encouraging reinvestment. These effects may be particularly relevant for private firms, young firms, and small and medium-sized enterprises (SMEs), which tend to rely more heavily on internal financing and face greater constraints in accessing external capital markets. At the same time, the regime entails trade-offs between supporting retained earnings and broadening the tax base, and raises questions about whether the investment response is sufficiently strong to justify delayed tax revenue. Although the ultimate goal of the 2018 CIT reform was to promote economic growth in

[1] Prepared by Bingjie Hu and Can Ugur, with assistance from Kofi Gefei Zhou. The authors are grateful for the helpful comments from Luis Brandao-Marques, David Bartolini, Helge Berger, Vincenzo Guzzo, Ha Nguyen, Latvian authorities, and seminar participants at the Bank of Latvia.

Latvia by raising firm investment, its more immediate goal was to encourage firms to build equity and improve access to credit by increasing their collateral value.[2]

4. This paper studies Latvia's shift to distributed-profit taxation and its effects on firm investment rate using firm-level data from Orbis and a difference-in-differences approach. The analysis compares the outcomes of Latvian firms to those of firms in Lithuania before and after the 2018 Latvian CIT reform. The study provides new micro-level evidence on how corporate tax design affects investment behavior and whether effects differ across Latvian firms with different characteristics. The study combines the difference-in-difference method and with an event study to give a more nuanced assessment of how distributed-profit taxation shapes investment behavior over time.

B. Institutional Background

Latvia's Corporate Income Tax Reform in 2018

5. Latvia implemented a new CIT regime effective January 1, 2018. Under the new system, pioneered by Estonia, undistributed profits are exempt from corporate income tax, while distributed and deemed distributed profits are taxed at the statutory rate. The reform shifted the timing of taxation from profit generation to profit distribution, with the stated aim of improving firms' cash flow and incentivizing reinvestment. The Latvian reform provides a valuable quasi-experiment for empirical analysis.

6. Latvia's 2018 corporate income tax reform incorporated anti-avoidance features from the outset. The Corporate Income Tax Law defines a broad set of taxable objects treated as deemed profit distributions, including nonbusiness expenses, capital reductions, transfer-pricing adjustments, excessive interest payments, and loans to shareholders or related parties that do not meet arm's-length or business-purpose criteria. In addition, Latvia transposed the EU Anti-Tax-Avoidance Directive in 2020. Compared to Estonia—where anti-avoidance provisions were strengthened gradually through subsequent amendments—Latvia's approach embeds these safeguards directly into the post-2018 distributed-profit regime.

Lithuania as a Counterfactual

7. Lithuania is used as the baseline control group as it provides a credible counterfactual for Latvia in the absence of the 2018 corporate income tax reform. The two economies are exposed to similar regional and global shocks and operate under comparable institutional and macroeconomic frameworks, while Lithuania maintained a conventional corporate income tax system throughout the period. This allows differences in investment outcomes to be more plausibly attributed to Latvia's shift to distributed-profit taxation rather than to concurrent policy changes or

[2] Tax Strategy 20/20 – Bank of Latvia (in Latvian). The relatively stringent collateral requirements by banks in Latvia and the Baltic region have been well documented. For instance, see "Financing of the Economy", 2024, Bank of Latvia, FPP_2024_EN.pdf

other macroeconomic shocks[3]. As a robustness check, the analysis also employs Finnish firms as an alternative control group.[4]

C. Conceptual Framework and Related Literature

8. Corporate tax rates should affect firms' investment decisions, in theory. In the standard neoclassical investment model, firms invest until the marginal product of capital equals the user cost of capital. Corporate taxation affects investment by lowering the after-tax return to capital. When firms rely on internal financing, taxation of retained earnings can further constrain investment by reducing available internal funds.

9. Distributed profit taxation alters these incentives by exempting retained earnings from immediate taxation. By reducing the tax wedge on reinvested profits, the regime lowers the effective cost of capital for internally financed investment and improves firms' liquidity positions. These channels are likely to be most relevant for firms that face external financing constraints. After the transition from earnings-based to distributed profit-based taxation, firms are likely to increase liquidity and reduce their borrowing. They may also increase their investment rate as the effective cost of capital is reduced. Investment increases may be strongest for financially constrained firms.

10. The corporate finance literature emphasizes that when external finance is costly due to information asymmetries or agency problems, investment becomes more sensitive to internal cash flow (Fazzari, Hubbard, and Petersen 1988). Under such conditions, tax systems that preserve internal liquidity may have disproportionate effects on investment among financially constrained firms, including SMEs and younger firms.

11. An empirical literature documents the relationship between corporate taxation and investment. Cross-country studies show that higher effective corporate tax rates are associated with lower aggregate investment, foreign direct investment, and entrepreneurial activity (Djankov and others 2010). Meta-analyses further indicate that corporate taxes affect investment through multiple behavioral margins, including capital accumulation and location decisions (De Mooij and Ederveen 2008; Fuest and Neumeier 2023).

12. Evidence specific to distributed profit taxation is more limited. Using firm-level data, Masso, Meriküll, and Vahter (2013) show that Estonia's 2000 shift to taxing distributed profits increased firms' liquidity and reduced leverage, with positive effects on investment and productivity, particularly among smaller firms. Staehr (2014) reports similar improvements in financing conditions, though macroeconomic and revenue outcomes were less favorable. Firm-level evidence on Latvia's

[3] Other events may have affected firm investment during the sample period. For instance, ABLV bank failure and financial sector restructuring in Latvia in 2018 had a negative effect on firm investment. In the case of Lithuania, investment project CIT allowance increased during the sample period, which had a positive effect on firm investment. Therefore, the estimated effect of the 2018 CIT reform on firm investment in Latvia may be lower than the actual impact.

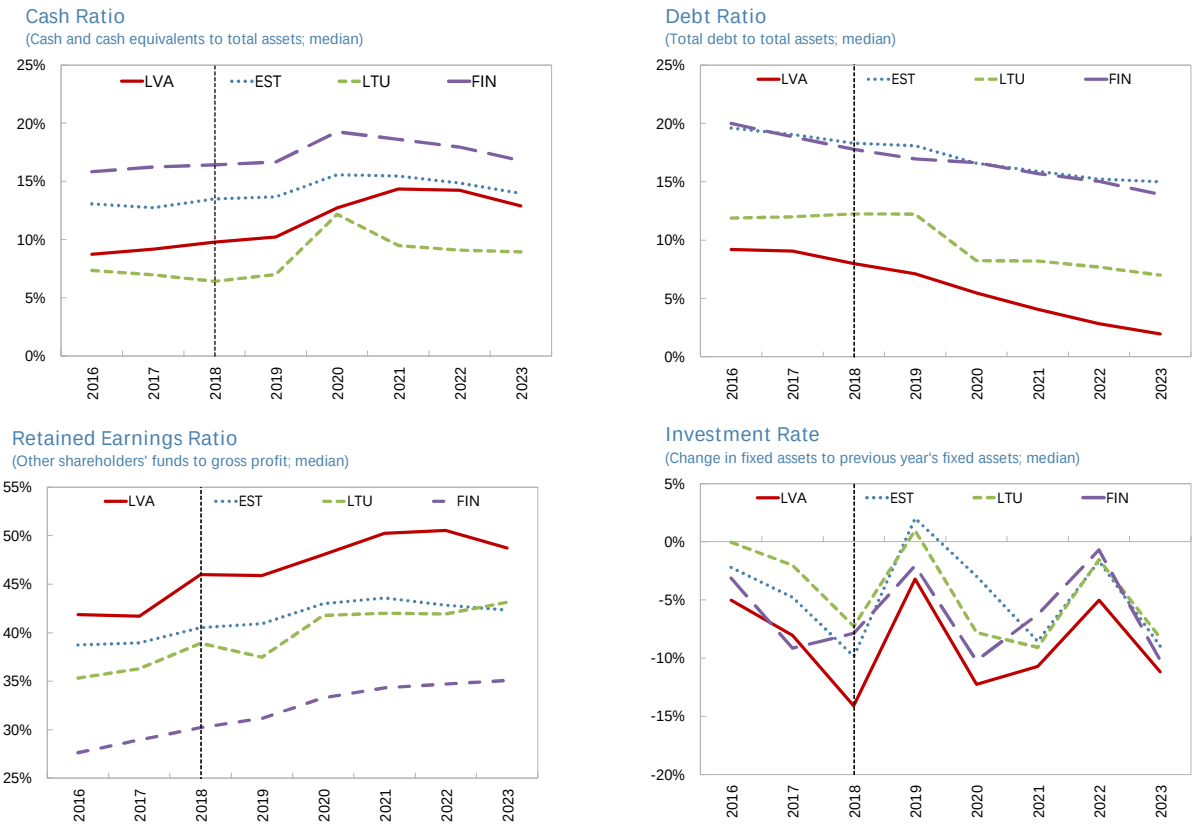
[4] Lithuania is a more similar comparator to Latvia, making it our baseline control group; Finland has better data coverage and is in the same region, allowing for an alternative control exercise.

2018 reform is even scarcer, and existing studies largely focus on balance-sheet indicators rather than investment behavior. This paper contributes to this literature by providing a comparative micro-level analysis of Latvian firms that tries to measure the effect of the reform on the investment rate, cash balances, leverage, and retained earnings.[5]

D. Stylized Facts

13. Stylized facts suggest that the distributed profit tax reform has an impact on firms' liquidity and leverage, but its effect on investment rates remains ambiguous. The country-level median financial indicators over time for Latvia, Estonia, Lithuania, and Finland based on firm-level data are represented in Figure 1. Data suggest that after the reform and during the COVID-19 crisis Latvian firms increased liquidity, reduced leverage, and retained more earnings than before the reform. By contrast, investment rates fluctuated with no clear post-reform pattern, like in the comparison countries.

Figure 1. Baltics and Finland: Firm-Level Financial Indicators, 2016–2023



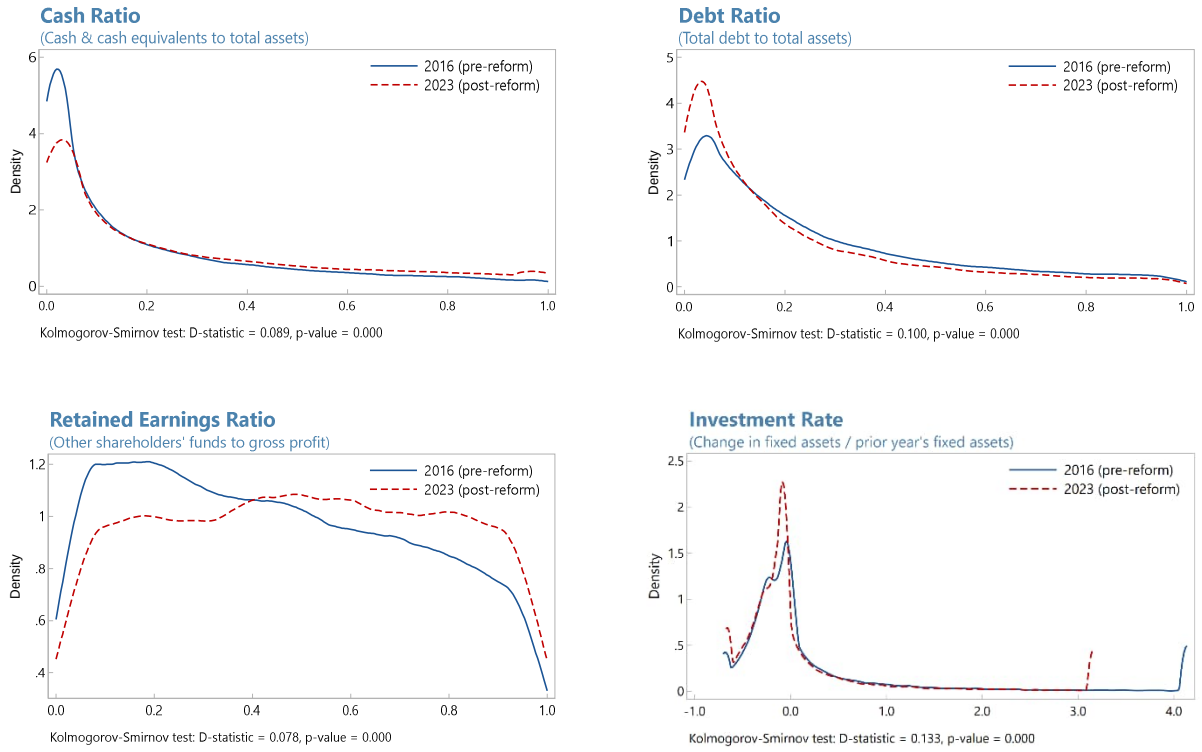
Sources: Bureau van Dijk, Orbis database; and IMF staff calculations.

Note: dashed vertical line indicates Latvia's reform year 2018. The data sample is cleaned as in the baseline regression analyses on investment rates (Table 1 and Appendix Table 6).

[5] These balance sheet variables and ratios capture some (but not all) of the objectives of the CIT reform.

14. The distribution of financial indicators across Latvian firms points to an improvement in corporate balance sheets after the reform (Figure 2). The distribution of the cash ratio and that of retained earnings moved to the right (i.e., most firms increased cash balances and retained earnings). In contrast, the distribution of the debt ratio shifted considerably to the left (i.e., leverage decreased). These changes indicate broad-based gains in liquidity and internal financing alongside reduced leverage. In contrast, post-reform investment rate[6] distribution exhibits some movement to the left after the reform, indicating declining investment rates.

Figure 2. Latvia: Firm-Level Financial Indicator Distributions, 2016 Versus 2023



Sources: CSB Latvia's firm-level dataset; and IMF staff calculations.

Note: The charts display kernel density estimates, using the Epanechnikov kernel with an optimal bandwidth. The data sample comes from CSB Latvia and is cleaned using the same cleaning methods as for the baseline regression analyses on investment rates using Orbis data (Table 1 and Appendix Table 6). For each of the four variables, the Kolmogorov-Smirnov test (presented in each chart's footnote) finds that the distributions for 2016 and 2023 are statistically distinct.

[6] Investment rate is defined as the annual change in fixed assets divided by the level of fixed assets in the previous year. This definition does not account for the depreciation rate and its heterogeneity across fixed asset types as well as adjustments in fixed asset values.

E. Methods and Data

15. The empirical strategy combines a difference-in-differences (DiD) framework with an event-study to estimate the effects of Latvia's 2018 CIT reform on firm investment. The DiD approach compares changes in firm-level investment outcomes in Latvia before and after the reform to contemporaneous changes in Lithuania (and Finland in a robustness check), controlling firm and country-level observable characteristics, and for firm and year fixed effects to absorb time-invariant heterogeneity and common shocks. The event-study specification traces the dynamic response of investment, cash balances, leverage, and retained earnings before and after the reform year. It allows for a flexible assessment of adjustment patterns and provides a formal test of the parallel-trends assumption in the pre-reform period.

Event-Study Specification

16. The analysis starts with an event-study specification to examine the dynamic effects of the reform and assess the validity of the parallel-trends assumption. This preliminary assessment is crucial to check the overall validity of the DiD framework. The specification is the following:

$$y_{it} = \alpha + \sum_{k \neq -1} \beta_k \, (\text{Latvia}_i \times \mathbf{1}\{t - t_0 = k\}) + \mu_i + \lambda_t + X_{it}'\gamma + \varepsilon_{it},$$

where y_{it} denotes the firm-level investment rate of firm *i* at year *t*. $t_0 = 2018$ denotes the reform year and k indexes leads and lags relative to the reform. The indicator $\mathbf{1}\{t - t_0 = k\}$ equals one if year t is k years away from the reform. The year immediately preceding the reform ($k = -1$) is omitted and serves as the reference period. Firm fixed effects (μ_i) control for time-invariant differences across firms, while year fixed effects (λ_t) absorb common macroeconomic shocks and regional trends affecting both countries. The vector X_{it} includes time-varying firm characteristics (lag of sales and the squares of demeaned firm age[7]) and time-varying country-level macroeconomic variables (real GDP growth, inflation, unemployment rate, and financial conditions). ε_{it} is the error term. Standard errors are clustered at the firm level.

Coefficients of interest: *The coefficients β_k trace the evolution of investment outcomes before and after the reform. Estimates for pre-reform years provide a formal test of the parallel-trends assumption, while post-reform coefficients capture the dynamic adjustment of firm investment to the new tax regime. If the pre-reform coefficients are not statistically different from zero, the parallel trends assumption is likely valid.*

[7] We use the sample mean of firm age.

Difference-in-Differences Framework

17. The analysis continues with a difference-in-differences (DiD) framework that compares investment outcomes of Latvian firms to those of Lithuanian firms before and after the reform. This analysis estimates the impact of Latvia's 2018 shift to distributed-profit taxation on firm investment. Lithuania serves as the baseline control group, while Finland is used as a control group in our robustness check. The baseline DiD specification is given by:

$$y_{it} = \alpha + \beta(\text{Latvia}_i \times \text{Post}_t) + \mu_i + \lambda_t + X_{it}'\gamma + \varepsilon_{it},$$

where y_{it} denotes the firm-level investment rate of firm *i* at year *t*, or other outcome variables such as cash ratio, retained earnings ratio or debt ratio. Latvia_i is an indicator for firms located in Latvia, and Post_t is an indicator equal to one for 2018 and subsequent years, signifying periods where the 2018 reform is in effect. The coefficient β captures the average treatment effect of the reform. Firm fixed effects (μ_i) control for time-invariant differences across firms, while year fixed effects (λ_t) absorb common macroeconomic shocks and regional trends affecting both countries. The vector X_{it} includes time-varying firm characteristics (lag of sales and the squares of demeaned firm age) and time-varying country-level macroeconomic variables (real GDP growth, inflation, unemployment rate, and financial conditions). ε_{it} is the error term. Standard errors are clustered at the firm level.

Heterogeneous Effects by Firm Characteristics

18. The baseline DiD specification is augmented to allow for heterogeneity by predetermined firm characteristics, such as employment and productivity. This allows an examination of whether the investment response to the corporate income tax reform differs across firms. Heterogeneous effects are estimated by interacting the treatment indicator with firm characteristics measured prior to the reform, thereby avoiding endogeneity concerns. Let $Z_i$denote a firm characteristic of interest, defined using pre-reform averages (e.g., number of employees, debt ratio, and labor productivity). The heterogeneous DiD specification is given by:

$$y_{it} = \alpha + \beta(\text{Latvia}_i \times \text{Post}_t) + \theta(\text{Latvia}_i \times \text{Post}_t \times Z_i) + \mu_i + \lambda_t + X_{it}'\gamma + \varepsilon_{it},$$

where all variables are defined as in the baseline specification. The coefficient β captures the average treatment effect for firms with $Z_i = 0$, while θ measures how the effect of the reform varies with the firm characteristic Z_i. Consistent with earlier models, the vector X_{it} includes time-varying firm characteristics (lag of sales and the squares of demeaned firm age) and time-varying country-level macroeconomic variables (real GDP growth, inflation, unemployment rate, and financial conditions).

The analysis also considers firm-level heterogeneity in the responses of the investment rate according to initial levels of productivity and debt. This is done as follows:

- Productivity Heterogeneity: Z_i is defined by the deviation from the mean[8] using pre-reform labor productivity. This specification allows the analysis to test whether more productive firms—potentially with higher returns to capital—exhibit stronger investment responses following the reform.

- Debt Ratio Heterogeneity: Z_i is defined by the deviation from the mean using pre-reform debt ratio. This specification helps identify whether firms with lower debt ratio exhibit stronger investment responses after the reform, as firms that do not have access to external financing may benefit more from the CIT reform.

Details about the macroeconomic variables used as controls, the dataset, cleaning procedure, and the sample can be found in the Appendix.

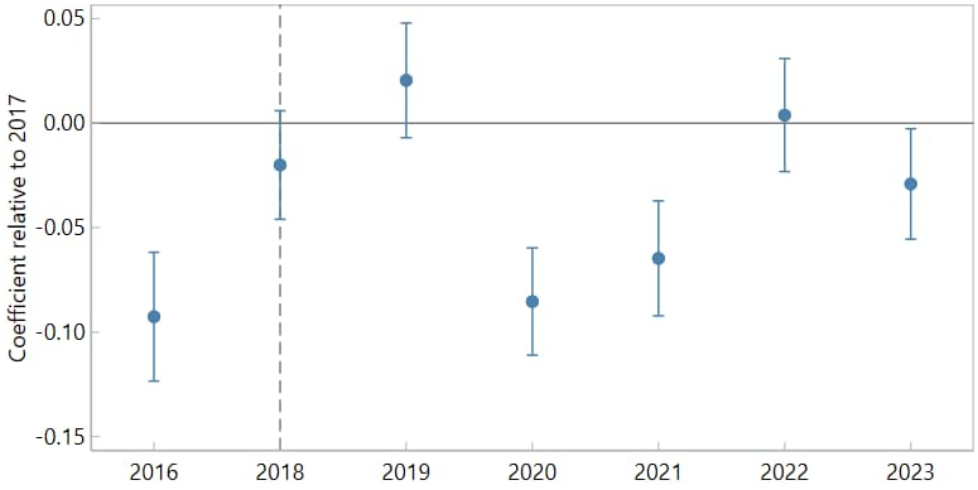
F. Regression Results

Event Study

19. The event study estimates do not provide evidence of a sustained increase in firms' investment rates following Latvia's 2018 corporate income tax reform (Figure 3). Post-reform coefficients oscillate between significantly negative or insignificant, and they exhibit no clear upward trend, with investment rates declining. Overall, the evidence suggests no sustained reform-induced increase in firm-level investment rates through 2023.

Figure 3. Latvia: Event Study of the Effect of the 2018 CIT Reform on Firms' Investment Rates

(Lithuanian firms are used as control group; variable controls for sales, firm age, and macro variables)



Sources: Bureau van Dijk, Orbis database; IMF, World Economic Outlook; ECB; and IMF staff calculations.

Note: Dashed line indicates reform year. Firm and year fixed effects absorbed. Standard errors clustered by firm.

[8] We use the sample mean of pre-reform firm characteristics such as labor productivity and debt ratio.

20. The event study indicates statistically significant differences in investment rates prior to the reform, pointing to underlying divergences between Latvian firms and the control group. The event-study estimates show a negative difference in investment rates of Latvian firms (compared to Lithuanian ones) two years prior to the reform, indicating deviations from parallel trends and warranting caution in interpreting the DiD results as causal.[9] The underlying divergences between Latvian and Lithuanian firms may reflect differential structural changes or sample composition effects. It is worth noting the differences in the economic structure of Latvia and Lithuania. For instance, Latvia has a larger share of micro firms, a smaller manufacturing sector, and a larger trade sector. Therefore, the results of the event study analysis mean that the DiD results should be interpreted as suggestive rather than causal.

Difference-in-Differences

21. The results from the DiD suggest that corporate balance sheets have strengthened after the CIT reform while there is no positive impact on firms' investment rates. The point estimate in Table 1, column (1) is negative but not statistically significant. In the meantime, the significant estimates in columns (2)-(4) suggest that firms increased their cash and retained earnings ratios after the reform, while decreasing their debt ratios. The results for the investment rate and cash ratio are robust if we use Finnish firms as an alternative control group (Appendix Table 6), but those for debt ratios and retained earnings are not. We perform further robustness exercises that use the investment rate as the dependent variable and Lithuanian firms as controls: first, we restrict the types of firms in the sample (i.e., exclude firms without any profitable years during 2015–7, include only manufacturing firms, or include small firms; Appendix Table 7) and then we extend the sample period to include 2015 (Appendix Table 8). The results are consistent with our baseline of no positive and significant association of the reform with investment rates.[10]

Table 1. Latvia: Effects of the 2018 CIT Reform on Firms' Investment Rates, Cash, Debt, and Retained Earnings Ratios
(Lithuanian firms are used as control group)

	(1) Investment rate	(2) Cash ratio	(3) Debt ratio	(4) Retained earnings ratio
Latvia × Post-2018	-0.0150	0.0153***	-0.0110***	0.0395***
	(0.0123)	(0.0017)	(0.0032)	(0.0043)
Sales (lag of log)	-0.0894***	-0.0068***	-0.0084***	0.0340***
	(0.0048)	(0.0008)	(0.0010)	(0.0020)

[9] In a robustness exercise (Appendix Figure 2), we restrict the types of firms in the sample (excluding firms without any profitable years during 2015-7, including only manufacturing firms, or small firms as well). The results are consistent with our baseline. Moreover, the results are similar when we use Finnish firms as an alternative control group (Appendix Figure 3).

[10] This is in line with the event study, which does not indicate a clear structural break in investment dynamics following the reform.

Table 1. Latvia: Effects of the 2018 CIT Reform on Firms' Investment Rates, Cash, Debt, and Retained Earnings Ratios (Concluded)

Firm age (square of demeaned)	0.0022***	0.0001***	-0.0001**	-0.0005***
	(0.0002)	(0.0000)	(0.0000)	(0.0001)
Real GDP growth (%)	0.0051*	0.0032***	-0.0004	0.0001
	(0.0026)	(0.0003)	(0.0004)	(0.0007)
HICP headline inflation (avg, %)	0.0537***	0.0120***	-0.0041**	0.0020
	(0.0082)	(0.0010)	(0.0016)	(0.0025)
Unemployment rate (%)	0.0314***	0.0179***	-0.0102***	0.0246***
	(0.0086)	(0.0013)	(0.0022)	(0.0032)
Financial conditions index (ECB)	-1.1242***	-0.3193***	0.0849**	-0.2358***
	(0.1745)	(0.0208)	(0.0332)	(0.0506)
Constant	0.9843***	0.1409***	0.3525***	-0.1543***
	(0.0927)	(0.0146)	(0.0194)	(0.0358)
N	237,553	248,082	183,406	82,274

Data window: 2016–2023. Standard errors clustered by firm in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.

Sources: Bureau van Dijk, Orbis database; IMF, World Economic Outlook; ECB; and IMF staff calculations.

22. The evidence suggests that Latvia's CIT reform had different effects on investment for different types of firms (Table 2). Firms with lower pre-reform productivity increase investment rates more than the rest following the reform. Likewise, firms with lower pre-reform debt ratios increase investment post-reform more than the rest of the sample. The results hold both with the baseline specification using Lithuania as the control group (Table 2) and in the robustness exercise that uses Finland as the control (Appendix Table 9). These patterns suggest that the reform may have supported capital accumulation among less productive firms and firms that rely more on internal funds (i.e., retained earnings). Importantly, this points to the reform having been more beneficial for firms that were more financially constrained before the reform, as intended. This raises the stakes for the reform improving firm productivity in the long term.

Table 2. Latvia: Heterogeneous Effects of the 2018 CIT Reform on Firms' Investment Rates, with Pre-Reform Labor Productivity and Debt Ratio
(Lithuanian firms are used as control group)

	(1) Investment rate	(2) Investment rate
Reform	-0.0134	0.0492**
	(0.0119)	(0.0192)
Reform x pre-reform labor productivity (demeaned)	-0.0269***	
	(0.0029)	
Reform x pre-reform debt ratio (demeaned)		-0.2572***
		(0.0149)
Constant	0.2047***	0.3600***
	(0.0720)	(0.1037)
N	354,482	272,839

Data window: 2016–2023. Heterogeneity variable non-missing required. Standard errors clustered by firm in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01
Sources: Bureau van Dijk, Orbis database; IMF, World Economic Outlook; ECB; and IMF staff calculations.

G. Discussion

23. Taxing profits only upon distribution may encourage the reinvestment of retained profits. Unlike traditional corporate income taxation, which raises the cost of internal financing by taxing profits regardless of payout, dividend-based regimes allow retained earnings to accumulate tax free, improving liquidity and easing financing frictions without necessarily boosting average investment. This could make financial constraints less binding for firms that have positive cash flows but lack collateral or long credit histories to be able to rely on external finance.

24. The findings of this paper suggest that shifting to distributed-profit taxation did not translate into a broad-based increase in firm investment rate. However, the assessment period is affected by confounding factors. The reform was still in its transition phase when firms were hit by the COVID-19 pandemic. During the post-reform period, uncertainty heightened due to Russia's war in Ukraine. Other confounding factors include the financial sector restructuring in Latvia and the investment-project CIT allowance in Lithuania during the sample period, which implies a potential bias in our estimated effect of the CIT reform in Latvia on investment rate. The heterogeneous CIT reform effects on Latvian firms suggest that the current tax regime may have benefited more

financially constrained firms. Although the results are also consistent with there being more limited effects on more productive firms, it is also possible that the CIT reform relaxed financial constraints for firms that were operating below their efficient scale and thus contributed to a better allocation of resources and improvement in firm productivity in the long term.

25. In formulating CIT policy, it is important to consider the tradeoff between revenue mobilization and supporting retained earnings of firms. The authorities have foregone a broader corporate income tax base in favor of stronger corporate balance sheets and avenues for firms to use retained earnings to finance investment. However, the revenue generated by the CIT, which declined after the reform, surpassed pre-reform levels in 2025.[11] This may have happened because the distributed-profit-based corporate tax system encourages firms to move from the shadow economy into the formal sector. In the meantime, a narrow corporate income tax base may become disadvantageous given rising medium-term public spending pressures. A fuller cost-benefit analysis is beyond the scope of this paper but should be the subject of further study.

[11] CIT revenues were 1.3 percent of GDP in 2016, 0.2 percent in 2019, and 1.9 percent in 2025. See Taxes in Latvia by the Ministry of Finance of the Republic of Latvia.

References

De Mooij, Ruud A., and Sjef Ederveen. 2008. “Corporate Tax Elasticities: A Reader’s Guide to Empirical Findings.” *Oxford Review of Economic Policy* 24(4): 680–697. [jstor.org]

Djankov, Simeon, Tim Ganser, Caralee McLiesh, Rita Ramalho, and Andrei Shleifer. 2010. “The Effect of Corporate Taxes on Investment and Entrepreneurship.” *American Economic Journal: Macroeconomics* 2(3): 31–64. [aeaweb.org]

Fazzari, Steven, R. Glenn Hubbard, and Bruce Petersen. 1988. “Financing Constraints and Corporate Investment.” *Brookings Papers on Economic Activity* 1: 141–195. [brookings.edu]

Fuest, Clemens, and Florian Neumeier. 2023. "Corporate taxation." *Annual Review of Economics* 15 (2023): 425–450.

Masso, Jaan, Jaanika Meriküll, and Priit Vahter. 2013. “Shift from Gross Profit Taxation to Distributed Profit Taxation: Are There Effects on Firms?” *Journal of Comparative Economics* 41(4): 1092–1105.

Staehr, Karsten. 2014. “Corporate Income Taxation in Estonia: Is It Time to Abandon Dividend Taxation?” *TUT Economic Research Series, Research Brief* RB-2014/1. [haldus.taltech.ee]

State Revenue Service of Latvia (VID). “Corporate Income Tax.” (Updated 23 April 2025). [vid.gov.lv]

PwC Tax Summaries. “Latvia—Taxes on Corporate Income.” (Last reviewed 06 February 2026).

Appendix I. Data Collection, Data Cleaning, and Additional Results

A. Macroeconomic Variables as Regression Controls

1. As country-level time-varying controls for our regressions, we incorporate a series of macroeconomic variables. We use the IMF's World Economic Outlook database to source real GDP growth, headline inflation, and unemployment rate, and we use the European Central Bank's database for financial conditions index series.

B. Orbis Dataset

2. The analysis is based on firm-level financial data from Bureau van Dijk's Orbis database. Orbis allows consistent construction of investment, capital, and other key firm characteristics across countries and over time, making it well suited for comparative policy analysis. The dataset covers incorporated firms with sufficient reporting continuity to compute investment rates and related controls, enabling a detailed examination of firm-level investment responses to CIT reform relative to a comparable control group.

C. Cleaning

3. The Orbis dataset is cleaned following Masso and others (2013). We exclude firms operating in public administration and financial sectors. Monetary variables are deflated using the producer price inflation and investment deflator at the country level. We exclude values for which cash to assets, current assets to total assets, total liabilities to total assets, debt to total assets, or retained earnings ratios are less than 0 or greater than 1. Investment rate is winsorized at the 5th and 95th percentiles. Observations with non-positive fixed assets (reflecting reporting or accounting anomalies) are excluded from the baseline sample, as investment rates are not well defined in the absence of a positive capital stock.

D. Sample

4. The baseline regression sample spans 2016 to 2023 for Latvia, Lithuania, and Finland (see Appendix Tables 2-5). We restrict the sample to firms with data coverage for both pre- and post-reform years. This restriction mitigates concerns over firm entry and exit around the reform. However, it also implies that the analysis is based on a sample of surviving firms, which may not be representative of the broader firm population[1]. If firms that exit after the reform differ systematically in their investment behavior, this could potentially bias the estimated effects. Moreover, we restrict our baseline sample to exclude small firms, as defined by two metrics: fewer than two employees or

[1] If firms that exit after the reform differ systematically in their investment behavior, this could potentially bias the estimated effects of the reform on investment rate. However, an analysis of differences in behavior across entrant and incumbent firms is beyond the scope of this paper.

having less than 40,000 USD in real sales (constant 2015 USD). This allows us to exclude any firm that might be simply individuals who are registering as firms as a tax shelter for labor income. Additionally, we restrict our sample to unconsolidated firms only in order to avoid any double-counting of firms being listed as both consolidated and unconsolidated. Finally, for each regression, we restrict the sample to Latvia and one control country at a time (Lithuania or Finland).

Appendix I. Table 1. Latvia, Lithuania, and Finland: Definition of Firm-Level Variables

Variable	Definition
Fixed assets	Total amount (after depreciation) of non-current assets (intangible assets + tangible assets + other fixed assets), deflated with World Bank World Development Indicators (WDI) country-level investment deflators.
Current assets	Total amount of current assets (stocks + debtors + other current assets), deflated with PPI.
Total assets	The sum of fixed assets and current assets.
Cash and cash equivalents	The amount of cash at bank and in hand of the company, deflated with PPI.
Loans	Short-term financial debts (e.g. to credit institutions + part of long-term financial debts payable within the year, bonds, etc.), deflated with PPI.
Long-term debt	Long-term financial debts (e.g. to credit institutions (loans and credits), bonds), deflated with PPI.
Total debt	Loans and noncurrent long-term debt.
Current liabilities	Current liabilities of the company (loans, creditors, and other current liabilities), deflated with PPI.
Noncurrent liabilities	Long-term liabilities of the company (long-term financial debts + other long-term liabilities and provisions), deflated with PPI.
Total liabilities	The sum of noncurrent liabilities and current liabilities.
Other shareholders' funds	All shareholders' funds not linked with the Issued capital such as reserve capital, undistributed profit, include also minority interests if any, deflated with PPI.
Sales	Net sales deflated with PPI.
Firm age	Number of years firm has been in operation.
Firm size	Natural log of total assets.
Number of employees	Total number of employees included in the company's payroll.
Cash ratio	The ratio of cash and cash equivalents to total assets.
Liabilities ratio	The ratio of total liabilities to total assets.
Debt ratio	The ratio of total debt to total assets.
Retained earnings ratio	The ratio of other shareholders' funds to gross profits.
Investment rate	Annual change in fixed assets divided by lagged fixed assets.
Labor productivity	Value added per worker.
Sales per worker	Log of total sales divided by number of employees.

Source: Bureau van Dijk, Orbis dataset; IMF Research Department; and IMF staff calculations.

Appendix I. Table 2. Latvia, Lithuania, and Finland: Observations by Year and Country

Year	Latvia	Lithuania	Finland	Total
2016	24,115	9,759	60,196	94,070
2017	25,009	8,742	58,688	92,439
2018	24,514	7,778	57,755	90,047
2019	22,824	9,434	54,191	86,449
2020	21,201	9,455	51,125	81,781
2021	20,367	9,318	48,545	78,230
2022	19,749	9,092	46,141	74,982
2023	18,877	8,750	42,363	69,990
Total	176,656	72,328	419,004	667,988

Note: The sample presented in Appendix Tables 2-5 represents the observations that were used for the baseline regressions related to investment rates (Table 1 and Appendix Table 6). Therefore, this is a cleaned sample with fewer observations than in the original Orbis dataset.
Source: Bureau van Dijk, Orbis dataset; and IMF staff calculations.

Appendix I. Table 3. Latvia: Descriptive Statistics, 2016–2023

Variable	Definition	Average	Std. dev.	Min.	Max.	Obs.
Cash ratio	Cash and cash equivalents / total assets	0.20	0.23	0.00	1.00	174,923
Current asset ratio	Current assets / total assets	0.64	0.30	0.00	1.00	176,646
Debt ratio	Total debt / total assets	0.17	0.24	0.00	1.00	164,944
Retained earnings ratio	Other shareholders' funds / gross profit	0.47	0.28	0.00	1.00	63,235
Investment rate	Change in fixed assets / lagged fixed assets	0.14	0.84	-0.71	3.94	170,703
Sales per worker (log)	Log of total sales / number of employees	10.75	1.03	6.37	17.13	174,377
Number of employees	Number of employees (headcount)	20.23	111.73	2.00	7710.00	174,875

Source: Bureau van Dijk, Orbis dataset; and IMF staff calculations.

Appendix I. Table 4. Lithuania: Descriptive Statistics, 2016–2023

Variable	Definition	Average	Std. dev.	Min.	Max.	Obs.
Cash ratio	Cash and cash equivalents / total assets	0.15	0.18	0.00	1.00	65,525
Current asset ratio	Current assets / total assets	0.67	0.27	0.00	1.00	72,328
Debt ratio	Total debt / total assets	0.15	0.17	0.00	0.97	14,423
Retained earnings ratio	Other shareholders' funds / gross profit	0.41	0.30	0.00	1.00	37,905
Investment rate	Change in fixed assets / lagged fixed assets	0.21	0.86	-0.69	5.24	67,200
Sales per worker (log)	Log of total sales / number of employees	11.26	1.12	7.09	16.03	72,103
Number of employees	Number of employees (headcount)	59.54	187.79	2.00	7550.00	72,103

Source: Bureau van Dijk, Orbis dataset; and IMF staff calculations.

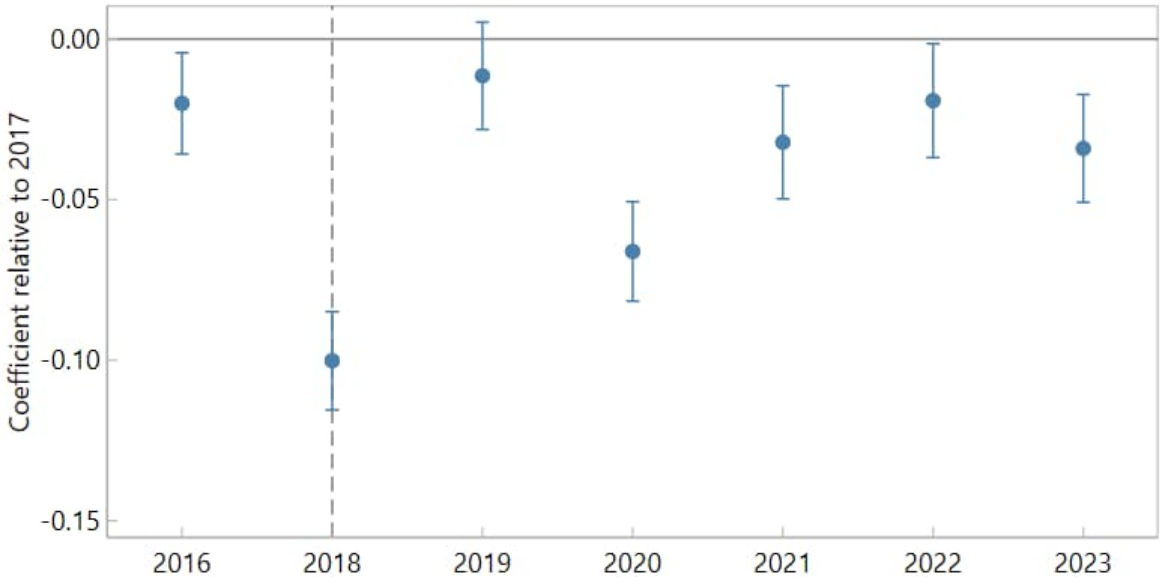
Appendix I. Table 5. Finland: Descriptive Statistics, 2016–2023

Variable	Definition	Average	Std. dev.	Min.	Max.	Obs.
Cash ratio	Cash and cash equivalents / total assets	0.24	0.23	0.00	1.00	386,238
Current asset ratio	Current assets / total assets	0.62	0.29	0.00	1.00	414,913
Debt ratio	Total debt / total assets	0.23	0.23	0.00	1.00	242,526
Retained earnings ratio	Other shareholders' funds / gross profit	0.37	0.26	0.00	1.00	271,794
Investment rate	Change in fixed assets / lagged fixed assets	0.06	0.46	-0.46	1.81	394,880
Sales per worker (log)	Log of total sales / number of employees	11.88	0.87	7.52	18.61	258,151
Number of employees	Number of employees (headcount)	24.64	153.21	2.00	15338.00	260,064

Source: Bureau van Dijk, Orbis dataset; and IMF staff calculations.

Appendix I. Figure 1. Latvia: Event Study of the Effect of the 2018 CIT Reform on Firms' Investment Rates

(Finnish firms are used as control group; variable controls for sales, firm age, and macro variables)



Sources: Bureau van Dijk, Orbis database; IMF, World Economic Outlook; ECB; and IMF staff calculations.

Note: Dashed line indicates reform year. Firm and year fixed effects absorbed. Standard errors clustered by firm.

Appendix I. Table 6. Latvia: Effects of the 2018 CIT Reform on Latvian Firms' Investment Rates, Cash, Debt, and Retained Earnings Ratios

(Finnish firms are used as control group)

	(1) Investment rate	(2) Cash ratio	(3) Debt ratio	(4) Retained earnings ratio
Latvia × Post-2018	-0.0144	0.0037**	0.0089***	-0.0093**
	(0.0106)	(0.0017)	(0.0018)	(0.0042)
Sales (lag of log)	-0.0721***	-0.0086***	-0.0065***	0.0152***
	(0.0027)	(0.0006)	(0.0007)	(0.0012)
Firm age (square of demeaned)	0.0010***	0.0002***	0.0001***	-0.0006***
	(0.0001)	(0.0000)	(0.0000)	(0.0000)
Real GDP growth (%)	0.0129***	0.0042***	-0.0012***	0.0013*
	(0.0017)	(0.0003)	(0.0003)	(0.0007)
HICP headline inflation (avg, %)	0.0098***	0.0034***	-0.0007***	0.0005
	(0.0009)	(0.0002)	(0.0002)	(0.0004)

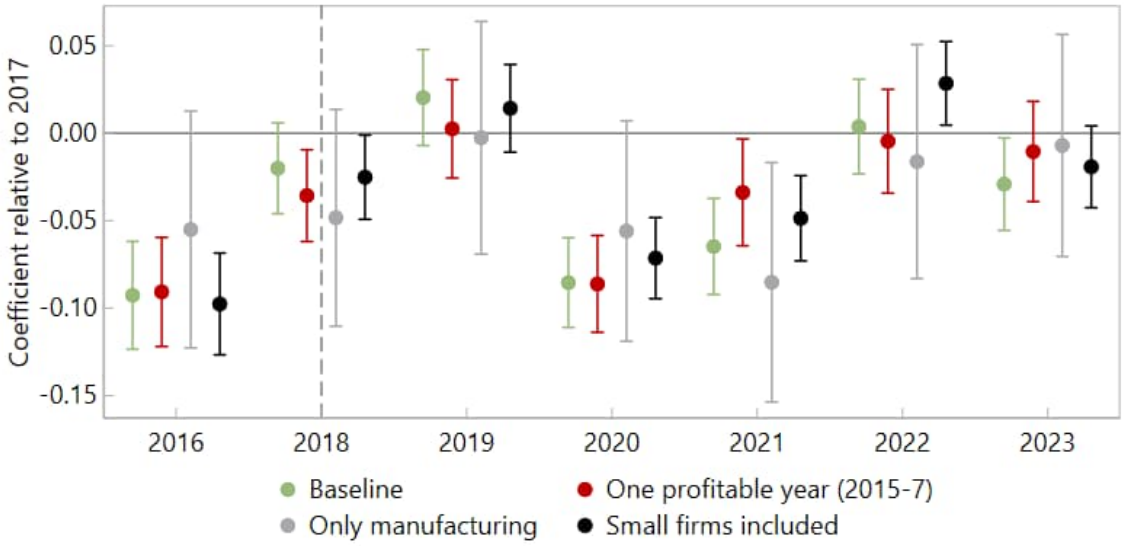
Appendix I. Table 6. Latvia: Effects of the 2018 CIT Reform on Firms' Investment Rates, Cash, Debt, and Retained Earnings Ratios (Concluded)

Unemployment rate (%)	0.0057	0.0162***	-0.0071***	0.0213***
	(0.0058)	(0.0011)	(0.0012)	(0.0027)
Financial conditions index (ECB)	-1.6966***	-0.1653***	0.0545**	0.1514***
	(0.1415)	(0.0220)	(0.0217)	(0.0537)
Constant	1.1333***	0.2370***	0.3306***	0.0156
	(0.0593)	(0.0116)	(0.0130)	(0.0265)
N	564,158	585,653	389,829	317,169

Data window: 2016-2023. Standard errors clustered by firm in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.
Sources: Bureau van Dijk, Orbis database; IMF, World Economic Outlook; ECB; and IMF staff calculations.

Appendix I. Figure 2. Latvia: Robustness Checks on Event Study of the Effect of the 2018 CIT Reform on Firms' Investment Rates

(Lithuanian firms are used as control group; variable controls for sales, firm age, and macro variables)



Sources: Bureau van Dijk, Orbis database; IMF, World Economic Outlook; ECB; and IMF staff calculations.
Note: Dashed line indicates reform year. Firm and year fixed effects absorbed. Standard errors clustered by firm. Except for "small firms included", small firms are removed (below 40,000 real sales in USD; fewer than two employees). "One profitable year (2015-7)" is limited to firms who reported positive profits in at least one year in the 2015-2017 window.

Appendix I. Table 7. Latvia: Robustness Checks on Effects of the 2018 CIT Reform on Firms' Investment Rates

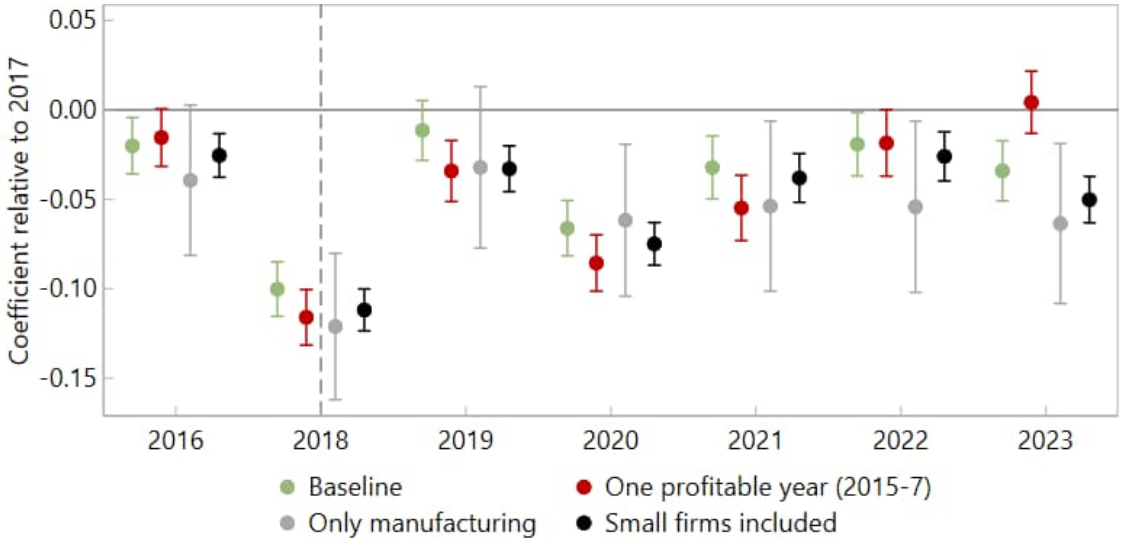
(Lithuanian firms are used as control group)

	(1) Investment rate (baseline)	(2) Investment rate (one profitable year during 2015-7)	(3) Investment rate (only manufacturing firms)	(4) Investment rate (small firms included)
Latvia × Post-2018	-0.0150	-0.0171	-0.0470*	-0.0096
	(0.0123)	(0.0124)	(0.0285)	(0.0116)
Sales (lag of log)	-0.0894***	-0.0906***	-0.1176***	-0.0346***
	(0.0048)	(0.0050)	(0.0132)	(0.0026)
Firm age (square of demeaned)	0.0022***	0.0023***	0.0018***	0.0023***
	(0.0002)	(0.0002)	(0.0004)	(0.0001)
Real GDP growth (%)	0.0051*	0.0053**	-0.0014	0.0037
	(0.0026)	(0.0026)	(0.0060)	(0.0024)
HICP headline inflation (avg, %)	0.0537***	0.0527***	0.0260	0.0432***
	(0.0082)	(0.0083)	(0.0183)	(0.0077)
Unemployment rate (%)	0.0314***	0.0304***	0.0292	0.0347***
	(0.0086)	(0.0086)	(0.0195)	(0.0080)
Financial conditions index (ECB)	-1.1242***	-1.0880***	-0.9621**	-1.0791***
	(0.1745)	(0.1760)	(0.3931)	(0.1636)
Constant	0.9843***	1.0106***	1.5485***	0.2326***
	(0.0927)	(0.0946)	(0.2444)	(0.0692)
N	237,553	231,223	33,259	371,180

Standard errors clustered by firm in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01. Except for column 4, small firms are removed (below 40,000 real sales in USD; fewer than two employees). Column 2's sample is limited to firms who reported positive profits in at least one year in the 2015-2017 window.
Sources: Bureau van Dijk, Orbis database; IMF, World Economic Outlook; ECB; and IMF staff calculations.

Appendix I. Figure 3. Latvia: Robustness Checks on Event Study of the Effect of the 2018 CIT Reform on Firms' Investment Rates

(Finnish firms are used as control group; variable controls for sales, firm age, and macro variables)



Sources: Bureau van Dijk, Orbis database; IMF, World Economic Outlook; ECB; and IMF staff calculations.

Note: Dashed line indicates reform year. Firm and year fixed effects absorbed. Standard errors clustered by firm. Except for "small firms included", small firms are removed (below 40,000 real sales in USD; fewer than two employees). "One profitable year (2015-7)" is limited to firms who reported positive profits in at least one year in the 2015-2017 window.

Appendix I. Table 8. Latvia: Robustness Checks on Effects of the 2018 CIT Reform on Firms' Investment Rates, Cash, Debt, and Retained Earnings Ratios

(Lithuanian firms are used as control group and sample is 2015-2023)

	(1) Investment rate (2015-2023)	(2) Cash ratio (2015-2023)	(3) Debt ratio (2015-2023)	(4) Retained earnings ratio (2015-2023)
Latvia × Post-2018	-0.0330***	0.0108***	-0.0024	0.0406***
	(0.0117)	(0.0017)	(0.0032)	(0.0043)
Sales (lag of log)	-0.0969***	-0.0069***	-0.0080***	0.0325***
	(0.0047)	(0.0008)	(0.0009)	(0.0020)
Firm age (square of demeaned)	0.0025***	0.0001***	-0.0001**	-0.0004***
	(0.0001)	(0.0000)	(0.0000)	(0.0001)
Real GDP growth (%)	0.0020	0.0026***	0.0011***	-0.0003
	(0.0024)	(0.0003)	(0.0004)	(0.0007)

Appendix I. Table 8. Latvia: Robustness Checks on Effects of the 2018 CIT Reform on Firms' Investment Rates, Cash, Debt, and Retained Earnings Ratios (Concluded)

HICP headline inflation (avg, %)	0.0615***	0.0141***	-0.0073***	0.0011
	(0.0079)	(0.0010)	(0.0016)	(0.0024)
Financial conditions index (ECB)	-1.2335***	-0.3409***	0.1332***	-0.2224***
	(0.1710)	(0.0209)	(0.0341)	(0.0508)
Constant	1.2804***	0.1703***	0.2750***	-0.1164***
	(0.0885)	(0.0135)	(0.0184)	(0.0337)
N	252,169	262,901	189,099	88,881

Standard errors clustered by firm in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.
In this robustness check, we include 2015 as well. In the dataset there are fewer number of observations in 2014, which impacts the investment rate values for 2015. Therefore, 2015 isn't included in the baseline.
Sources: Bureau van Dijk, Orbis database; IMF, World Economic Outlook; ECB; and IMF staff calculations.

Appendix I. Table 9. Latvia: Heterogeneous Effects of the 2018 CIT Reform on Firms' Investment Rates, with Pre-Reform Labor Productivity and Debt Ratio

(Finnish firms are used as control group)

	(1) Investment rate	(2) Investment rate
Reform	-0.0581***	-0.0126
	(0.0093)	(0.0090)
Reform x pre-reform labor productivity (demeaned)	-0.0244***	
	(0.0029)	
Reform x pre-reform debt ratio (demeaned)		-0.2600***
		(0.0150)
Constant	0.4713***	0.6115***
	(0.0470)	(0.0468)
N	585,730	573,597

Data window: 2016–2023. Heterogeneity variable non-missing required. Standard errors clustered by firm in parentheses. Sources: Bureau van Dijk, Orbis database; IMF, World Economic Outlook; ECB; and IMF staff calculations.

HOUSING QUALITY AND LABOR MOBILITY IN LATVIA[1]

This paper studies how a municipality's "livable" housing stock – dwellings equipped with piped water, a fixed bath or shower, a flushed toilet, and some form of heating – shapes its capacity to absorb labor migrants in response to demand shocks. Using a panel of 42 Latvian municipalities over 2012–2025, we construct a Bartik-style labor demand shock from 2-digit NACE employment shares and interact it with per capita measures of housing vintage drawn from the 2011 census. Municipalities with more livable dwellings built between 1945 and 1995 per capita exhibit a stronger internal in-migration response to positive labor demand shocks, while those with more post-1995 construction exhibit a markedly weaker response. The 1945–1995 cohort – Soviet-era dwellings that are affordable and widely available – appears to lower the cost of relocation, facilitating spatial labor reallocation. Post-1995 construction, concentrated in peri-urban municipalities near Rīga where workers commute rather than migrate, attenuates the migration response. House-level analysis estimated on the full 2011 census microdata confirms that in-migrants sort specifically into dwellings with the four basic amenities defining livability, validating the housing measure at the individual dwelling level.

A. Introduction

1. Spatial labor reallocation requires workers to move, and moving requires housing at the destination. A large literature documents that high housing prices in productive cities deter in-migration and reduce the efficiency of spatial labor allocation (Ganong and Shoag, 2017, Hsieh and Moretti, 2019). This paper studies a related mechanism: the stock of affordable, livable housing can absorb new residents.

2. The distinction matters in economies where housing markets are thin and the stock is dominated by a single construction era. Latvia's housing stock is characterized by deterioration in condition – much of it dating to Soviet-era construction with outdated insulation and heating systems – although recent renovation and energy-efficiency programs have sought to upgrade the stock. In Latvia, roughly 80 percent of the livable housing stock was built between 1945 and 1995. This Soviet-era cohort consists predominantly of standardized panel-block apartment buildings that were mass-produced across all municipality types and are structurally uniform. A municipality with abundant Soviet-era livable stock per capita can absorb new residents when a positive labor demand shock arrives: workers can find an entry point in the local housing market without competing intensively for a fixed supply or facing prices that make relocation financially unreasonable. A municipality dominated by post-1995 market construction faces a different adjustment margin: housing costs are higher.

[1] Prepared by Ha Nguyen and Can Ugur. We thank David Bartolini, Luis Brandao Marques, Vincenzo Guzzo, Bingjie Hu, Kofi Gefei Zhou, Uldis Rutkaste, Ludmila Fadejeva, Gundars Davidsons, and participants at the seminar at the Bank of Latvia for helpful comments and suggestions. We thank the Central Statistical Bureau of Latvia for access to the 2011 Latvia census.

3. The existing literature on housing and labor mobility focuses almost exclusively on the price level at the destination [Ganong and Shoag, 2017, Notowidigdo, 2020, Diamond, 2016]. Glaeser et al. [2005] and Hsieh and Moretti [2019] link supply restrictions to large aggregate misallocation costs. In this paper, we focus on whether the availability of affordable and livable housing supply facilitates labor movement into a municipality following a labor demand shock.

4. We answer this question using a panel of 42 Latvian municipalities over 2012–2025. To ensure geographic consistency over time, we harmonize pre-2021 observations to the post-2021 municipal boundaries following Latvia's administrative-territorial reform, which reduced the number of municipalities from 119 to 42. Our identification strategy follows Bartik [1991] as formalized by Goldsmith-Pinkham et al. [2020]: we construct a Bartik-style labor demand shock from municipalities' pre-period (2011) employment shares across 34 tradable 2-digit NACE sectors, interacted with national employment growth in each sector. Using 2-digit rather than 1-digit sector codes is important in this context: two municipalities with the same aggregate manufacturing share may have very different exposure to national shocks if one specializes in wood products and the other in machinery, and the 2-digit shock captures that heterogeneity. We interact the Bartik shock with per capita measures of livable dwellings by construction era, using the 2011 Population and Housing Census as the source for the cross-sectional housing variation. The migration response to a Bartik shock should be increasing in the per capita stock of livable dwellings for cohorts that are broadly accessible and affordable (1945–1995 Soviet-era stock), and potentially decreasing in that stock for cohorts that represent expensive or location-specific construction (post-1995 suburban development): a municipality with abundant affordable housing can accommodate new workers, while one dominated by expensive new construction may attract higher-wage commuters rather than migrants.

5. We report two findings. First, municipalities with more livable 1945–1995 dwellings per capita exhibit a stronger in-migration response to positive Bartik shocks: the interaction coefficient is positive and significant at the 10 percent level, consistent with the housing availability channel. Second, municipalities with more post-1995 construction per capita exhibit a substantially weaker migration response – the interaction coefficient is large, negative and precisely estimated. Both findings are identified only after controlling for urban, peripheral-urban and rural municipality type to control for unobserved characteristics such as amenities or population density.

6. The paper contributes to the literature on housing and spatial labor allocation by introducing housing vintage as a dimension of supply quality distinct from price or aggregate quantity. It also contributes to the small but growing literature on labor market adjustment in post-transition economies, where the legacy of Soviet-era construction creates a housing environment qualitatively different from either high-cost productive cities or low-cost declining regions in Western Europe or the United States.

B. Data

Migration

7. The primary outcome variable is the internal in-migration rate: the number of persons who arrived in municipality r from another Latvian municipality in year t, divided by the municipality's population at the beginning of the year:

$$y_{r,t} = Arrivals_{r,t}^{within} / Pop_{r,t-1}$$

We exclude international arrivals because they are frequently driven by motives unrelated to local labor demand, such as return migration and family reunification, and using arrivals from within Latvia isolates moves that are more plausibly a response to local labor market conditions. The migration series is drawn from the Central Statistical Bureau of Latvia (CSB). Migration data for 2023 are unavailable, so the panel excludes that year, leaving 13 years (2012–2025 excluding 2023). The outcome has a sample mean of 0.066 (internal arrivals per capita per year) and a standard deviation of 0.016 across municipality-year observations.

Bartik Labor Demand Shocks

8. We construct a Bartik-style labor demand shock [Bartik, 1991, Goldsmith-Pinkham et al., 2020] at the 2-digit NACE level. For municipality r in year t, the shock is:

$$B_{rt} = \sum_{k \in T} (s_{rk,2011} \times \Delta log E_{kt}^{nat})$$

where $s_{rk,2011} = \frac{emp_{rk,2011}}{emp_{r,2011}^{total}}$ is municipality r's share of its total 2011 workforce employed in 2-digit sector k, and $\Delta log E_{kt}^{nat}$ is the year-on-year log change in national employment in tradable sector k. Both inputs are described below. The point is to derive exogenous labor demand shocks to a municipality, stemming from the national job growth in tradable sectors that is arguably exogenous to local conditions in a municipality.

9. Employment shares. Municipality-level employment by 2-digit NACE sector for 2011 is drawn from the 2011 Latvia census. Shares are fixed at the 2011 pre-period to avoid endogeneity: contemporaneous changes in local sectoral employment reflect both demand shocks and local supply responses, so using lagged shares ensures that $s_{rk,2011}$ is predetermined with respect to the migration outcomes we study. The 2011 base year predates the panel (2012–2025) by one year, which is standard in this literature.

10. National employment growth. Year-on-year log changes in national employment by 2-digit NACE sector are computed from Eurostat national accounts for Latvia, available annually over 2011–2025. National employment growth in a given 2-digit sector reflects economy-wide demand conditions – export market shifts, technology adoption, sectoral reorganization –that are plausibly exogenous to the labor supply conditions of any individual municipality, particularly the 41 small and medium-sized municipalities outside Rīga. In a robustness check, we remove Rīga from the regression.

11. Sector selection. The set T contains 34 tradable 2-digit sectors, listed in full in Table 1 (Appendix II). At the letter level, we include agriculture (A), mining (B08), manufacturing (C), electricity and gas (D), wholesale trade (G46), transport and storage (H), accommodation (I55), information and communication (J), financial services (K), and scientific research (M72), excluding sectors whose national employment is primarily driven by local population demand or government policy: construction (F), food services (I56), real estate (L), public administration (O), education (P), health (Q), and personal services (R–S). Within manufacturing (C), four 2-digit sub-sectors are excluded due to data suppression in Latvian administrative records for small municipalities.[2]

12. Identification advantage of 2-digit codes. Using 2-digit rather than 1-digit NACE codes substantially increases the cross-municipal variation in exposure. At the 1-digit level, two municipalities with identical shares in manufacturing (C) receive identical exposure weights for the entire manufacturing aggregate, even if one specializes in wood products (C16) and the other in machinery (C28), which have different national employment growth trajectories. The 2-digit shock exploits this within-letter heterogeneity: it assigns higher weight to national shocks in the specific sub-sectors where each municipality was historically specialized. The correlation between the 2-digit Bartik shock and a comparable 1-digit shock is 0.69, confirming that the finer classification generates meaningful additional variation. The Bartik shock has a sample mean of −0.003 and standard deviation of 0.012 across municipality-year cells, reflecting aggregate employment contraction in most tradable sectors over the panel period.

Housing Vintage Indices

13. The housing supply proxies are drawn from the 2011 Population and Housing Census. The census survey contains questions about the availability of four basic amenities: piped water, a fixed bath or shower, a flushed toilet, and some form of heating. We define a dwelling as livable if it is equipped with all four of these amenities. Dwellings lacking any of these are classified as non-livable and excluded from the count. For each dwelling, the census also reports the construction year. For each municipality, we aggregate the dwelling-level data to three cohorts – pre-1945, 1945–1995, and post-1995 – chosen to reflect qualitatively distinct roles in the housing market. Pre-1945 stock is old enough to have suffered structural deterioration, making it a less reliable entry point for new arrivals. Post-1995 stock was built under market conditions and is concentrated in peri-urban suburbs near Rīga, where prices are high and rental supply thin; it is unlikely to absorb in-migrants responding to labor demand shocks in the same way as mass-produced Soviet-era apartments. The 1945–1995 cohort is therefore the theoretically motivated group: structurally uniform, widely distributed across municipality types, and affordable enough to function as a genuine relocation option. We normalize each cohort count by the municipality's base-year population to obtain:

$$H_{r,v} = n_{livable,r,v} / P_r$$

[2] Printing and reproduction (C18), manufacture of motor vehicles (C29), other transport equipment (C30), and manufacture of paper and paper products (C17).

14. Table 1 reports summary statistics across 42 municipalities, broken out by urban, peri-urban, and rural municipality type (mapped in Appendix I, Figure 1). Geographically, urban and peri-urban municipalities are concentrated in the western half of the country and along the Rīga metropolitan corridor, while rural municipalities cover the remainder, including the more sparsely populated eastern regions of Latgale and Vidzeme.

Table 1. Latvia: Housing Vintage Indices, Summary Statistics

Panel A: Full sample (n = 42)

	Mean	Min	Median	Max
H_{pre45} (before 1945)	0.026	0.004	0.021	0.076
H_{Soviet} (1945–1995)	0.258	0.158	0.238	0.389
H_{post} (after 1995)	0.035	0.005	0.014	0.193

Panel B: Livable dwellings per capita – means by municipality type

	Before 1945	1945–1995	After 1995	Total
Urban (n = 7)	0.039	0.353	0.020	0.413
Peri-urban (n = 7)	0.016	0.266	0.119	0.401
Rural (n = 28)	0.025	0.232	0.017	0.274

Panel C: Non-livable dwellings per capita – means by municipality type

	Before 1945	1945–1995	After 1995	Total
Urban (n = 7)	0.046	0.053	0.008	0.108
Peri-urban (n = 7)	0.025	0.065	0.032	0.122
Rural (n = 28)	0.123	0.115	0.025	0.263

Panel D: Vacancy rate (%), means – livable vs. all dwellings, by cohort and municipality type

	Before 1945		1945–1995		After 1995	
	Livable	All	Livable	All	Livable	All
Full sample (n = 42)	12.7%	24.4%	13.9%	18.9%	24.0%	36.4%
Urban (n = 7)	19.8%	24.4%	11.3%	13.5%	29.3%	32.8%
Peri-urban (n = 7)	11.5%	17.7%	15.4%	23.0%	30.6%	34.8%
Rural (n = 28)	11.2%	26.2%	14.1%	19.2%	21.0%	37.8%

Source: 2011 Population and Housing Census.
Note: Base-year population is each municipality's 2011 population. All 42 municipalities are included; Saulkrasti is classified as Rural but excluded from regressions as a dacha outlier. Panels B and C report per capita levels of livable and non-livable dwellings, respectively; Total is the sum across all three cohorts. Panel D reports the vacancy rate separately for livable and all dwellings. Urban: Rīga, Daugavpils, Jelgava, Jūrmala, Liepāja, Rēzekne, Ventspils. Peri-urban: Ādaži, Sigulda, Ķekava, Mārupe, Olaine, Ropaži, Salaspils.

15. The 1945–1995 cohort dominates the stock at 0.258 dwellings per capita – roughly ten times the pre-1945 (0.026) and post-1995 (0.035) cohorts. Panel B shows that the three cohorts are unevenly distributed across municipality types in ways that bear directly on identification. Urban municipalities have the highest mid-century stock (0.353), reflecting the mass apartment construction that defines Soviet-era city building. Post-1995 stock is concentrated almost entirely in peri-urban municipalities (mean 0.119), nearly six times the urban average (0.020) and seven times the rural average (0.017), confirming that market-era construction went disproportionately to the Rīga commuter belt. Rural municipalities have the smallest mid-century stock per capita (0.232) and negligible post-1995 construction.

16. Panel D shows why restricting the vacancy measure to livable units matters. Across all cohorts and municipality types, the vacancy rate for all dwellings substantially exceeds the vacancy rate for livable dwellings alone. The gap is sharpest for rural pre-1945 stock – 26.2% of all pre-1945 units are vacant versus 11.2% of livable pre-1945 units – and for rural post-1995 stock, where the corresponding figures are 37.8% and 21.0%. This finding confirms that the excess vacancy in the all-dwellings count is concentrated in structurally inadequate units: dwellings without piped water, fixed sanitation, or heating that are effectively abandoned rather than available to in-migrants. Counting them would overstate usable supply and introduce measurement error into the housing index. The 1945–1995 cohort shows a smaller gap (18.9% vs. 13.9% for the full sample), because Soviet-era panel blocks were built to a uniform standard that included the four basic amenities at high rates. This finding is consistent with the theoretical motivation for the livable restriction and applies with greatest force precisely where the omission would cause the largest bias – the pre-1945 and post-1995 cohorts – while the 1945–1995 index that is our main focus is the least affected.

Table 2. Latvia: Share of Livable Dwellings, by Cohort and Municipality Type
(Percent)

	Full sample	Urban	Peri-urban	Rural
Overall	69.8%	83.1%	76.6%	53.2%
Before 1945	35.3%	55.8%	38.9%	17.4%
1945–1995	81.8%	91.1%	80.8%	70.0%
After 1995	67.0%	82.1%	79.0%	43.0%

Source: 2011 Population and Housing Census.
Note: A dwelling is livable if it has piped water, a fixed bath or shower, a flushed toilet, and some form of heating. Shares are dwelling-weighted: total livable dwellings divided by total dwellings, pooled across all municipalities within each group (42 municipalities: 7 urban, 7 peri-urban, 28 rural).

17. Table 2 restates this same fact as a share rather than a per capita level: the proportion of the housing stock that is livable, by cohort and municipality type. Shares are dwelling-weighted, i.e. computed as the total number of livable dwellings divided by the total number of dwellings pooled across municipalities within each group, rather than as an average of municipality-level shares. The 1945–1995 cohort has the highest livable share in every municipality type, reaching 81.8 percent overall and 91.1 percent in urban municipalities. This finding indicates that Soviet-era mass construction, despite its age, was built to a uniform standard that has proven durable. Pre-

1945 stock is livable in only 35.3 percent of units overall, falling to 17.4 percent in rural municipalities, reflecting decades of deterioration in unretrofitted farmhouse and small-town buildings. Post-1995 stock is livable in 67.0 percent of units overall, but the rural share (43.0 percent) is far below the urban (82.1 percent) and peri-urban (79.0 percent) shares, indicating that new construction in low-demand rural areas is disproportionately low-quality relative to new construction near urban centers. The urban–rural gap is present in every cohort and is largest for pre-1945 stock (55.8 versus 17.4 percentage points), reinforcing the motivation for restricting the housing supply measures used throughout the paper to livable units only.

Validation: House-Level Evidence

18. Tables 3 and 4 report house-level linear probability models estimated on the 2011 Population and Housing Census microdata. Both specifications include municipality fixed effects and robust standard errors. The right-hand side contains the four basic amenity indicators that define livability (central/district heating, piped water, flushed toilet, fixed bath or shower), a multi-apartment building indicator, and vintage dummies with pre-1945 as the omitted category.

Table 3. Latvia: House-Level Regressions, Probability of Occupancy

	Coefficient	Robust SE
Heating (central/district)	+0.123***	(0.001)
Piped water	+0.173***	(0.002)
Flushed toilet	+0.016***	(0.002)
Fixed bath or shower	+0.035***	(0.002)
Multi-apartment building	−0.012***	(0.001)
Vintage 1945–1995	−0.073***	(0.001)
Vintage post-1995	−0.225***	(0.003)
Municipality fixed effects	Yes	
Observations	705,735	
R^2	0.108	

Note: Outcome equals one if the dwelling is occupied, zero if vacant. Pre-1945 is the omitted vintage category. *** $p < 0.01$.

19. House-level regressions corroborate the validity of the livable restriction at the dwelling level. The first is a linear probability model in which the dependent variable equals one if the dwelling is occupied, estimated on all 705,735 dwellings from the 2011 census with municipality fixed effects. A heating connection raises the probability of occupancy by 12.3 percentage points, piped water by 17.3 percentage points, a fixed bath or shower by 3.5 percentage points, and a flushed toilet by 1.6 percentage points, all precisely estimated (Table 3). This finding confirms that

the four amenities defining a livable dwelling are precisely those that predict actual occupation, not the construction vintage per se. The second regression narrows the sample to the 167,425 dwellings that are either vacant or occupied by a household including at least one migrant who arrived from another municipality in Latvia within the previous year; the dependent variable equals one for the migrant-occupied units. Among this selected sample, the same amenities predict migrant occupancy: a heating connection raises the probability by 8.9 percentage points, piped water by 4.5 percentage points, a flushed toilet by 3.0 percentage points, and a fixed bath or shower by 3.3 percentage points (Table 4). This finding indicates that in-migrants sort specifically into dwellings with the four basic amenities – the dwellings we classify as livable – rather than into physically substandard units.

Table 4. Latvia: House-Level Regressions, Probability of Migrant Occupancy

	Coefficient	Robust SE
Heating (central/district)	+0.089***	(0.003)
Piped water	+0.045***	(0.002)
Flushed toilet	+0.030***	(0.004)
Fixed bath or shower	+0.033***	(0.003)
Multi-apartment building	−0.037***	(0.002)
Vintage 1945–1995	−0.021***	(0.002)
Vintage post-1995	−0.066***	(0.003)
Municipality fixed effects	Yes	
Observations	167,425	
R^2	0.067	

Note: Outcome equals one if the dwelling is occupied by a household that includes at least one within-Latvia in-migrant who arrived in the year preceding the census; outcome equals zero if the dwelling is vacant. Sample is restricted to dwellings that are either migrant-occupied or vacant. Pre-1945 is the omitted vintage category. *** p < 0.01.

C. Empirical Strategy

Specification

20. We adopt the following empirical specification:

$$y_{rt} = \alpha_r + \gamma_t + \beta B_{rt} + \theta_u(B_{rt} \times Urban_r) + \theta_p(B_{rt} \times Peri_r) + \theta_H\left(B_{rt} \times H_{r,Soviet}\right) + \varepsilon_{rt} \quad (1)$$

where y_{rt} is the internal in-migration rate, α_r are municipality fixed effects, γ_t are year fixed effects, $B_{rt}$is the Bartik shock, $Urban_r$ and $Peri_r$ are indicators for the seven cities (Rīga, Daugavpils, Jelgava, Jūrmala, Liepāja, Rēzekne, Ventspils) and seven peri-urban municipalities adjacent to Rīga (Ādaži, Sigulda, Ķekava, Mārupe, Olaine, Ropaži, Salaspils), respectively.

21. The housing index $\boldsymbol{H_{r,Soviet}}$ is time-invariant and absorbed by municipality fixed effects; only its interaction with the time-varying Bartik shock is identified. The coefficient θ_H captures whether municipalities with more mid-century, Soviet-era housing stock per capita – presumed more affordable than the post-1995 stock – exhibit a stronger or weaker migration response to a given Bartik shock. Controlling for $B_{rt} \times Urban_r$ and $B_{rt} \times Peri_r$ is essential because municipality type is correlated with many omitted variables beyond housing supply that affect how strongly a municipality attracts in-migrants. Urban and peri-urban municipalities systematically differ from rural ones in cost of living, local amenities, public service quality, and labor market depth – all of which could independently shape migration responsiveness to demand shocks. Without these controls, the housing vintage signal is indistinguishable from the urban-rural migration gradient, and any omitted characteristic that co-varies with both municipality type and housing stock composition would contaminate the estimated housing availability effect.

22. Standard errors are clustered at the municipality level throughout. The coefficient β is the migration response for rural municipalities with zero Soviet-era housing per capita.

Identification

23. The core identification challenge is that a municipality's housing stock may be correlated with other characteristics that independently determine how strongly it responds to labor demand shocks. Municipalities with abundant Soviet-era livable stock tend to be smaller cities or rural areas with lower wages, lower cost of living, and a history of out-migration that may itself have generated the vacancies making the stock accessible. An OLS regression of migration responsiveness on housing would conflate the housing availability channel with these correlated characteristics.

24. The Bartik shift-share design addresses this by constructing variation in local labor demand from two sources that are predetermined and plausibly exogenous to any municipality's housing conditions. First, the employment shares $s_{rk,2011}$ are fixed in 2011, one year before the panel begins, so they cannot be influenced by housing or migration outcomes we study. Second, the national employment growth rates $\Delta logE_{kt}^{nat}$ reflect economy-wide forces— export demand shifts, technology adoption, and global commodity price cycles—that are driven at the national and international level. For the 40 small and medium-sized municipalities outside Rīga that form the core of our sample, whether national employment in wood products, food processing, or telecommunications expands or contracts in a given year is economically unrelated to whether the municipality happens to have more or fewer Soviet-era apartments per capita. The identifying assumption, following Goldsmith-Pinkham et al. [2020], is that conditional on municipality and year fixed effects, national sectoral shocks are as good as randomly assigned across municipalities with different pre-period sectoral compositions.

25. The interaction term $\boldsymbol{B_{rt}} \times \boldsymbol{H_{r,Soviet}}$ exploits a further source of variation: the same national demand shock translates differently into migration depending on local housing supply. The housing index $H_{r,Soviet}$ is time-invariant and absorbed by municipality fixed effects in

levels; only its interaction with the time-varying Bartik shock is identified. The coefficient θ_H is therefore identified by comparing, within municipality type, how two municipalities with different stocks of affordable mid-century housing respond to the same national sectoral shocks – holding fixed all time-invariant characteristics of each municipality, including its amenities, institutions, and long-run demographic trajectory.

Sample

26. The sample covers 41 municipalities over 2012–2025. Migration data for 2023 are unavailable from the CSB, leaving 13 survey years (2012–2022 and 2024–2025) and 531 municipality-year observations after the exclusions described below.

27. Saulkrasti is excluded entirely from the regression sample. Saulkrasti is a small coastal resort municipality on the Baltic Sea approximately 40 kilometers north of Rīga. Its Soviet-era housing stock consists predominantly of dachas and low-rise seasonal holiday homes rather than the panel-block apartment buildings that characterize the Soviet-era stock in all other municipalities. As a result, Saulkrasti's housing profile is structurally distinct: its 1945–1995 livable stock per capita reflects seasonal second-home ownership rather than the permanent residential supply that mediates the migration response to labor demand shocks. Including it would conflate two qualitatively different types of Soviet-era construction.

28. Two individual observations are excluded on the grounds that they reflect discrete administrative or institutional events unrelated to local labor demand.

- Talsi, 2012. Reported internal arrivals in Talsi in 2012 are approximately three times higher than in any adjacent year, a pattern inconsistent with the smooth variation of the Bartik shock and inconsistent with any identifiable labor demand event. The spike is attributable to a one-time administrative reclassification of residents following Latvia's 2009 administrative reform, in which some individuals who had registered addresses in merged or reorganized units were reassigned to Talsi in the 2012 count. This is an artifact of the registration system, not a migration response.

- **Ā**daži, 2017. Reported internal arrivals in Ādaži in 2017 are substantially elevated relative to trend. Ādaži hosts Latvia's main NATO Enhanced Forward Presence battalion, which began arriving in 2017. The associated housing construction and population inflow – military personnel, contractors, and associated service workers – is a discrete institutional event unconnected to civilian labor demand in the local economy. Including this observation would conflate a military deployment with the Bartik-style labor demand shock.

D. Results

Baseline: Livable 1945–1995 Stock per Capita

29. Column (1) of Table 5 reports the unconditional relationship between the Bartik shock and internal in-migration, with only municipality and year fixed effects and no housing or municipality-type interactions. The coefficient is small and statistically insignificant at −0.007, indicating that a positive labor demand shock has no detectable average effect on in-migration once the heterogeneity captured by housing supply and municipality type is ignored.

Table 5. Latvia: Migration Response with 1945–1995 Housing Supply
(N = 531; 41 municipalities)

	(1)	(2)	(3)	(4)	(5)
	Baseline	Total livable	Occupied livable	Vacant livable	Rented livable
Bartik	−0.007	−0.224	−0.227	−0.022	−0.020
	(0.052)	(0.142)	(0.143)	(0.073)	(0.072)
Bartik × H_{Soviet}	–	1.133*	1.331*	1.994	0.921
		(0.656)	(0.764)	(2.004)	(0.821)
Bartik × Urban	–	−0.321***	−0.337***	−0.185***	−0.180***
		(0.097)	(0.104)	(0.050)	(0.048)
Bartik × Peri-urban	–	−0.397***	−0.394***	−0.359***	−0.332**
		(0.113)	(0.109)	(0.130)	(0.132)
Municipality fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	531	531	531	531	531

Note: The outcome is the internal in-migration rate (arrivals from within Latvia divided by beginning-of-year population). The Bartik-style labor demand shock uses 2011 employment shares at the 2-digit NACE level across 34 tradable sectors. Column (1) includes only the Bartik main effect and fixed effects. H_{Soviet} is: column (2) total livable dwellings built 1945–1995 per capita; column (3) occupied livable dwellings built 1945–1995 per capita; column (4) vacant livable dwellings built 1945–1995 per capita; column (5) rented livable dwellings built 1945–1995 per capita. All housing indices are normalized by each municipality's 2011 population. Urban municipalities: Rīga, Daugavpils, Jelgava, Jūrmala, Liepāja, Rēzekne, Ventspils. Peri-urban municipalities: Ādaži, Sigulda, Ķekava, Mārupe, Olaine, Ropaži, Salaspils. Standard errors clustered at the municipality level in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.

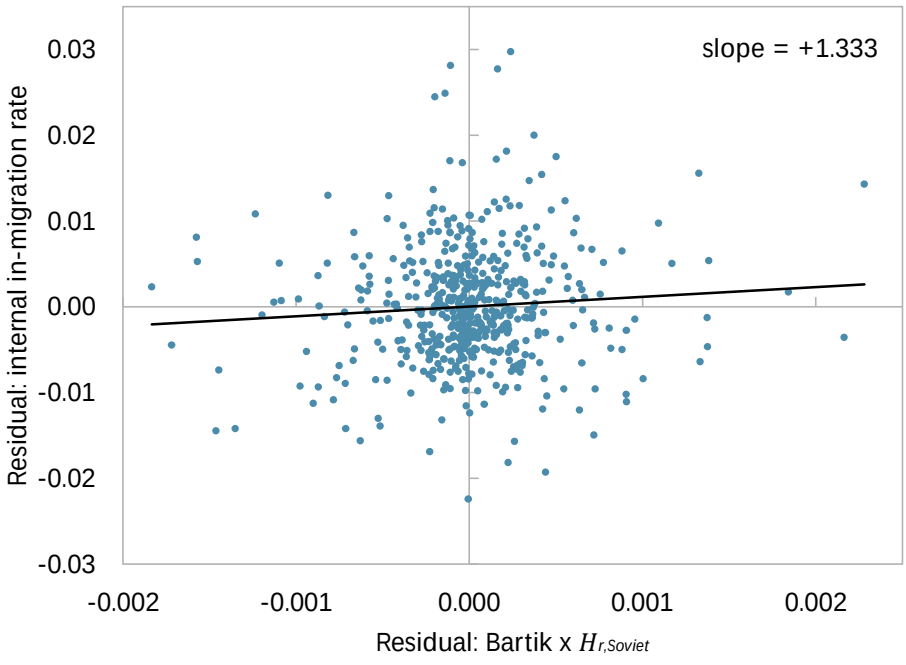
30. Columns (2)–(5) of Table 5 add the Bartik × $\boldsymbol{H_{r,Soviet}}$ interaction under four alternative housing measures; the interaction carries a positive sign in every column, indicating that the housing availability channel is not an artifact of any single measure. Column (2) reports the baseline specification with $H_{r,Soviet} = n_{livable,mid-century} / P_r$ as the housing index. The interaction coefficient is +1.133, marginally significant at the 10 percent level. Because the specification controls for the

Bartik shock interacted with urban and peri-urban indicators, θ_H is identified by variation in $H_{r,Soviet}$ within municipality type. The comparison is between two municipalities of the same type – most often two rural municipalities – facing the same labor demand shock: the one with more affordable mid-century livable housing per capita absorbs more in-migrants. This finding is consistent with the housing availability channel: where more affordable Soviet-era units exist relative to the local population, workers can relocate when labor demand improves without competing for a scarce supply or facing prices that make relocation financially unreasonable.

31. The urban and peri-urban interaction coefficients are large and precisely estimated: −0.321*** for urban municipalities and −0.397*** for peri-urban, confirming that cities and suburbs near Rīga attract far fewer internal migrants per unit of Bartik shock, likely because their labor market adjustment operates through wages and commuting rather than relocation. Section 4.5 examines commuting directly as an alternative labor market margin.

32. Figure 1 plots the partial regression scatter for the baseline interaction after removing municipality fixed effects, year fixed effects, and the Bartik main effect and urban/peri-urban interactions via the Frisch-Waugh-Lovell theorem. The slope of the fitted line replicates θ_H = +1.133 exactly. The scatter does not reveal influential outliers; the positive gradient is distributed across the sample.

Figure 1. Latvia: Partial Regression Plot for the $\boldsymbol{Bartik} \times \boldsymbol{H_{Soviet}}$ Interaction (N = 531; 41 municipalities)



Note: Each point is a municipality-year observation (n = 531). Both axes are residuals after projecting out municipality fixed effects, year fixed effects, the Bartik main effect, and the urban and peri-urban interactions. The slope of the fitted line equals θ_H = +1.133 from column (2) of Table 5.

33. One concern is that the pandemic years distort the estimate, since 2020 and 2021 combined an unusual labor demand shock with mobility restrictions and a temporary reallocation of population away from cities. Re-estimating column (2) of Table 5 on the sample that excludes 2020 and 2021 leaves 449 municipality-year observations and raises the interaction coefficient from +1.133 to +1.266, now significant at the 5 percent level. Outside the pandemic, one additional livable 1945–1995 dwelling per capita converts a given labor demand shock into roughly 1.3 percentage points more internal in-migration per year. This finding indicates that the housing availability channel is not a product of pandemic-era relocation, and that including the pandemic years attenuates the estimate. The same pattern holds for the occupied livable stock in column (3), where the coefficient rises from +1.331 to +1.560 and likewise gains significance at the 5 percent level.

Extension 1: Alternative Housing Measures within the 1945–1995 Cohort

34. Table 5 also reports results for three alternative housing measures within the 1945–1995 cohort: occupied livable dwellings (column 3), vacant livable dwellings (column 4), and rented livable dwellings (column 5), each normalized by base-year population. Columns (2)–(5) use the same sample, fixed effects, and urban/peri-urban controls.

35. Occupied Soviet-era stock (column 3) yields the strongest result: $\boldsymbol{\theta_H}$ = +1.331, marginally significant at the 10 percent level. This finding suggests that it is specifically the inhabited Soviet-era stock – already integrated into the local rental and housing market – that facilitates relocation, not merely the existence of physically habitable units. Vacant Soviet-era units (column 4) show a positive but imprecise coefficient of +1.994, consistent with the intuition that vacant units could in principle accommodate in-movers but are often in worse condition or located in less desirable areas. Rented Soviet-era units (column 5) show a positive but insignificant coefficient of +0.921. The urban and peri-urban interaction coefficients are large and stable across all four columns.

Extension 2: Total In-migration

36. Table 6 replicates the four specifications of Table 5 replacing the outcome with the total in-migration rate – arrivals from both within Latvia and from abroad divided by beginning-of-year population. The total rate includes international return migrants and family reunification flows that may not respond to local labor demand shocks, so it is a noisier measure of labor-demand-driven mobility. The comparison assesses whether the 1945–1995 housing availability result is specific to domestic relocation or extends to all arrivals.

Table 6. Latvia: Migration Response with 1945–1995 Housing Supply, Total In-Migration
(N = 531; 41 municipalities)

	(1)	(2)	(3)	(4)
	Livable	Occupied	Vacant	Rented
Bartik	−0.185	−0.191	−0.009	−0.016
	(0.133)	(0.134)	(0.066)	(0.067)
Bartik × H_{Soviet}	0.955	1.142	1.504	0.820
	(0.630)	(0.735)	(1.782)	(0.712)
Bartik × Urban	−0.307***	−0.323***	−0.191***	−0.189***
	(0.098)	(0.104)	(0.054)	(0.052)
Bartik × Peri-urban	−0.345***	−0.344***	−0.311**	−0.290**
	(0.111)	(0.108)	(0.126)	(0.129)
Municipality fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	531	531	531	531

Note: The outcome is the total in-migration rate (all arrivals, including international, divided by beginning-of-year population). H_{Soviet} is: column (1) total livable dwellings built 1945–1995 per capita; column (2) occupied livable dwellings built 1945–1995 per capita; column (3) vacant livable dwellings built 1945–1995 per capita; column (4) rented livable dwellings built 1945–1995 per capita. All other details as in Table 5. * p < 0.10, ** p < 0.05, *** p < 0.01.

37. The interaction coefficients are positive across all four columns and similar in magnitude to their internal migration counterparts in Table 5, but none reach conventional significance levels. This finding suggests that the housing availability signal is somewhat attenuated when the outcome includes international flows unrelated to local labor demand. The urban and peri-urban interaction coefficients are large, negative, and stable across columns, confirming that the differential migration responsiveness by municipality type is not specific to domestic relocation.

Extension 3: Vintage Cohorts Simultaneously

38. Table 7 includes all three cohort interactions simultaneously in a single regression. This specification tests whether the 1945–1995 result survives conditional on pre-1945 and post-1995 stock.

Table 7. Latvia: Migration Response with All Three Vintage Cohorts
(N = 531; 41 municipalities)

	Internal in-migration rate
Bartik (rural base)	0.096
	(0.116)
Bartik × H_{pre45} (before 1945)	−1.942
	(1.198)
Bartik × H_{Soviet} (1945–1995)	0.107
	(0.391)
Bartik × H_{post} (after 1995)	−4.884***
	(0.929)
Bartik × Urban	−0.167**
	(0.069)
Bartik × Peri-urban	0.057
	(0.082)
Municipality fixed effects	Yes
Year fixed effects	Yes
Observations	531

Note: $H_{r,v} = \frac{n_{livable,r,v}}{P_r}$ for each cohort v. All other details as in Table 5. * p < 0.10, ** p < 0.05, *** p < 0.01.

39. When all three cohort interactions enter simultaneously, the Soviet interaction coefficient remains positive at 0.107 but is not statistically significant. The post-1995 coefficient is negative and highly significant at −4.884, confirming that municipalities with more post-market-era housing per capita absorb fewer in-migrants for a given labor market shock. The pre-1945 coefficient is also negative, at −1.942, but only marginally misses the 10 percent significance threshold. Among the three cohorts, only the post-1995 stock robustly attenuates spatial reallocation once all three vintages compete for identifying variation.

Extension 4: In-Commuting as an Alternative Labor Market Margin

40. The negative urban and peri-urban interaction coefficients in Table 5 imply that cities and commuter-belt municipalities absorb positive labor demand shocks with less in-migration than rural areas. One explanation is that workers could respond to positive shocks in accessible municipalities by commuting rather than relocating. To test this directly, Table 8 replaces the outcome with the in-commuting rate: the number of workers who reside in another municipality but work in municipality r in year t, divided by municipality r's population. The sample covers 2017–2023, the years for which commuting flows are available from the Central Statistical Bureau, yielding 286 municipality-year observations.

Table 8. Latvia: In-Commuting Rate as Outcome
(N = 286; 41 municipalities; 2017–2023)

	(1)	(2)
Bartik	−0.250**	−0.164
	(0.106)	(0.260)
Bartik × H_{Soviet}	–	−0.371
		(1.368)
Bartik × Urban	0.136*	0.185
	(0.076)	(0.197)
Bartik × Peri-urban	0.214	0.227
	(0.258)	(0.295)
Municipality fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Observations	286	286

Note: The outcome is the in-commuting rate: workers residing in another municipality who work in municipality r in year t, divided by municipality r's beginning-of-year population. Commuting flows are from the Central Statistical Bureau of Latvia, available annually for 2017–2023. H_{Soviet} is total livable dwellings built 1945–1995 per capita, as in column (2) of Table 5. Ādaži 2017 is excluded (NATO deployment). Standard errors clustered at the municipality level in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.

41. Column (1) of Table 8 includes the Bartik main effect and its interactions with urban and peri-urban indicators. The rural baseline is negative and significant: a positive labor demand shock in a rural municipality reduces in-commuting, consistent with firms filling vacancies from the local resident pool or attracting workers who formally relocate rather than commute. The urban interaction is positive and marginally significant at the 10 percent level, implying that positive shocks in cities partly draw in workers from surrounding municipalities who commute rather than move. The peri-urban interaction is also positive and larger in magnitude, but imprecise. These findings confirm a commuting pattern.

42. A positive Bartik shock in an urban municipality reduces in-migration (Table 5, column 2: −0.321***) while increasing in-commuting (Table 8, column 1: +0.136*). This finding directly identifies commuting as the labor market adjustment margin that substitutes for migration in cities and their commuter belt.

43. The Bartik × $\boldsymbol{H_{r,Soviet}}$ interaction in column 2 shows that the housing coefficient is negative and far from significant. This finding is consistent with the theoretical role of housing availability: Soviet-era livable stock lowers the cost of relocating to a municipality, facilitating migration. It has no direct bearing on whether a worker who already commutes chooses to commute farther or more often.

Extension 5: Excluding Rīga

44. The identifying assumption of the Bartik-style labor demand shock requires that national sectoral employment shocks are exogenous to any individual municipality's conditions. For the 40 municipalities outside Rīga, this assumption is more straightforward to defend: with populations ranging from roughly 5,000 to 100,000 inhabitants, each contributes a negligible share of national employment in any 2-digit sector, so local labor market conditions in these municipalities cannot meaningfully influence the national growth rates used as shocks. Rīga is categorically different. With approximately 700,000 residents – roughly one third of Latvia's total population – Rīga accounts for a disproportionate share of national employment in several tradable sectors, particularly information and communication (J) and financial services (K). If Rīga's own economic conditions simultaneously affect its housing stock composition and the national sectoral growth rates entering the Bartik, the exogeneity condition could be compromised for that observation.

Table 9. Latvia: Excluding Rīga
(N = 518; 40 municipalities)

	(1)	(2)	(3)	(4)
	Livable	Occupied	Vacant	Rented
Bartik	−0.246*	−0.252*	−0.043	−0.041
	(0.143)	(0.142)	(0.068)	(0.069)
Bartik × H_{Soviet}	1.103	1.313*	1.776	0.806
	(0.675)	(0.781)	(2.004)	(0.809)
Bartik × Urban	−0.290***	−0.308***	−0.156***	−0.152***
	(0.096)	(0.103)	(0.041)	(0.038)
Bartik × Peri-urban	−0.392***	−0.390***	−0.354***	−0.330**
	(0.116)	(0.113)	(0.134)	(0.136)
Municipality fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	518	518	518	518

Note: Rīga is excluded from the sample. H_{Soviet} is: column (1) total livable dwellings built 1945–1995 per capita; column (2) occupied livable dwellings built 1945–1995 per capita; column (3) vacant livable dwellings built 1945–1995 per capita; column (4) rented livable dwellings built 1945–1995 per capita. All other details as in Table 5. * p < 0.10, ** p < 0.05, *** p < 0.01.

45. Table 9 replicates the four specifications of Table 5 on the sample of 40 municipalities excluding Rīga, reducing the observation count from 531 to 518. The interaction coefficients are nearly unchanged: the livable mid-century interaction falls from +1.133 to +1.103 and the occupied mid-century interaction from +1.331 to +1.313, with standard errors widening by at most 0.02. The urban and peri-urban interaction coefficients are stable throughout. Replicating the all-cohorts

specification of Table 7 on the same restricted sample yields a post-1995 coefficient of −5.000, essentially identical to the baseline −4.884. This finding confirms that the results are not driven by Rīga's potential influence on the national Bartik shocks, and that the housing availability channel is identified entirely from variation among Latvia's small and medium-sized municipalities.

Extension 6: High-Skill Versus Low-Skill Labor Demand

46. The baseline Bartik aggregates all 34 tradable sectors into a single shock. The consistently negative urban and peri-urban interaction coefficients could reflect a compositional mechanism: cities concentrate employment in high-skill sectors – information and communication (J), financial services (K), and professional services (M72) – that generate fewer in-migration responses because high-skill workers are already locally available or because they substitute commuting for relocation. Rural municipalities, by contrast, receive a mix of low-skill manufacturing and agricultural shocks that require drawing workers from outside. To test whether the aggregate Bartik result is driven by one skill tier or both, Table 10 decomposes the Bartik shock into a high-skill component (B_{rt}^{H} sectors J58 publishing, J61 telecommunications, J62 computer programming and consultancy, J63 information services, K64 financial services, K65 insurance, K66 activities auxiliary to financial services, and M72 scientific research and development) and a low-skill component (B_{rt}^{L}, the remaining 26 tradable sectors), constructed by applying the same shift-share formula separately to each sub-group of sectors.

47. The high-skill rural baseline is positive and marginally significant at 1.312, while the low-skill rural baseline is negligible at 0.008 (Column (1) of Table 10). This finding reverses the intuition that rural areas attract primarily low-skill migrants: it is positive shocks to high-skill tradable sectors that generate rural in-migration, not shocks to low-skill sectors. One explanation is that high-skill workers are in short supply in rural areas – the 2011 census records high-skill sector employment shares of 2.2 percent in rural municipalities compared to 4.0 percent in urban ones – so a positive national shock to these sectors cannot be absorbed locally and instead pulls workers from elsewhere. Low-skill shocks, by contrast, are absorbed by the existing local workforce with no net in-migration effect.

48. The urban and peri-urban interactions remain negative and significant for both skill components, but the pattern differs by type. The high-skill urban and peri-urban interactions are the largest in absolute magnitude, implying that a positive high-skill shock in urban and peri-urban municipalities generates less in-migration – consistent with the commuting result in Table 8.

49. The low-skill interaction is positive and marginally significant at +1.142, while the high-skill interaction is negative and insignificant at −0.491 (Column (2) of Table 10). This finding indicates that the housing availability channel operates through the in-migration of workers responding to low-skill labor demand shocks specifically, not high-skill shocks, within each municipality type.

Table 10. Latvia: High-Skill Versus Low-Skill Bartik Shocks
(N = 531; 41 municipalities)

	(1) Split Bartik	(2) + Housing
Bartik high-skill (BH, rural base)	1.312*	1.383**
	(0.730)	(0.611)
Bartik low-skill (BL, rural base)	0.008	−0.263*
	(0.060)	(0.152)
BH × H_{Soviet}	–	−0.491
		(2.104)
BL × H_{Soviet}	–	1.142*
		(0.670)
BH × Urban	−0.973**	−0.946*
	(0.390)	(0.538)
BL × Urban	−0.146***	−0.298***
	(0.045)	(0.094)
BH × Peri-urban	−1.687***	−1.704***
	(0.584)	(0.614)
BL × Peri-urban	−0.331**	−0.391***
	(0.139)	(0.117)
Municipality fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Observations	531	531

Note: The Bartik-style labor demand shock is decomposed into a high-skill component BH (sectors J58, J61, J62, J63, K64, K65, K66, M72) and a low-skill component BL (the remaining 26 tradable sectors). H_{Soviet} is livable dwellings built 1945–1995 per capita. The housing interaction applies across all municipality types. Standard errors clustered at the municipality level in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.

E. Conclusion

50. This paper examines whether the composition of a municipality's housing stock shapes its capacity to absorb labor migrants in response to demand shocks. Using a panel of 41 Latvian municipalities over 2012–2025, we interact a 2-digit NACE Bartik instrument with per capita measures of livable dwellings by construction era drawn from the 2011 census. The central result is that within municipality type, a rural municipality with more affordable mid-century livable housing per capita absorbs more in-migrants when a positive labor demand shock arrives: the interaction coefficient for 1945–1995 livable stock is positive and marginally significant, consistent with the housing availability channel that Soviet-era panel-block apartments provide an accessible entry point in the local housing market that lowers the effective cost of relocation. The legacy of Soviet-

era construction – often viewed as an urban planning liability – may therefore function as a labor market asset: standardized, widely distributed, and affordable housing stock lowers the friction of moving to where jobs are.

51. Three caveats are warranted. First, the urban and peri-urban controls are necessary for identification: municipality type may proxy for local amenities or administrative capacity rather than housing supply alone, so the estimated housing effect should be read as how affordable livable housing supply facilitates the migration response to a labor demand shock within each municipality type, not as an unconditional comparison across types. Second, the 2011 census housing indices are held fixed throughout the panel; post-2011 construction in peri-urban municipalities means the post-1995 stock variable may understate actual recent supply there. Third, the 2011 census housing indices do not capture recent, albeit modest, housing renovations.

52. The supply-side implications operate through the existing stock and through new investment. Renovation of Soviet-era apartment blocks is the most direct policy lever: unrenovated panel-block buildings impose high, largely fixed district-heating costs on residents, which makes them less attractive as relocation destinations even when rents are nominally low, so programs that co-finance the thermal rehabilitation of building and district-heating systems, such as the EU-funded energy-efficiency renovation programs, would lower the effective occupancy cost for future in-migrants and directly amplify the housing availability channel. A complementary measure is the conversion of vacant non-livable dwellings into usable stock: Panel D of Table 1 shows that the gap between all-dwelling vacancy and livable-dwelling vacancy is pronounced in the pre-1945 and post-1995 cohorts, where many units are physically present but substandard, so targeted rehabilitation grants – conditional on bringing units up to the four-amenity livability threshold – would expand the stock of dwellings capable of absorbing in-migrants without requiring greenfield construction.

53. The demand side concerns the costs workers face when deciding to relocate in response to labor demand signals. Mortgage access and rental assistance tied to job-related relocation could reduce the financial barrier for workers who are liquidity-constrained rather than permanently priced out. Similarly, employer-linked relocation subsidies address the coordination problem in which workers are willing to move but require some assurance that the job will materialize before committing to upfront moving costs. Packaging a housing mobility component alongside existing wage and hiring incentives for firms in labor-short municipalities would recognize that the bottleneck is not only the wage offered but the initial cost of establishing a household at the new location.

54. The two margins interact: renovation that lowers occupancy costs makes the Soviet-era stock more attractive to potential in-migrants, while relocation assistance that lowers moving costs reduces the activation threshold for workers who would find that stock affordable once in place. Finally, it is important to note that housing policy does not substitute for other place-based policies aimed at regional development and job creation: the housing availability channel operates only conditional on a positive labor demand shock materializing in a municipality in the first place, so housing supply policy is best understood as raising the effectiveness of regional job-creation efforts, not replacing them.

References

Bartik, Timothy J., 1991. "Who Benefits from State and Local Economic Development Policies?" W.E. Upjohn Institute for Employment Research, Kalamazoo, MI.

Diamond, Rebecca , 2016. "The Determinants and Welfare Implications of US Workers' Diverging Location Choices by Skill: 1980–2000." *American Economic Review*, 106(3):479–524.

Ganong, Peter and Daniel Shoag, 2017. "Why Has Regional Income Convergence in the U.S. Declined?" *Journal of Urban Economics*, 102:76–90.

Glaeser, Edward L., Joseph Gyourko, and Raven Saks, 2005. "Why Have Housing Prices Gone Up?" *American Economic Review*, 95(2):329–333.

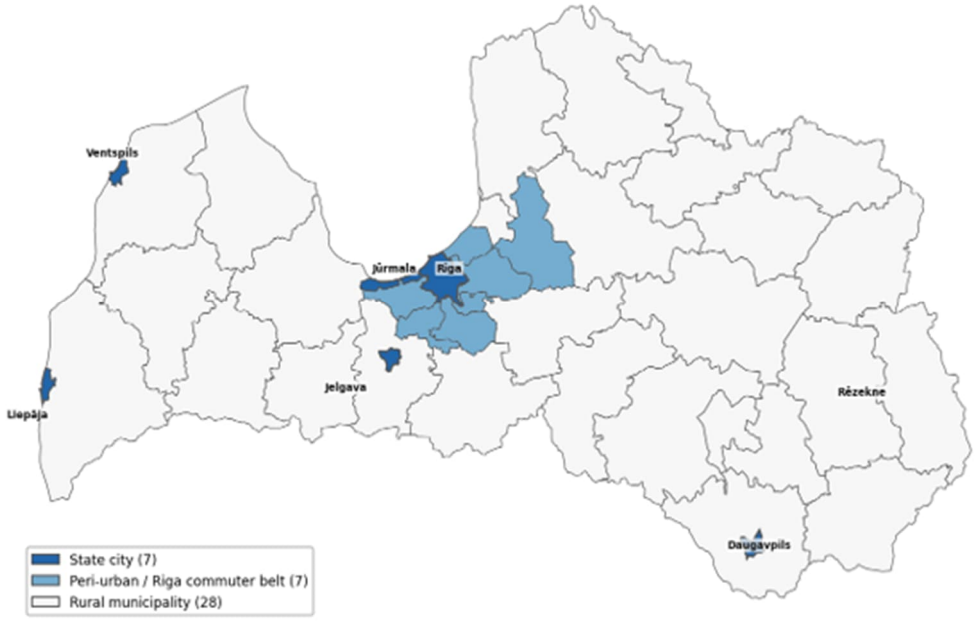
Goldsmith-Pinkham, Paul, Isaac Sorkin, and Henry Swift, 2020. "Bartik Instruments: What, When, Why, and How." *American Economic Review,* 110(8):2586–2624.

Hsieh, Chang-Tai and Enrico Moretti, 2019. "Housing Constraints and Spatial Misallocation." *American Economic Journal: Macroeconomics*, 11(2):1–39.

Notowidigdo, Matthew J., 2020. "The Incidence of Local Labor Demand Shocks." *Journal of Labor Economics*, 38(3):687–725.

Appendix I. Municipality Classification Map

Appendix I. Figure 1. Latvia: Municipality Classification by Urban Type



Dark blue: seven state cities (urban).
Light blue: seven peri-urban municipalities in Rīga's commuter belt.
White: 28 rural municipalities, of which Saulkrasti is excluded from regressions.

Source: Authors' classification based on administrative boundaries and proximity to Rīga.

Appendix II. Tradable Sectors in the Bartik-Style Labor Demand Shock

Appendix II. Table 1 lists the 34 tradable 2-digit NACE sectors included in the Bartik-style labor demand shock. Sector codes are grouped by letter section. Excluded from the tradable set are: construction (F), food services (I56), real estate (L), public administration (O), education (P), health (Q), personal services (R–S), and four manufacturing sub-sectors omitted due to data suppression or predominantly local demand – printing and reproduction (C18), manufacture of motor vehicles (C29), other transport equipment (C30), and manufacture of paper and paper products (C17).

Appendix II. Table 1. Latvia: 2-Digit NACE Sectors Included in the Bartik-Style Labor Demand Shock (34 Sectors)

NACE Code	Description
A – Agriculture, forestry and fishing	
A01	Crop and animal production, hunting and related service activities
A02	Forestry and logging
A03	Fishing and aquaculture
B – Mining and quarrying	
B08	Other mining and quarrying
C – Manufacturing	
C10	Manufacture of food products
C11	Manufacture of beverages
C13	Manufacture of textiles
C14	Manufacture of wearing apparel
C16	Manufacture of wood and products of wood and cork
C20	Manufacture of chemicals and chemical products
C21	Manufacture of basic pharmaceutical products
C22	Manufacture of rubber and plastic products
C23	Manufacture of other non-metallic mineral products
C25	Manufacture of fabricated metal products
C26	Manufacture of computer, electronic and optical products
C27	Manufacture of electrical equipment
C28	Manufacture of machinery and equipment n.e.c.
C31	Manufacture of furniture
C32	Other manufacturing
C33	Repair and installation of machinery and equipment
D – Electricity, gas, steam and air conditioning	
D35	Electricity, gas, steam and air conditioning supply

Appendix II. Table 1. Latvia: 2-Digit NACE Sectors Included in the Bartik-Style Labor Demand Shock (34 Sectors) (Concluded)

G – Wholesale and retail trade	
G46	Wholesale trade, except of motor vehicles and motorcycles
H – Transportation and storage	
H49	Land transport and transport via pipelines
H50	Water transport
H51	Air transport
I – Accommodation	
I55	Accommodation
J – Information and communication	
J58	Publishing activities
J61	Telecommunications
J62	Computer programming, consultancy and related activities
J63	Information service activities
K – Financial and insurance activities	
K64	Financial service activities
K65	Insurance, reinsurance and pension funding
K66	Activities auxiliary to financial services
M – Professional, scientific and technical activities	
M72	Scientific research and development

Note: Employment shares for 2011 are drawn from the Latvian Population and Housing Census. National employment growth rates are from Eurostat. Employment shares are fixed at the 2011 base year for all years of the panel (2012–2025).