INTERNATIONAL MONETARY FUND

Long-Term Spending Pressures in Liechtenstein

Principality of Liechtenstein

Rodgers Chawani

SIP/2026/032

***IMF Selected Issues Papers* are prepared by IMF staff as background documentation for periodic consultations with member countries.** It is based on the information available at the time it was completed on March 5, 2026. This paper is also published separately as IMF Country Report No 26/68.

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Long-Term Spending Pressures in Liechtenstein

Prepared by Rodgers Chawani

Authorized for distribution by Kazuko Shirono
April 2026

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ABSTRACT: Liechtenstein faces long-term fiscal pressures from population aging, climate transition, and enhanced security requirements. Using a Marginal Abatement Cost Curve framework, cohort-component demographic modeling, and cross-country benchmarking, staff estimates cumulative annual spending pressures of approximately 3½ percent of GDP by 2050—climate mitigation and adaptation (1.7 percent), pensions (1.5 percent), and security (0.3 percent). Liechtenstein's strong fiscal position—consistent surpluses, near-zero public debt, and substantial net assets—provides space to address these pressures. Systematic integration of long-term projections into budgetary frameworks through regular sustainability assessments and independent evaluation would strengthen transparency, intergenerational equity, and fiscal credibility.

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Author’s E-Mail Address:	rchawani@imf.org

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Prepared by Rodgers Chawani[1]

[1] The author would like to thank Mark Horton and Kazuko Shirono (all IMF EUR) for their helpful comments and suggestions.

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LONG-TERM SPENDING PRESSURES IN LIECHTENSTEIN

Liechtenstein faces long-term fiscal spending pressures from aging and higher pension obligations, climate mitigation and adaptation, and enhanced national security. These pressures have not been quantified in detail, so that their impact on public finances has yet to be assessed This paper's preliminary estimate suggests spending needs of about 3.5 percent of GDP annually by 2050. Liechtenstein's strong fiscal position—consistent surpluses over the past decade of approximately the same magnitude—suggests scope to accommodate these challenges. Costing and systematically integrating these pressures into the fiscal framework through independent evaluation and regular sustainability assessments would enhance transparency, sustainability, resource allocation efficiency, and credibility.

A. Introduction

1. Liechtenstein faces rising long-term spending pressures. Unlike many European economies that face substantial fiscal burdens exacerbated by the pandemic and energy shock, Liechtenstein has maintained a strong fiscal position with consistent surpluses and limited public debt, partially driven by one-off income tax effects. Nevertheless, the Principality faces imminent and growing spending pressures from aging, climate change, and security needs, including cybersecurity, and modernization of police. The burden of these costs will be felt in the near term and increase considerably over time.

2. Accounting explicitly for long-term spending pressures promote macroeconomic stability, fiscal sustainability, and intergenerational equity. Systematic assessment enables evaluation of the consistency of current fiscal positions with long-term solvency, creating a common foundation for policy dialogue and affording timely adjustment, reducing the risk/need of abrupt adjustment (Clements and others 2015; Debrun and others 2013; Caselli and others 2022; Eble and others 2025). Transparent disclosure of fiscal pressures—and timely adjustment—may bolster market confidence, reduce sovereign risk premiums, and avoid leaving obligations for future generations (IMF 2018; Gaspar and others 2016).

3. The paper provides an initial assessment of long-term spending pressures in Liechtenstein. Section B describes the methodology for projecting climate, pension, and security expenditures. Sections C–E present findings for climate-related spending, pension spending, and security spending, respectively. Section F provides the bottom-line assessment, while section G discusses good practices for integrating long-term pressures into budgetary frameworks. Section H concludes.

B. Methodology

4. Spending pressures are defined as the deviation of projected expenditure from baseline levels. This section estimates spending pressures from aging and pensions, security and

climate needs. For pensions and security, baselines are set at 2023 levels in percent of GDP, the most recent year with comprehensive data. For climate spending, the baseline incorporates investments already underway. Spending pressures are calculated as the difference between projected annual expenditure requirements and baseline levels, expressed both in percent of annual GDP and in percent of baseline-scenario GDP (Eble and others 2025).

5. Costing climate expenditures utilizes a bottom-up sectoral framework integrating Marginal Abatement Cost Curve (MACC) optimization. Following best practices identified by Kesicki and Ekins (2012) for MACC construction and the sequential optimization approach of Vogt-Schilb and Hallegatte (2014), the approach ranks mitigation measures by cost-effectiveness, enabling optimization of climate investment strategies. The methodology proceeds through six analytical steps:

- *Emissions baseline*. Sectoral greenhouse gas (GHG) emissions trajectories are disaggregated across energy, transport, buildings, industry, agriculture, and waste using the Intergovernmental Panel on Climate Change (IPCC) 2006 Guidelines classification. Business-as-usual projections through 2050 are derived using sector-specific activity drivers and emission factors, informed by technology trends, and using global warming potentials from the IPCC's Fifth Assessment Report.

- *Abatement gap calculation*. Required emissions reductions are derived comparing business-as-usual path against the Nationally Determined Contribution (NDC) targets—a 55 percent reduction by 2030, 68 percent by 2035, and net-zero by 2050, relative to 1990, leading to abatement requirements of 62 $ktCO_2e$ by 2030, rising to 166 $ktCO_2e$ by 2050.

- *Mitigation measures identification***.** Specific interventions are identified across all major sectors, including building envelope retrofits, heating system replacements (primarily heat pumps), electric vehicle adoption, solar PV deployment, industrial efficiency improvements, agricultural methane reduction, and waste management enhancements. The analysis relies on data from the Swiss Federal Office of Energy, IEA technology assessments, and EU climate policy evaluations.

- *Cost-Effectiveness Ranking*. Measures are ordered from lowest to highest marginal abatement cost. Technology costs incorporate Swiss Federal Office of Energy benchmarks, IEA technology assessments, and European market data adjusted for Liechtenstein's scale and Alpine context.

- *Pathway Optimization*. The optimal mitigation strategy prioritizes lowest-cost options subject to technical constraints, financing availability, and implementation capacity. The first 62 $ktCO_2e$ of abatement demonstrates negative net cost (averaging -CHF 85 per ton), while remaining abatement requires positive investment (averaging CHF 120 per ton).

- *Financing Structure*. Public expenditure concentrates on building efficiency subsidies under the Energy Efficiency Act, CO_2 levy, district heating infrastructure, and regulatory implementation. Private investment is mobilized through carbon pricing, vehicle efficiency standards, and market-based instruments.

6. Several factors motivated the use of MACC analysis. First, granular data on actual unit costs for heat pumps, building retrofits, and solar installations are readily available. Second, the MACC produces CHF expenditure estimates that may feed directly into fiscal planning, unlike aggregate models that project policy effects without budget line items. Third, the framework disaggregates public and private financing—essential given the importance of the private sector in Liechtenstein. Fourth, Liechtenstein's scale (41,000 residents, 167 $ktCO_2e$ emissions, 11 municipalities) makes discrete investments measurable events, rendering bottom-up accounting more accurate than cross-country averages. Fifth, the 26-year projection aligns with the 2050 net-zero target, beyond the typical 10–15 year window of aggregate models. Finally, the approach captures institutional arrangements with Switzerland—the customs union, shared carbon levy, connected electricity grid—that create policy spillovers not reflected in standardized models.

7. Pension expenditure projections employ a cohort-component demographic model (Amaglobeli and Shi, 2016). The approach disaggregates spending into replacement rate, coverage ratio, old-age dependency ratio, and inverse labor force participation. Population projections use UN World Population Prospects (2024 revision, medium-fertility variant) calibrated to recent demographics. The replacement rate applies average pension-to-GDP-per-capita ratios from 2018–23 to projected output per worker. Outputs are validated against actuarial calculations from Liechtenstein's pension authorities and tested for sensitivity to wage growth, inflation, and labor force participation assumptions.

8. Security spending projections combine policy analysis and cross-country benchmarking. The analysis incorporates announced government policy objectives on defense cooperation, cybersecurity strategy, and border control modernization, translating qualitative commitments into quantitative expenditure estimates using comparable programs in neighboring countries and required technological investments. Projections account for the European security environment, cybersecurity threats, enhanced border control needs, and police equipment system modernization. Given limited public information on specific budget allocations for security programs, estimates reflect the order of magnitude of prospective pressures rather than precise forecasts.

C. Climate-Related Spending

9. Liechtenstein has achieved significant emission reductions while successfully decoupling growth from GHG intensity (Table 1). Total emissions have fallen by 27 percent from 1990 levels and per capita emission stood at approximately 4.2 tCO_2eq in 2023, well below the EU average of 6.8 tCO_2eq. Liechtenstein's forests and managed land absorb approximately 7.3 $ktCO_2eq$ annually, partially offsetting emissions from other sectors (UNFCCC 2024). However, the NDC target excludes Land Use, Land-Use Change, and Forestry (LULUCF) categories.

10. The energy sector dominates the emissions profile (Figure1), with buildings and transport constituting the main abatement challenges (Figure 1a). Energy accounted for 79.8 percent of total emissions in 2023, 8 ppts lower than 1990. Within the sector, residential and commercial heating

(33.2 percent of total emissions) and road transport (32.3 percent) together account for 65 percent of energy-related emissions. Non-energy sectors are structurally stable: agriculture contributes 14.5 percent of total emissions, driven by enteric fermentation with limited abatement potential; Industrial Processes and Product Use (IPPU) adds 4.7 percent, dominated by fluorinated gas substitution; and waste accounts for a minor 1.0 percent.

Table 1. Liechtenstein: Greenhouse Gas Emissions Trajectory and Targets, 1990–2050
(Kilotons of Carbon Dioxide Equivalent, $ktCO_2eq$)

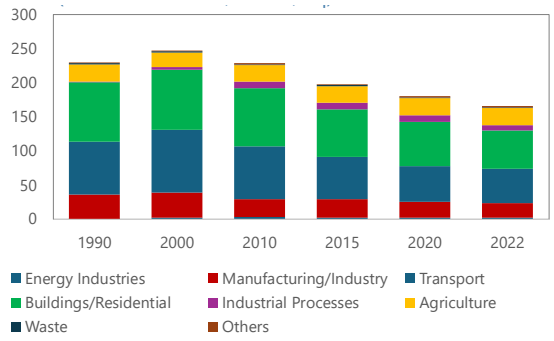
Year	1990	2022	2030	2035	2050
Total emissions ($ktCO_2e$)	229.0	165.5	103.1	73.3	0.0
Reduction vs 1990 (percent)	—	-28	-55	-68	-100
Required abatement ($ktCO_2e$)	—	—	62.4	92.2	165.5
Total emissions ($ktCO_2e$)	229.0	165.5	103.1	73.3	0.0

Source: National Inventory Document 2024 (UNFCCC); Second Nationally Determined Contribution; IMF Staff Calculations.

Figure 1. Emissions Profile and Trajectory

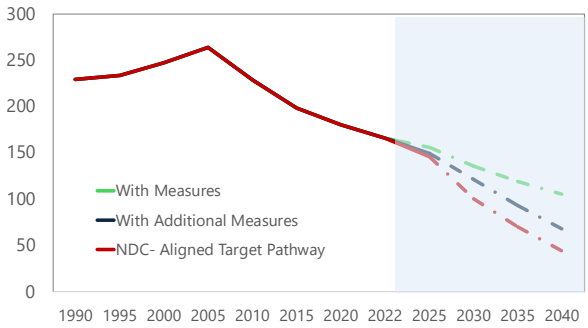
The energy sector accounts for 80 percent of emissions, concentrated in buildings and transport….

Sectoral Breakdown of Greenhouse Gas Emissions
(Baseline scenario, KtCOz, eq)



The with-measures scenario falls short of the 2030 and 2035 targets, necessitating for additional policy action.

Emission Reduction Pathway Under Different Scenarios
(KtCO2, eq)



Source: Second Nationally Determined Contribution 2025.

11. Current policy paths fall short of NDC commitments (Figure 1b). The second NDC targets a 55 percent reduction below 1990 levels by 2030 and 68 percent by 2035 (UNFCCC 2025). The With Measures (WM) scenario projects only a 44–45 percent total reduction by 2035, leaving a gap of 10 and 22 ppts. relative to the 2030 and 2035 targets respectively; only the With Additional Measures (WAM) scenario reaches 57–58 percent by 2035, still short of the 68 percent commitment. Closing the 2030 gap will require annual reductions of three times the pace achieved over the past decade during 2023–2030, underscoring significant execution risk absent accelerated policy implementation.

12. Buildings and transport represent the most cost-effective abatement opportunities. Building insulation, electric vehicles, heat pumps, and industrial efficiency generate lifetime operational savings exceeding upfront capital costs (Table 2). Solar PV and agricultural interventions contribute additional reductions, albeit at positive cost.

Table 2. Liechtenstein: MACC Analysis: Investments by Cost-Effectiveness

Rank	Measure	MACC (CHF/ktCO2)	Abatement (ktCO2)
1	Building Installation	-150	18
2	Electric Vehicles	-80	15
3	Heat Pumps	-50	12
4	Industrial Efficiency	-30	8
5	Solar PV	+20	5
6	Agriculture Measures	+50	3

Sources: UNFCCC 2025 - Second Nationally Determined Contribution (NDC) and MACC Calculations.

13. The green transition requires total investment of around 45 percent of current GDP through 2050. Mitigation accounts for 40 percent of GDP (88 percent of the total), concentrated in energy (20 percent of GDP) and buildings (9 percent of GDP), reflecting the capital intensity of renewable energy deployment, grid modernization, and building retrofits. Transport and industry contribute a further 7 and 4 percent of GDP respectively, with agriculture and waste accounting for a modest 1 percent. Adaptation expenditure of 5 percent of GDP (12 percent of the total) is concentrated in flood and water management (3 percent of GDP) and infrastructure resilience (1 percent of GDP), consistent with exposure to Alpine climate hazards.

14. The aggregate investment requirement is relatively modest. At approximately 1.7 percent of cumulative GDP over the 26-year transition period, the required pace of around CHF 129 million per year is broadly in line with Switzerland's climate strategy and with the 1–2 percent of GDP per annum envisaged under the EU Green Deal (European Commission 2019). The costs, while significant, represent a cumulative capital stock transformation rather than a recurring fiscal burden.

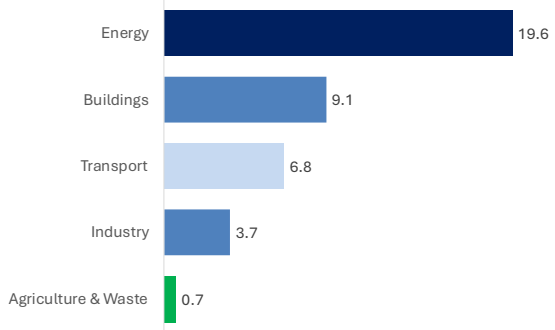
15. Mitigation costs are concentrated in energy and buildings, reflecting the importance of fossil fuel combustion (40 percent of GDP). The energy sector has the largest share, comprising renewable electricity generation, grid modernization, and heat decarbonization of about 20 percent of GDP (UNFCCC 2024; IEA various years). Buildings require retrofitting of the existing stock through insulation, window upgrades, and heating system conversions (9 percent of GDP). Transport costs cover fleet electrification, upgrades, and demand-side measures, with transition complexity due to dependence on cross-border commuters (7 percent of GDP). Industry, agriculture, and waste account for the residual, with limited abatement potential in the latter expected to be addressed through negative emission technologies or international offsets as net-zero approaches (5 percent of GDP).

16. Adaptation investment reflects physical exposure. Flood and water management accounts for 50 percent of adaptation costs, covering Rhine flood protection, urban drainage, and water retention (UNFCCC 2024). Infrastructure resilience—transport network adaptation, critical utilities protection, and heat-resistant construction—accounts for a further 25 percent. Ecosystem protection absorbs 16 percent, and emergency preparedness—natural hazard mapping, civil protection systems, and early warning infrastructure—the remaining 9 percent. As the underlying benefits constitute public goods, adaptation costs fall on the public sector.

Figure 2. Projected Climate Change Costs and Financing

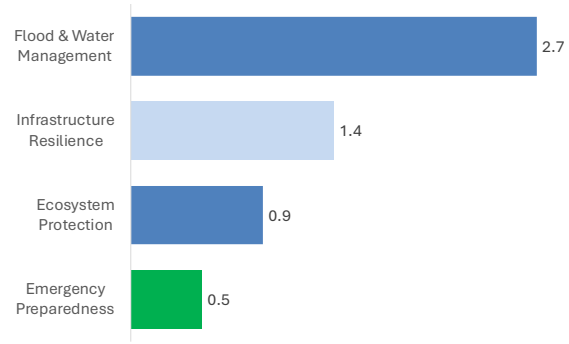
Mitigation costs are concentrated in energy (20 percent of GDP) and buildings (9 percent of GDP) …

Climate Investment Costs by Sector
(Percent of GDP)



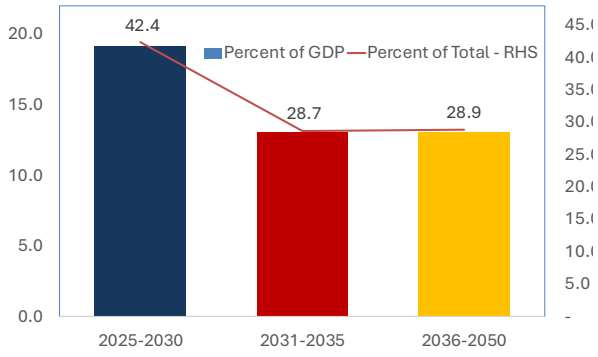
Flood and water management dominate adaptation costs, accounting for 4.1 percent of GDP of the total investment…

Climate Adaptation Costs by Category
(Percent of GDP)



Investment is front-loaded to meet the 2030 targets creating a declining burden over time…

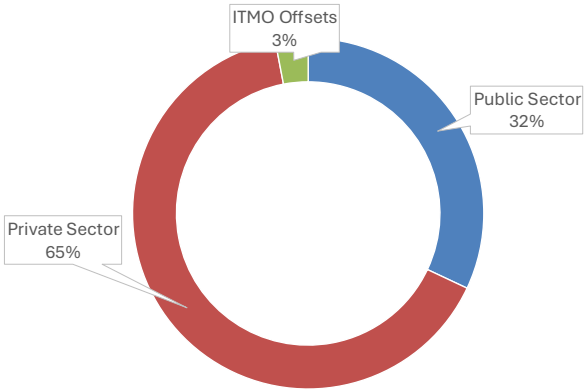
Climate Investment Phasing
(Percent of GDP and percent of total investment)



Sources: Liechtenstein Authorities and IMF Staff Calculations.

Only 32 percent of total investment falls on public finances. The majority is private sector investment

Climate Investment Financing Structure
(Percent of total investment)



Source: IMF Staff Calculations.

17. Staff analysis suggests that the primary financing burden for climate transition will rest more on the private sector with public expenditures playing a more targeted role. The private sector could account for 29 percent of GDP through heat pumps, building insulation, and

electric vehicles, driven by rising carbon prices, subsidy incentives, and improving technology economics. The public sector could finance 15 percent of GDP, concentrated in infrastructure investment, subsidies for building retrofits and heating system conversions, and public transport electrification. International carbon credit offsets (ITMOs) account for the residual 1 percent of GDP, limited to genuinely residual emissions after domestic abatement potential is exhausted.

18. Investment needs are heavily front-loaded. The 2025–30 period accounts for a large share, 42.4 percent, reflecting the urgency of foundational infrastructure—renewable energy systems, building retrofit programs, and transport electrification—ahead of 2030 target (Vogt-Schilb and Hallegatte 2014). Spending moderates in the 2031–35 period at 28.7 percent, as the initial capital stock is established and incremental deployment becomes less capital-intensive and stabilizes at 28.9 percent over the longer 2036–50 horizon. The phasing implies the concentration of public expenditure in the near term and calls for climate spending to be systematically integrated into medium-term budget frameworks to avoid crowding out competing priorities.

19. Delayed action could increase transition costs. Postponing investment in efficient buildings and low-carbon transport locks in fossil fuel infrastructure for 15–20-year operating lifetimes, extending carbon payback periods and compressing timelines to meet interim targets. A five-year delay would require accelerating the annual abatement rate by approximately 40 percent to achieve the 2030 target, concentrating investment into a shorter period and raising aggregate financing requirements. Delay also erodes negative-cost opportunities: building retrofits and heat pump installations become costlier as the stock ages, while foregone operational savings reduce financial attractiveness (Vogt-Schilb and Hallegatte 2014). Later action further constrains the use of ITMOs, as deferred domestic abatement exhausts flexibility to rely on international offsets within Paris Agreement frameworks.

D. Pension Spending

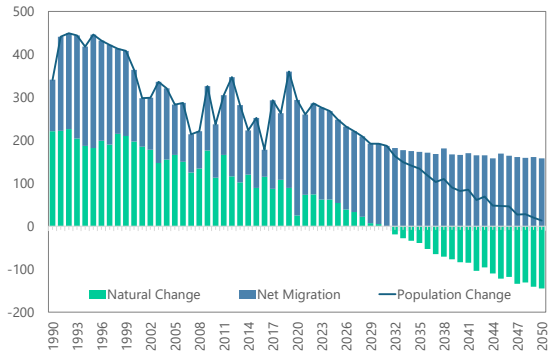
20. Population growth has trended upward driven primarily by net migration. The population increased approximately 25 percent during 2000–24, with net migration consistently outpacing natural population change (UN 2024). Under the trend scenario, the population is projected to increase by 7 percent by 2030 and by a further 8 percent by 2050.

21. The speed of population ageing is advancing. The old-age dependency ratio—defined as the ratio of people 65 and older to people between 15 and 64—is expected to increase from 33.3 percent in 2023 to 51 percent in 2050. The 65+ and 80+ cohorts are projected to increase by 7.7 and 6.1 percentage points, respectively, to 27.8 percent and 11 percent. The expansion of older population cohorts will strain social support systems. Further, given the large share of commuters in the labor market, their net inflow growth constitutes a key contributor to the potential Pillar I fund-to-expenditure ratio trajectory.

Figure 3. Population Trends

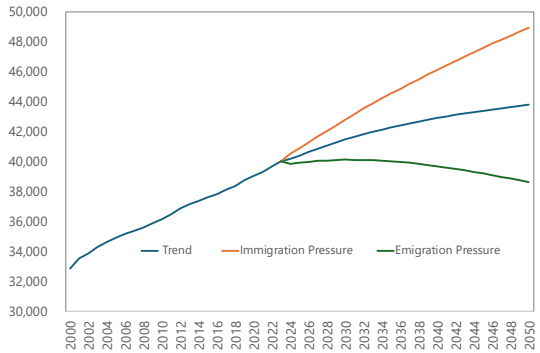
Net migration has been the dominant driver of Liechtenstein's population growth since 1990, consistently outpacing natural change….

Contribution to Total Population Growth



Migration dynamics will be the primary driver determining whether Liechtenstein's population grows modestly or substantially through 2050.

Population Projections 2024–2050



Sources: United Nations, World Population Prospects and IMF Staff Calculations.

22. Demographic changes are projected to significantly increase pension expenditure. The impact is assessed using benefit and coverage ratios from projections of age dependency ratios and labor force participation rates (Clements and others, 2015). In line with actuarial assumptions of 2 percent nominal wage growth and 1 percent inflation, the proxy replacement rate for Pillar I pensions declines from a peak of 37 percent in 2011 to 20 percent in 2050. Labor force participation rates and output per worker are endogenous. Pension spending pressures are projected to increase by 1.5 percent of GDP annually, consistent with trends in advanced economies.

E. Security Spending

23. Security spending pressures reflect the shifting geopolitical landscape. Across Europe, countries are increasing defense spending, with a number increasing the 2-year moving average of defense outlays as a share of GDP rises by at least 1 percentage point (Eble and others 2025). Liechtenstein has no army. Security spending pressures focus on cybersecurity, and police modernization. Outlays on security represent 3–4 percent of total government spending and averaged 1 percent of GDP during 2013–23.

24. Several factors point to the need for increased security spending. In a baseline scenario, security spending increases from 1.0 to 1.3 percent of GDP, reflecting expansion of cybersecurity capabilities for law enforcement and government infrastructure, enhanced border control technology, and modernization of police equipment. This would involve an enhanced police force with advanced technology, robust cybersecurity infrastructure, improved intelligence sharing, and expanded emergency response.

F. Summary of Long-Term Spending Needs

25. Liechtenstein faces long-term fiscal pressures estimated at 3½ percent of GDP annually by 2050. Climate mitigation and adaptation constitute the largest component at 1.7 percent of GDP, followed by pension obligations at 1.5 percent of GDP, and enhanced security of 0.3 percent of GDP (Table 3).

Table 3. Liechtenstein: Spending Pressures in 2050
(Percent of GDP)

Category	Total Spending Pressures
Pension spending	1.5
Security spending	0.3
Climate mitigation and adaptation	1.7
Total spending pressures	**3.5**

Source: IMF Staff Calculations.

26. While these pressures are substantial, Liechtenstein has significant fiscal space. The Principality's exceptionally strong fiscal position—characterized by consistent surpluses of 3 percent of GDP or more, virtually zero public debt, and substantial net public assets—provides a solid foundation to address spending pressures. without threatening fiscal sustainability.

G. Options for Accounting for Long-Term Spending in Budgetary Frameworks

27. Several options should be considered for accounting for long-term spending pressures (Eble and others (2025)). Liechtenstein, like peer countries, should explore:

- *A comprehensive assessment of long-term fiscal pressures*. This would involve a proactive approach, with regular publication of long-term forecasts under different scenarios.
- *Publication of annual fiscal sustainability reports with medium-and long-term forecasts of public finances (Debrun and others 2013; Curristine and others 2024)*. These would include sensitivity analyses to changes in key demographic, macroeconomic, and other relevant assumptions.
- *Automatic adjustment mechanisms with built-in prudency factors* to help address uncertainty while maintaining the credibility of the multiannual framework (Eble and others 2025).
- *Enhanced data and institutional frameworks to support policies addressing medium- to long-term spending pressures (Caselli and others 2022; Eble and others 2025).* More detailed actuarial projections for pensions and health care assessing the fiscal effect of legislative reforms.

Several countries in Europe have established independent fiscal councils (Beetsma and Debrun 2016; Debrun and others 2013). The council would be mandated to conduct independent evaluations of

long-term spending pressures. This could be considered in Liechtenstein once macroeconomic and fiscal data are improved and once there is sufficient capacity to do so.

H. Conclusion

28. Liechtenstein faces significant but manageable demographic, security, and climate transition spending pressures. Staff analysis suggests that these pressures could reach 3½ percent of GDP annually by 2050. Liechtenstein's strong fiscal position—low public debt, substantial net assets, and prudent budgetary management—provides a solid foundation for addressing these challenges. However, further assessment and near-, medium- and long-term budget planning are needed. The gradual materialization of spending pressures affords time for implementing reforms and mobilizing resources, although action should begin promptly—particularly in the climate area—and be maintained across political cycles.

References

Adler, Gustavo, Romain Duval, Davide Furceri, Sinem Kiliç Çelik, Ksenia Koloskova, and Marcos Poplawski-Ribeiro. 2017. "*Gone with the Headwinds: Global Productivity.*" IMF Staff Discussion Note 17/04, International Monetary Fund, Washington, DC.

Aiyar, Shekhar, Christian Ebeke, and Xiaobo Shao. 2016. "*The Impact of Workforce Aging on European Productivity.*" IMF Working Paper 16/238, International Monetary Fund, Washington, DC.

Amaglobeli, David, and Wei Shi. 2016. "*How to Assess Fiscal Implications of Demographic Shifts: A Granular Approach.*" IMF How To Notes 2016/002, International Monetary Fund, Washington, DC.

Batog, Cristina, Ernesto Crivelli, Anna Ilyina, Zoltan Jakab, Jaewoo Lee, Anvar Musayev, and Iva Petrova. 2019. "*Demographic Headwinds in Central and Eastern Europe.*" IMF Departmental Paper 2019/011, International Monetary Fund, Washington, DC.

Beetsma, Roel, and Xavier Debrun. 2016. "*Fiscal Councils: Rationale and Effectiveness.*" IMF Working Paper 16/86, International Monetary Fund, Washington, DC.

Caselli, Francesca, Luca Antonio Ricci, Padamja Khandelwal, and Mehdi Benamghar. 2022. "*Addressing Long-Term Fiscal Challenges in a Low Interest Rate Era.*" IMF Departmental Paper 2022/003, International Monetary Fund, Washington, DC.

Clements, Benedict, Kamil Dybczak, Vitor Gaspar, Sanjeev Gupta, and Mauricio Soto. 2015. "*The Fiscal Consequences of Shrinking Populations.*" IMF Staff Discussion Note 15/21, International Monetary Fund, Washington, DC.

Curristine, Teresa, Zhiyong Harris, and Hanan Morsy. 2024. "*Strengthening Fiscal Frameworks in the Middle East and Central Asia.*" IMF Departmental Paper 2024/005, International Monetary Fund, Washington, DC.

Debrun, Xavier, Tidiane Kinda, Teresa Curristine, Ljubinko Jankov, Laura Jaramillo, and Chunfang Yang. 2013. "*The Functions and Impact of Fiscal Councils.*" IMF Policy Paper, International Monetary Fund, Washington, DC.

Eble, Stephanie, Alexander Pitt, Irina Bunda, Oyun Erdene Adilbish, Nina Budina, Gee Hee Hong, Moheb Malak, Sabiha Mohona, Alla Myrvoda, and Keyra Primus. 2025. "*Long-Term Spending Pressures in Europe*." IMF Departmental Paper, International Monetary Fund, Washington, DC.

Escolano, Julio. 2010. "*A Practical Guide to Public Debt Dynamics, Fiscal Sustainability, and Cyclical Adjustment of Budgetary Aggregates*." IMF Technical Notes and Manuals 2010/02, International Monetary Fund, Washington, DC.

European Commission. 2019. "*The European Green Deal*." Communication from the Commission COM (2019) 640 final, European Commission, Brussels.

European Environment Agency. 2023. "*Annual European Union Greenhouse Gas Inventory 1990–2021 and Inventory Report 2023*." Copenhagen: EEA.

Feyrer, James. 2007. "*Demographics and Productivity*." Review of Economics and Statistics 89 (1): 100–109.

Gaspar, Vitor, Laura Jaramillo, and Philippe Wingender. 2016. "*Tax Capacity and Growth: Is There a Tipping Point?*" IMF Working Paper 16/234, International Monetary Fund, Washington, DC.
International Energy Agency. 2023. "CO_2 Emissions in 2023." Paris: IEA.

———. Various years. "Energy Technology Perspectives." Paris: IEA.

International Monetary Fund. 2018. "*Fiscal Monitor: Managing Public Wealth*." October, International Monetary Fund, Washington, DC.

IPCC. 2014. "*Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*." Geneva: IPCC.

———. 2019. "*2006 IPCC Guidelines for National Greenhouse Gas Inventories, 2019 Refinement*." Intergovernmental Panel on Climate Change, Geneva.

Kesicki, Fabian, and Paul Ekins. 2012. "*Marginal Abatement Cost Curves: A Call for Caution*." Climate Policy 12 (2): 219–36.

Sakrak, Elif, Mauricio Soto, and Juliana Gamboa Arbelaez. 2022. "*Integrating Climate and Green Considerations into Public Financial Management.*" IMF How to Notes 2022/002, International Monetary Fund, Washington, DC.

United Nations. 2024. "*World Population Prospects 2024.*" Department of Economic and Social Affairs, Population Division, New York.

UNFCCC. 2024. "*Liechtenstein National Inventory Document 2024.*" United Nations Framework Convention on Climate Change, Bonn.

———. 2025. "*Liechtenstein's Second Nationally Determined Contribution.*" United Nations Framework Convention on Climate Change, Bonn.

Vogt-Schilb, Adrien, and Stéphane Hallegatte. 2014. "*Marginal Abatement Cost Curves and the Optimal Timing of Mitigation Measures.*" Energy Policy 66: 645–53.