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OECD Economic Surveys: Chile 2025

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Foreword

This Economic Survey was prepared by Claudia Ramírez Bulos and Adolfo Rodríguez-Vargas, under the supervision of Aida Caldera Sánchez. Research assistance was provided by Véronique Gindrey and editorial support by Gemma Martínez and François Iglesias.

This Survey is published under the responsibility of the Economic and Development Review Committee of the OECD. The Committee discussed the draft Survey on 22 October 2024. The cut-off date for data used in the Survey is 6 January 2025.

Information about this and previous Surveys and more information about how Surveys are prepared is available at https://www.oecd.org/en/topics/economic-surveys.html.

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Basic statistics of Chile, 2023

(Numbers in parentheses refer to the OECD average)[1]

LAND, PEOPLE AND ELECTORAL CYCLE					
Population (million)	19.6		Population density per km²	26.4	(39.2)
Under 15 (%,)	18.2	(17.0)	Life expectancy at birth (years, 2022)	79.5	(79.6)
Over 65 (%)	13.5	(18.3)	Men (2022)	77.2	(77.0)
International migrant stock (% of population, 2020)	8.6	(13.9)	Women (2022)	81.9	(82.4)
Latest 5-year average growth (%)	1.0	(0.4)	Latest general election	December 2021	
ECONOMY					
Gross domestic product (GDP)			Value added shares (%)		
In current prices (billion USD)	336.1		Agriculture, forestry and fishing	3.9	(2.8)
In current prices (billion CLP)	281 833.6		Industry including construction	32.9	(27.2)
Latest 5-year average real growth (%)	1.5	(1.6)	Services	63.2	(70.0)
Per capita (thousand USD PPP)[2]	33.3	(59.0)			
GENERAL GOVERNMENT					
Expenditure (OECD: 2022)	26.9	(42.3)	Gross financial debt (OECD: 2022)	43.2	(112.9)
Revenue (OECD: 2022)	24.7	(39.0)	Net financial debt (OECD: 2022)	14.1	(67.4)
EXTERNAL ACCOUNTS					
Exchange rate (CLP per USD)	838.54		Main exports (% of total merchandise exports)		
PPP exchange rate (USA = 1)	431.42		Minerals	30.3	
In per cent of GDP			Metals	22.2	
Exports of goods and services	31.2	(31.0)	Chemicals	11.7	
Imports of goods and services	29.8	(31.2)	Main imports (% of total merchandise imports)		
Current account balance	-3.4	(-0.3)	Machinery and electronics	22.1	
Net international investment position	-19.0		Fuels	21.0	
			Chemicals	10.4	
LABOUR MARKET, SKILLS AND INNOVATION					
Employment rate (aged 15 and over, %)	55.9	(58.0)	Unemployment rate, Labour Force Survey (aged 15 and over, %,)	8.7	(4.8)
Men	65.1	(65.5)	Youth (aged 15-24, %)	21.4	(10.6)
Women	47.0	(50.8)	Long-term unemployed (1 year and over, %)	1.3	(1.0)
Participation rate (aged 15 and over, %)	61.2	(60.9)	Tertiary educational attainment (aged 25-64, %, 2022, OECD: 2023)	32.9	(41.0)
Average hours worked per year	1,953	(1,742)	Gross domestic expenditure on R&D (% of GDP, 2020, OECD: 2021)	0.3	(2.9)
ENVIRONMENT					
Total primary energy supply per capita (toe, 2022)	1.9	(3.8)	CO_2 emissions from fuel combustion per capita (tonnes, 2022)	4.1	(7.8)
Renewables (%, 2022)	27.0	(12.0)	Renewable internal freshwater resources per capita (1 000 m³, 2020)	45.9	
Exposure to air pollution (more than 10 µg/m³ of $PM_{2.5}$, % of population, 2020)	98.8	(56.5)	Municipal waste per capita (tonnes, 2018, OECD: 2022)	0.4	(0.5)
SOCIETY					
Income inequality (Gini coefficient, 2022, OECD: latest available)	0.448	(0.315)	Education outcomes (PISA 2022 score)		
Relative poverty rate (%, 2022, OECD: 2020)	16.3	(11.7)	Reading	448	(476)
Median disposable household income (thousand USD PPP, 2022, OECD: 2020)	14.0	(27.5)	Mathematics	412	(472)
Public and private spending (% of GDP)			Science	444	(485)
Health care (2022)	10.0	(9.2)	Share of women in parliament (%)	35.5	(32.8)
Pensions (2021, OECD: 2019)	4.7	(9.5)			
Education (% of GNI, 2020)	6.4	(5.1)			

The year is indicated in parenthesis if it deviates from the year in the main title of this table. Where the OECD aggregate is not provided in the source database, a simple OECD average of latest available data is calculated where data exist for at least 80% of member countries[2] OECD aggregate refers to weighted average.

Source: Calculations based on data extracted from databases of the following organisations: OECD, International Energy Agency, International Labour Organisation, International Monetary Fund, United Nations, World Bank.

Executive summary

Key messages:

Securing fiscal sustainability: Fiscal space is limited, and long-term spending pressures are set to increase. To put debt on a declining path and address spending needs, higher tax revenues and greater spending efficiency are needed.

Fostering gender equality in the labour market: Facilitate women's incorporation in the workforce, particularly in better-paid jobs, to achieve more gender equality and boost potential growth.

Boosting digitalisation and innovation: Address gaps in digital skills, improve the adoption of digital tools among small firms, while promoting coherent public R&D support and pro-competition regulation for higher productivity.

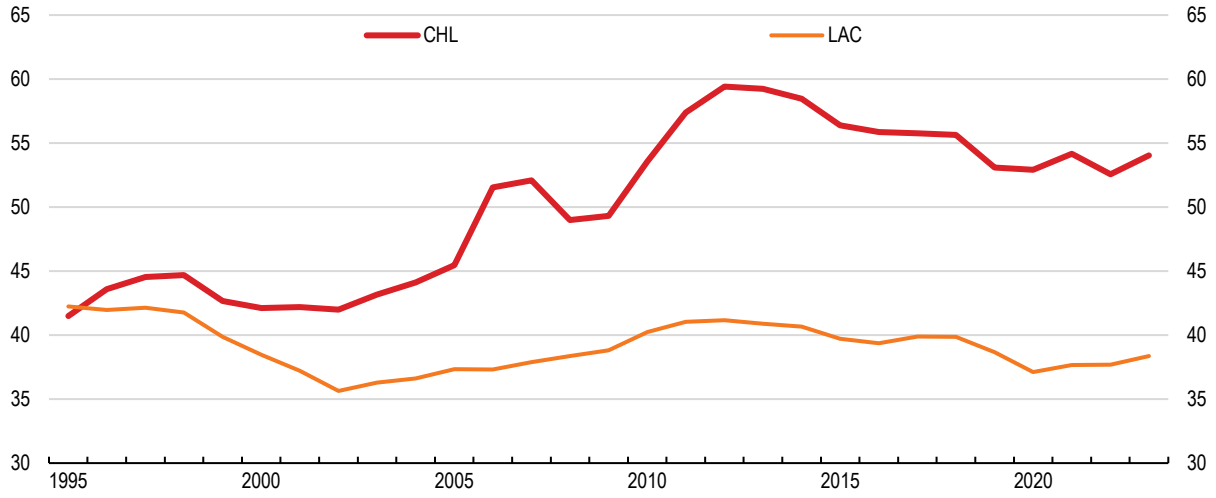
Decarbonising the economy while promoting growth: Chile faces significant climate hazards, which warrant more investment in adaptation measures. The country may not meet its 2030 decarbonisation target. Stronger policies to raise carbon prices, improve business and environmental regulations, improve infrastructure, and develop technical capabilities are needed, while also addressing the socioeconomic impacts of decarbonisation.

Chile needs to bolster its growth potential

The Chilean economy has returned to its trend growth on the back of adequate macroeconomic policies, after overheating following the pandemic. However, Chile's income convergence with more advanced OECD economies has stalled since 2012 (Figure 1), partially reflecting declining productivity and weaker investment. Chile's long-term growth outlook will largely depend on its ability to address structural barriers to lift productivity and investment, while increasing space for government spending. Efforts to profit from the digital and green transitions and boost a wider participation of women in the labour market are necessary to stimulate growth potential.

Figure 1. Income convergence has stalled

Convergence of GDP per capita, current prices, USD, PPP, % of OECD average



Note: LAC is a simple average of Colombia, Costa Rica, Mexico, Argentina, Brazil, and Peru.
Source: World Bank, World Development Indicators.

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Investment has slowly recovered from the pandemic, yet long-standing structural barriers hinder Chile's catch up in productivity and living standards with more advanced OECD economies. A slowing economy, constrained capital markets, policy uncertainty and restrictive monetary policy leading to tight credit conditions weighed on business investment after the pandemic. Besides short-term challenges, structural barriers hinder productivity growth. A lengthy and complex permit system, low digital skills and digital uptake among SMEs, and persistently low female labour force participation weaken Chile's medium term growth potential. Implementing the new national strategy on public integrity and the public procurement law will reduce corruption risks and foster competition.

Chile is well positioned to profit from the green transition thanks to its high potential for renewable energy, and its large reserves of lithium and copper, minerals critical for electrification. To leverage on these advantages, Chile needs to promote investment, streamline regulation processes, ensure an adequately prepared workforce, and develop the State's technical capabilities, while protecting water resources and biodiversity.

The outlook has started to brighten

Growth recovered more firmly in 2024. The evolution of headline and core inflation have allowed monetary policy to continue its prudent and data-driven easing cycle. Economic growth is projected to remain solid in 2025 and 2026.

Growth is estimated to have recovered to 2.4% in 2024 and projected to remain solid at 2.3% in 2025 and 2.1% in 2026 (Table 1). Recovering real wages and monetary policy easing will support higher real income and consumption growth. A gradual improvement of credit and financial conditions in Chile should increase access to credit for consumers and spur investment growth. Investment in mining projects will grow on the back of sustained demand for minerals within the global green transition. Risks to the outlook, particularly external ones, remain.

Economic growth continued to moderate in 2023 on the back of sound macroeconomic policies. After decisive monetary tightening since 2021 until late 2022, and the withdrawal of pandemic-related support measures and fiscal tightening in 2022 the output gap narrowed, and inflation fell.

Fiscal and monetary authorities are committed to macroeconomic stability. Fiscal plans are aligned with the structural fiscal rule, projecting a gradual fiscal tightening in 2024-2026 (Figure 2). The Central Bank has significantly eased monetary policy amid firmly anchored inflation expectations and projected falling inflation.

Table 1. Economic growth will pick up

Annual % change unless specified

	2023	2024	2025	2026
Gross domestic product	0.3	2.4	2.3	2.1
Private consumption	-5.2	1.2	2.0	2.3
Government consumption	2.2	3.5	2.1	2.0
Gross fixed capital formation	-0.7	-1.3	4.6	2.5
Exports	0.2	5.7	4.0	2.5
Imports	-11.6	1.1	4.3	3.1
Unemployment rate (% of the labour force)	8.7	8.4	8.3	8.0
Consumer price index	7.6	4.3	4.2	3.2
Current account balance (% of GDP)	-3.4	-2.5	-2.4	-2.5
General gov. fiscal balance (% of GDP)	-2.4	-2.3	-1.3	-1.0

Source: OECD Economic Outlook database.

Ensuring fiscal sustainability should remain a priority

The government is pursuing a reform agenda that pledges to increase permanent spending only if structural revenue increases. The fiscal space is limited, and long-term spending pressures are set to increase. Putting debt on a declining path and addressing spending needs will require higher tax revenues and greater spending efficiency.

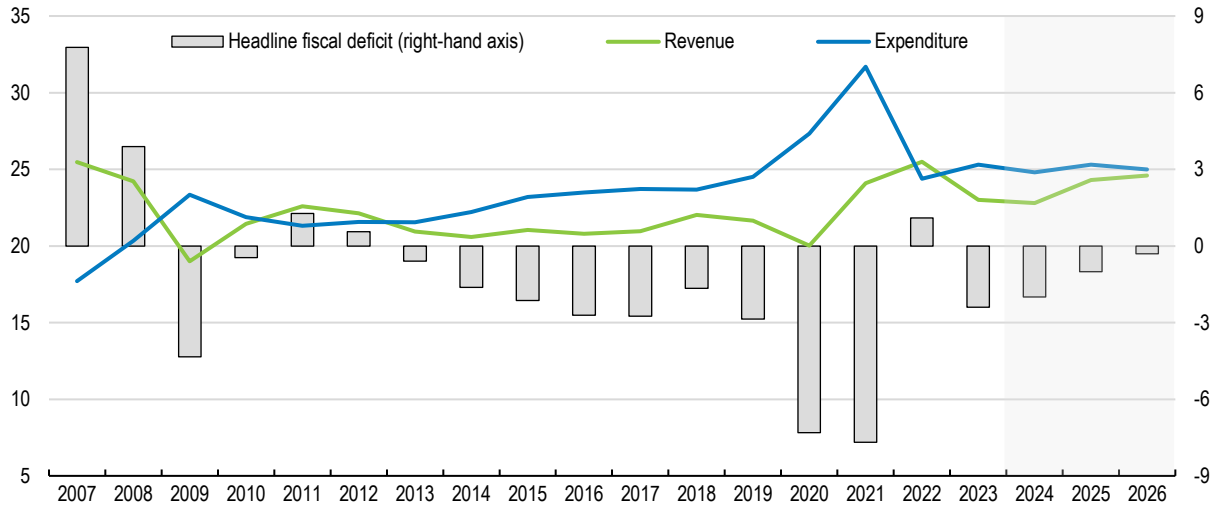
Fiscal space has been narrowing over the past decade on the back of higher debt, low economic growth and higher government spending, **while pressures are set to increase in the longer term.** Tax revenues of close to 21% of GDP are insufficient to meet spending needs and future fiscal pressures due to necessary spending in the green and digital transitions, to deal with more frequent and severe climate risks, and higher spending from population ageing. A

comprehensive tax reform can increase fiscal space. Such reform should consider raising more revenue from personal income taxes, reducing the tax burden on businesses, higher immovable property taxes, and environmental and tobacco ones, even if transitory, while gradually lowering regressive income tax deductions and exemptions. Efforts should also focus on reducing tax evasion and improving spending efficiency.

Chile has a robust fiscal framework that can be further strengthened, particularly in the face of the green transition. The fiscal framework has been reinforced in 2024 with an enhanced dual-target fiscal rule, including the structural balance and a debt ceiling to contain gross debt. Also, the Autonomous Fiscal Council was recently strengthened. As the lithium industry evolves, the fiscal rule must ensure that windfall gains are saved. Integrating fiscal risks associated with climate change in the medium-term budget framework and long-term fiscal sustainability analyses is necessary to create fiscal space to absorb losses.

Figure 2. Fiscal consolidation will continue

% of GDP



Note: Data for the years 2024 to 2026 are current government plans.
Source: Chile Dirección de Presupuestos, Informe de Finanzas Públicas, Tercer Trimestre de 2024.

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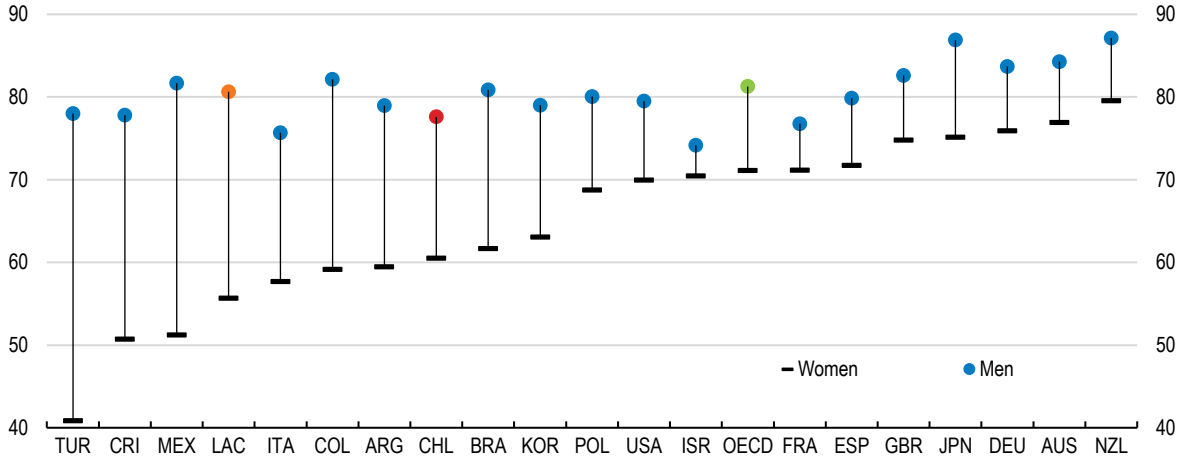
Fostering women's participation in the labour market

Social and economic inequalities between men and women have decreased in Chile, but large gaps in labour market participation (Figure 3) continue to cause disparities in income and pension benefit. Closing gender gaps in the labour market can increase the labour force, boosting potential growth by improving resources allocation and alleviating the impact of an ageing population. To facilitate women's participation in the labour market it is necessary to continue efforts to better balance unpaid work between women and men, reduce education gaps in high-skill occupations, and foster women participation in leadership roles.

Women continue to face barriers to employment, particularly full-time. Family responsibilities, traditional gender roles, and lack of affordable childcare preclude many women from working full-time, especially after becoming mothers. A strengthened high-quality childcare system, enhanced parental leave policies, and wider access to teleworking can help support a more equal balance of unpaid workloads between women and men, thus supporting mothers staying in work or entering the labour market.

Figure 3. Gender inequalities remain significant in the labour market

Labour force participation rate, % of population aged 15-64, 2023



Note: LAC is a simple average of Colombia, Costa Rica, Mexico, Argentina, and Brazil. Data for Argentina refer to the year 2021.
Source: OECD Labour Force Statistics.

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Education and skills disparities accumulate over time as women tend to make educational choices that lead them to occupations with lower expected earnings, compared to men. Greater efforts to eradicate gender stereotypes in education from an early age and to encourage more women to pursue STEM careers can boost women involvement in high-wage jobs. Women not in employment participate less often in adult training than men, limiting their reskilling. Reviewing adult training courses and gradually incorporating short and flexible trainings, while covering training costs can help upskill more women.

Accelerating productivity through digitalisation and innovation

Accelerating productivity requires boosting digitalisation and innovation. Chile has one of the highest connectivity rates in the Latin American region following policy efforts to close connectivity gaps. However, it lags other OECD countries in several areas such as digital skills, use of digital tools among small firms, digital innovation, and interoperability of government digital services, which hinder wider benefits of digitalisation.

Chile faces shortages of high-skilled workers for the digital and green transitions, at the same time many individuals lack the skills to perform adequately in a digital world. Foundational skills among young students, and adults' skills for the digital economy are low in Chile. There is also a deficit of ICT professionals and demand is likely to increase as the IT sector keeps expanding. Efforts are needed at all levels of education and training, including lifelong learning and reskilling, to keep up with the digital transition.

Boosting digital innovation and facilitating the adoption and diffusion of digital tools in SMEs are fundamental for the digital transformation. Chile has policies to boost innovation and investment in R&D including tax incentives and grants, yet business R&D spending is low. Small enterprises still lag in the adoption of digital technologies despite ample public programmes to boost SMEs' digitalization. Increasing the coherence and integration of R&D grants programmes and better tailoring public training to SMEs would support digital adoption.

As AI use expands, the government should remain vigilant, so AI initiatives do not outpace regulation. Ensuring a proper implementation and regular updates of the AI national strategy while enhancing the training of government officials to use AI effectively and ethically can help harness AI benefits.

Achieving a green transition

Chile faces significant climate hazards and has set ambitious targets to decarbonise its economy. Investment in adaptation measures must increase. To achieve climate targets and harness the benefits for growth and wellbeing of lithium and green hydrogen production, policy actions are needed to increase carbon prices, improve regulation, bolster investment, improve electricity transmission and port infrastructure, and enhance skills and innovation.

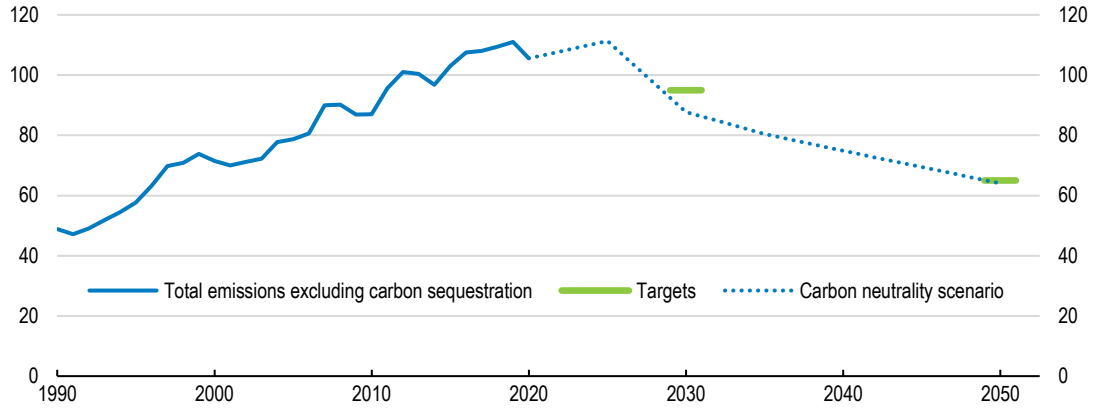
Emissions may not meet the 2025 and 2030 targets, requiring faster reduction of emissions, particularly in the energy and transport sectors (Figure 4)**.** Higher carbon prices and more stringent regulations, coupled with the phase-out of fossil fuel tax expenditures is needed. Since reaching net zero by 2050 depends critically on carbon sequestration, preventing wildfires through better management of forest resources is essential. Reducing regulatory burdens, expanding electricity transmission lines and improving storage capacity are critical steps for making the most of renewable energy. Strengthening incentives to replace the most polluting vehicles and deploying sufficient charging infrastructure can spur the uptake of greener vehicles and the electrification of public transport, including in lagging areas.

Ramping up adaptation measures is key to manage the climate-related risks Chile is already facing. Investment in public and private resilient infrastructure must accelerate. Home insurance is low, and take-up could be increased through stricter regulation. Ensuring stable public resources for prevention of climate related risks, such as floods, droughts, and fires and for emergency response and disaster relief is critical, alongside efforts to raise awareness about risks.

Chile needs to ensure a coordinated, targeted and well-funded policy response to assist the population affected by decarbonisation policies. This could include helping workers laid off from polluting industries to reskill and reallocate, improving the coverage and adequacy of cash transfer programmes, and compensating vulnerable populations for higher carbon prices.

Figure 4. Emissions reduction must accelerate

Historical GHG emissions and targets, Mt CO_2 eq.



Source: OECD Environmental Performance Reviews: Chile 2024.

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Green hydrogen is central to Chile's decarbonisation plans, expected to contribute 21% of GHG reductions by 2050, by helping to decarbonise hard-to-abate sectors. Developing a hydrogen industry can boost employment, attract investment, and support growth. To promote the sustainable development of the industry Chile needs to streamline permitting processes, monitor and evaluate training programmes, invest in port, road and rail infrastructure, while protecting water availability and biodiversity.

Chile can benefit from rising world demand for lithium, as it has the largest share of known lithium reserves, and comparatively low production costs. National plans foresee significant state participation in production alongside the private sector, which calls for strengthening the State's technical capabilities and improving corporate governance in the State's main mining company. Growing the lithium industry can provide resources for economic diversification, but it also must entail protecting water availability and biodiversity.

Private sector financing will be key for the investment required to decarbonise the economy and build new industries. Chile has made progress in greening its financial system and attracting resources for decarbonisation. Greater private and public capacity on green finance is needed. Ensuring that the financial system identifies and incorporates climate-related risks and opportunities in their business models is crucial.

MAIN FINDINGS	KEY RECOMMENDATIONS
Strengthening macroeconomic policies	
Headline inflation has slowed rapidly from a peak of 14.1% in August 2022 to 4.2% in November 2024, while inflation expectations are well anchored at the 3% target since 2023.	Continue a gradual, prudent, and data-based monetary easing cycle to facilitate a gradual return of inflation to target.
Consolidation efforts have reduced the fiscal deficit from pandemic highs. Planned consolidation for 2025-2029 heavily relies on significant government expenditure restraint. While government medium term fiscal plans comply with the fiscal rule, caution is needed, as the measures outlined in the pact for growth may not lead to the expected returns.	Maintain fiscal consolidation in line with current fiscal plans and ensure compliance with the fiscal rule so that debt remains below the debt ceiling.
The replacement rate for low-income pensioners has improved due to the minimum guaranteed universal pension, but many people still have inadequate old-age pensions, owing to low contributions and contribution gaps due to informal employment. Higher mandatory contributions will raise the cost of formal job creation, driving many low-skilled workers into informality.	Raise pension benefits and apply a progressive contribution rate schedule, ensuring strong incentives for formal job creation.
Chile's traditionally deep financial markets are shallower since the extraordinary pension funds withdrawals of around 20% of GDP in 2020-2021. This hinders savings accumulation, and limits access to long-term financing in local currency, which increases external vulnerabilities and limits the financial system capacity to absorb external shocks.	Avoid additional extraordinary pension withdrawals and ensure that the pension system continues to support deep and liquid long term capital markets by ensuring that part of future pension contributions is saved and invested in capital markets.
Tax revenues of only 21% of GDP are insufficient to meet social demands while preserving necessary public investment in infrastructure, education, health, and climate change mitigation and preserving Chile's commitment to fiscal sustainability.	Mobilise additional tax revenue through strengthening the tax administration and a comprehensive reform that raises more revenues from personal income taxes, reduces the tax burden on businesses, increases revenues from immovable property taxes, transitorily raises tobacco and environmental revenues and gradually lowers regressive income tax deductions and exemptions.
Chile has consistently shown a strong position in corruption indicators, but corruption cases in municipalities have been increasing. A National Strategy on Public Integrity and a reform on public procurement were adopted in 2023.	Ensure the implementation of the new national strategy on public integrity and the public procurement law by clarifying institutional responsibilities, monitoring compliance, and enforcing penalties.
Enabling wider women's participation in the labour market	
Women's labour force participation has increased but remains significantly below men's, and women perform most unpaid work. Low access to affordable and quality childcare and after school care, makes entering and staying in the labour market more difficult for women. A new government bill aims at expanding childcare for formal workers with children aged 0-2.	Eliminate the rule to provide childcare for companies employing more than 20 women and gradually expand formal high-quality early childhood education and after-school care, prioritizing lower- and middle-income families.
Accelerating productivity through digitalisation and innovation	
Foundational skills are low among Chilean students. Chile has many initiatives to expose children to STEM-related areas, but their scope is limited and out of the formal education system.	Promote STEM skills development at schools, including investing in teacher training and equipment.
About 50% of workers in Chile perform routine tasks with a high risk of automation and AI is likely to automate a significant number of increasingly complex tasks. The green transition will lead to reallocation of workers. Existing programmes such as *Reinvéntate*, provide training opportunities.	Ensure that lifelong learning and reskilling programmes are prepared for labour market shifts caused by AI, automation, and the green transition through alignment of training to labour market needs and flexible adult learning provision to overcome barriers to participation.
R&D expenditure is well below the OECD average and businesses spend relatively little in R&D. Programmes to boost technological innovation and grant public support to firms' R&D are complex and with overlapping objectives.	Simplify public R&D grant programmes supporting technological innovation, increasing coherence and integration, and in the medium-term increase R&D spending based on cost-benefit analysis.
Achieving a green transition for a more prosperous Chile	
Chile is highly exposed to climate-related hazards. Sectoral adaptation plans are being designed, but limited knowledge on resources needed and financial resources hinder implementation.	Strengthen co-ordination across administrations, build capacity at sub-national level, and encourage public-private collaboration in adaptation.
The tax on carbon emissions from stationary sources is low by international standards (USD 5 per ton of CO_2), and significantly lower than the social cost of carbon, estimated by the government at USD 63.4 per ton of CO_2, undermining efforts to reduce emissions. Progress in the creation of an Emissions Trading System has been limited.	Increase the carbon tax, expand its base, and implement an emissions trading system, while compensating vulnerable households.
Fuel excise taxes have many exemptions and several tax refunds. The tax rate for diesel is much lower than for gasoline. There is still considerable fiscal support for fossil fuels, like a rebate scheme for the diesel excise tax.	Phase out sectoral exemptions for fuel excise taxes, gradually align excise taxes for gasoline and diesel, and phase out tax expenditures that support fossil fuels.
Chile aims to reach 80% of electricity from renewable sources by 2030. However, lack of transmission lines from renewable generation zones to demand zones wastes energy and creates regional electricity price disparities.	Facilitate the expansion of electricity transmission lines to integrate renewables into the electric grid.
Chile aims to develop the lithium industry through partnerships between national mining companies and private companies. The weak financial position and lack of expertise in lithium production of the national copper company, Codelco, poses challenges.	Enhance Codelco's executive board technical expertise and independence.

1 Macroeconomic developments and policy challenges

Claudia Ramírez Bulos, OECD

Adolfo Rodríguez-Vargas, OECD

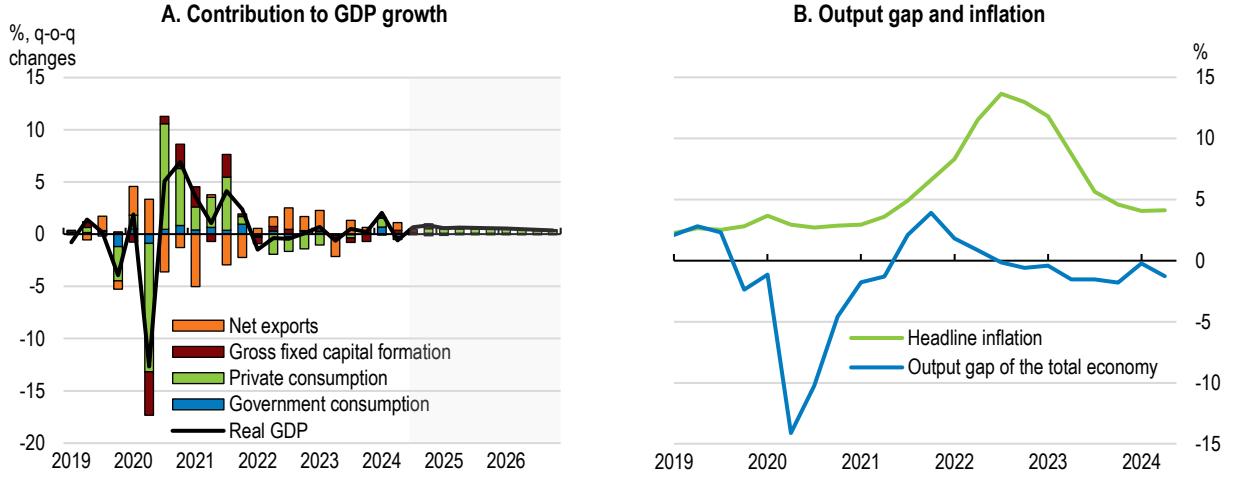
After the overheating of the economy in the aftermath of the pandemic, GDP growth moderated in 2023 and inflation decelerated considerably on the back of tighter macroeconomic policies. As domestic demand normalised, GDP growth stabilised in the second half of 2023 and recovered in 2024 supported by less restrictive monetary and slightly expansionary fiscal policies, while financial stability risks have been contained. The government is committed to fiscal sustainability and is planning to finance investment, social needs, health, and security spending while keeping debt contained through reforms to strengthen tax compliance, enhance spending efficiency, and boost growth. However, further reforms to finance additional spending needs and growth-enhancing investments will be needed.

1.1. The outlook has started to brighten

1.1.1. Macroeconomic imbalances built during the pandemic have largely resolved

After growing 11.6% in 2021, following the oversized fiscal support delivered in face of the COVID pandemic, and the massive liquidity from voluntary pension fund withdrawals, GDP growth significantly moderated in 2022 as policy support was gradually withdrawn and household consumption slowed on the back of high inflation (Figure 1.1, Panels A and B). The sizable fiscal adjustment the government implemented when coming into office in 2022, and the withdrawal of pandemic-related support, contributed to a fiscal surplus in 2022, along with higher revenues from lithium production. Moreover, decisive monetary policy tightening helped to further cool down the economy slowing consumption and investment, narrowing the output gap, and lowering inflation (Figure 1.1, Panel B). Activity stabilised in the second half of 2023 with annual GDP growth at 0.3% in 2023. Headline inflation has been on a rapid downward path slowing from an average of 11.6% in 2022 to 4.2% in November 2024, while core inflation stood at 3.7% in November 2024.

Figure 1.1. Economic growth has moderated driven by internal demand



Note: Shaded area is a forecast.
Source: OECD Economic Outlook database.

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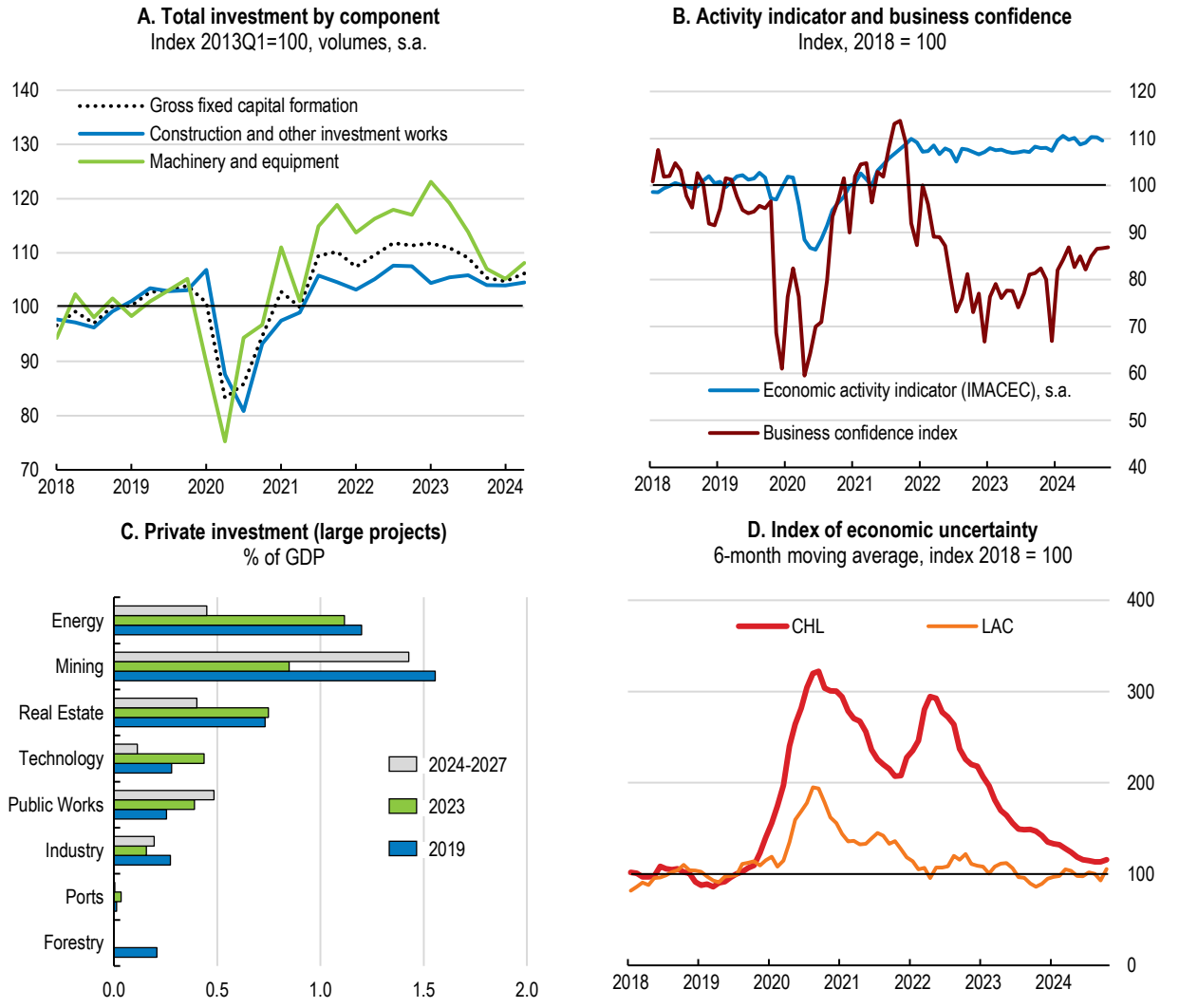
Investment has slowly recovered from the pandemic, largely driven by machinery and equipment. Investment in construction and other works has been weak on the back of high interest rates, tight credit conditions, and low business confidence (Figure 1.2, Panels A and B). Investment fully recovered from the pandemic in some sectors, including energy and technology but remained subdued in others such as industry and mining (Figure 1.2, Panel C). Survey data points towards higher private investment in the coming years, largely driven by mining projects (Figure 1.2, Panel C) (BCCH, 2024[1]) benefiting from the approval of the mining royalty law and lower domestic economic uncertainty. Economic uncertainty in Chile spiked in 2022 with the war of aggression against Ukraine, the discussions on pensions funds withdrawals, macroeconomic imbalances and the constitutional reform process (CLAPES UC, 2024[2]), but has come down since, as the constitution process is closed and imbalances have narrowed (Figure 1.2, Panel D).

Figure 1.2. Investment has recovered slowly



Note: LAC is a simple average of Colombia, Mexico, Argentina, Brazil, and Peru.
Source: OECD Economic Outlook database; Capital Goods Corporation; Central Bank of Chile; Bank of Spain.

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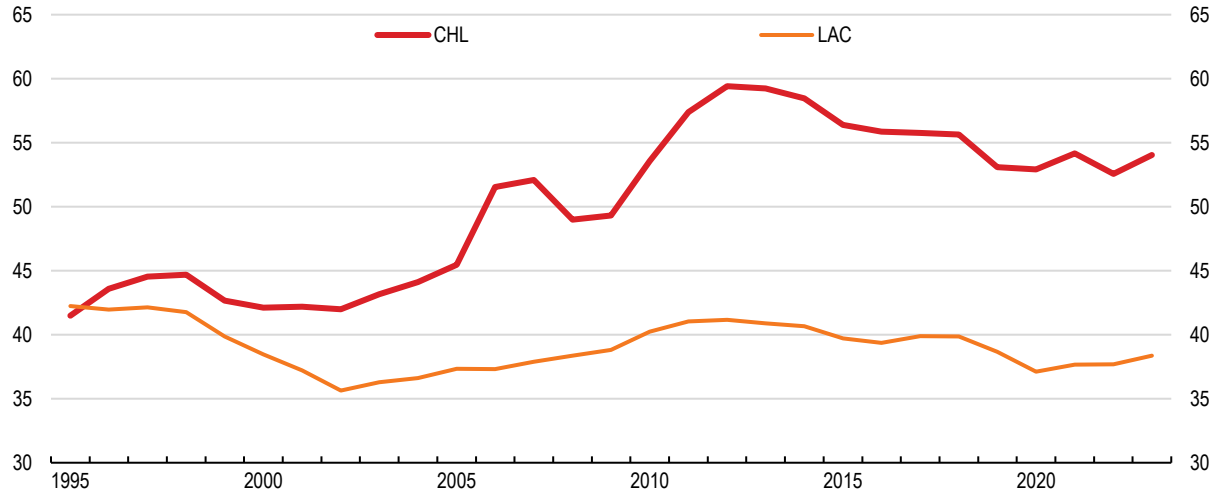
Besides short-term challenges, Chile's income convergence to more advanced OECD economies has stalled since 2012 (Figure 1.3), partially reflecting declining productivity (see Chapter 3) and weaker investment, particularly in new technologies (OECD, 2022[3]). A long-standing driver behind weaker investment is the permit system that makes investment approvals costly and lengthy (CNEP, 2020[4]). The amount of time and money to comply with permits and licences is excessive. Processing times take on average 6.6 years, ranging from 2.8 years in telecom to 8.9 years in mining (Comité de Expertos, 2023[5]), imposing significant burdens on enterprises. In a welcome step, the government presented an ambitious reform bill in January 2024, that aims to reform all permits, except environmental ones, by streamlining procedures, reducing processing times, and providing more certainty to investors for all procedures involved in the permit course. The reform introduces proportionality criteria, clarifies the rules for the application of "silence is consent" provisions, requires an assessment of admissibility before starting a permit review process, and creates a digital one-stop shop for all permits. The reform is welcome and should be swiftly approved and adequately implemented. Strengthening public communication and clearly and extensively informing the public about the new rules, particularly about the implications of the "silence

is consent" provision, would be crucial. If adequately implemented, the reform would further ease firms' entry and formalisation, accelerate investment and growth, and attract more investment, particularly in green-related industries to implement the green hydrogen and lithium national strategies (see Chapter 4).

Figure 1.3. Income convergence has stalled

Convergence of GDP per capita, current prices, USD, PPP, % of OECD average



Note: LAC is a simple average of Colombia, Costa Rica, Mexico, Argentina, Brazil, and Peru.
Source: World Bank, World Development Indicators.

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Box 1.1. Main recent reforms

- Labour regulations to gradually reduce the working day from 45 to 40 hours per week over a 5-year period and to provide flexibility to caregivers of children younger than 14 years old were modified in April 2023.
- The real minimum wage increased by 22% in real terms between early 2022 and July 2024. This growth was driven by two laws passed in June 2022 and June 2023. To support small businesses, wage subsidies were provided.
- A new mining royalty was approved in 2023 with the goal to raise an annual revenue of 0.45% of GDP. The new tax framework includes: i) an ad valorem tax on annual sales of large copper mining companies, and ii) tax applicable on the mining operator's Adjusted Taxable Mining Operating Income ("RIOMA" or Renta Imponible Operacional Minera Ajustada). The total tax burden on mining activity cannot exceed 46.5% of the taxable adjusted mining operational income. Revenues will be partly allocated to three new government funds for regional governments and municipalities where mining is a relevant activity.
- A public procurement reform approved in December 2023 increased the standards of probity and transparency, seeks better planning of public procurement and promotes small companies and local suppliers.
- The Law to Strengthen the Resilience of the Financial System and its infrastructures approved in October 2023, expands access to the central bank's payment and liquidity systems to some non-bank entities and facilitates the development of repo markets, enhancing policy responses in scenarios of financial distress to promote financial stability, competition, and neutrality among institutions in the use of the central bank's payments infrastructure. It also strengthens liquidity

regulation for investment funds and promotes the internationalisation of the Chilean peso by simplifying operations between local and international banks.

- A new law establishing a Consolidated Credit Registry, approved in June 2024, aims to enhance the functioning of credit markets and to improve the monitoring of both firms' and households' indebtedness.
- A new law on tax compliance aimed at addressing tax evasion and strengthening the Chilean tax administration was approved in September 2024. The government expects to raise 1.5% of GDP from this reform.

Reforms under discussion in Congress:

- **Pact For Growth** aims at increasing the government total revenues to finance pensions, health, social assistance, and public safety. It includes measures to boost investment, productivity, and formalisation, that together would raise revenues by 0.5% of GDP by 2028. Besides additional revenues from the tax compliance law, the government expects to raise 0.1% from efficiency gains in operational spending. Additionally, the government plans to add revenues through an income tax reform that still needs to be defined in terms of scope and expected revenues.
- **Measures to reduce informality in the Pact for Growth** include a single tax rate for SMEs (for up to two years) replacing income taxes, value added taxes and social security contributions; the possibility for companies to recover 100% of VAT in the first year, gradually decreasing this percentage in the second year; and raising the threshold for annual sales that a business can make while still qualifying for the tax benefits that apply to SMEs.
- **Pension reform** increases pension contributions paid by employers to 6% of workers' salaries, on top of the 10% paid by workers. The reform also seeks to change the pension industry structure to promote greater competition and efficiency. A state-run alternative to the private pension funds will be created and the investment scheme will change to a target date funds system to better align investment decisions in the long run. The reform aims at gradually raising the amount of the universal guaranteed pension from USD 225 to 272.
- A reform on **regulations and permits** was presented to Congress in early 2024 aimed at simplifying non-environmental permits for investment projects and activities in regulated areas. To fully implement the reform, 360 sectoral permits would be modified along with 37 laws. Estimates suggest that GDP would increase by 0.24% annually in the next 10 years if the time to process permits decline by one-third (Comité de Expertos, 2023[5]).
- Bill to create the **Agency for the Quality of Public Policies and Productivity** (presented in April 2024), which will promote public policy initiatives to ensure the efficient use of resources and will fully merge with the National Evaluation and Productivity Commission (CNEP). It aims at implementing independent evaluations and providing recommendations.
- Bill to create the **Agency for Development Financing and Investment ("AFIDE")**, which aims to improve business competitiveness, diversify production, and foster sustainable economic growth. It will offer financial instruments, coordinate, advise, and invest in business projects focused on technology adoption and innovation. The government estimates that over 450 thousand companies will benefit in the first five years of its creation.

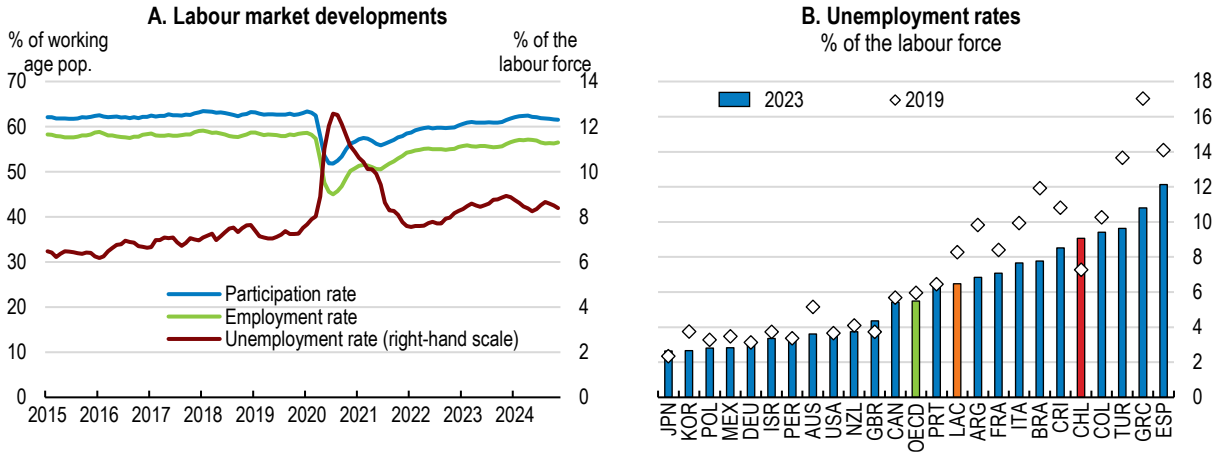
1.1.2. The labour market recovery is slow in tandem with economic activity

The labour market is gradually recovering, and job creation continues to be slow consistent with the economic cycle (Figure 1.4, Panel A). The labour force participation rate gradually expanded from 59.8% in 2022 to 61.2% in 2023 but remains below pre-pandemic levels in November 2024, with a notable recovery in female participation. The delay in returning to the workplace is partly explained by the impact of fiscal transfers during the pandemic and extraordinary pension fund withdrawals, with more persistent effects in participation of the young and elderly (Briones, Carlomagno and García, 2023[6]). Participation rates of workers between 25 and 54 years have recovered. By contrast, participation rates of people younger than 25 and older than 54 have had a slower recovery and show stagnation. Participation rates of the elderly may not recover to pre-pandemic trends due to more structural factors such as a more generous minimum pension scheme and skills obsolescence (BCCH, 2024[7]). Total employment rate at 56.5% continue to be below pre-pandemic levels in November 2024. The unemployment rate stood at 8.2% in November 2024, above the pre-pandemic rate of 7.2% in 2019 (Figure 1.4, Panel B).

Policy efforts to address income inequality and raise labour market formalisation should continue, together with progress in raising the still low female labour force participation, including by ensuring sufficient childcare (see Chapter 2). Chile has experienced a substantial reduction in labour informality since 2010, with a fall from around 40% to around 27% of the total workforce in November 2024. Nonetheless, informality remains high compared to the OECD average. Informality is higher among self-employed workers and has increased over the past decade among lower income deciles (CASEN, 2022[8]). As discussed in the 2022 Economic Survey of Chile (OECD, 2022[3]), the causes of informality are multidimensional and a comprehensive strategy is needed to foster formalization, including lower non-wage labour costs, better skills, stronger enforcement, and improvements in tax administration. The government aims at promoting formality among SMEs and new companies as part of the pact for growth (Box 1.1). Furthermore, an adequate implementation of the tax compliance law can reduce informality.

The government increased the minimum wage by 8.4% in real terms in July 2024 relative to May 2023. Minimum wages were already high relative to median wages (70.07%) in Chile and compared to other OECD countries in 2023 (OECD, 2024[9]). The authorities have implemented temporary subsidies to help SMEs adjust to the recent increases in minimum wages and lower the risks of job displacement or informality. A relatively high minimum wage reduces the prospects for low-income workers to obtain formal employment, particularly for women, young and rural workers, as analysed in the 2022 Economic Survey of Chile (OECD, 2022[3]). Further increases in the minimum wage will need to be carefully evaluated as they could potentially lower formal employment prospects, especially for low-skilled workers, and people located in rural and less developed regions. To analyse and generate income indicators and reports to inform the 2025 minimum wage discussions, Chile established an “Income and cost-of-life Observatory,” a technical committee comprising representatives from workers’ organisations, employers, and the government in 2024. To further support the social dialogue and negotiations between social partners and authorities for setting the minimum wage, a permanent and independent commission could regularly provide recommendations on setting minimum wage increases, in line with changing labour market conditions and productivity, as in other OECD countries, and as recommended in the 2022 Economic Survey of Chile (OECD, 2022[3]).

Figure 1.4. Labour market dynamism remains subdued



Note: LAC is a simple average of Colombia, Costa Rica, Mexico, Argentina, Brazil, and Peru.
Source: INE; CEIC; and World Bank World Development Index.

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1.1.3. The reform to the pension system remains a priority

Few people have adequate old-age pensions, owing to low contributions and contribution gaps due to informal employment. The challenges of the pension system, such as low replacement rates, contribution density and returns, aggravated with the pension withdrawals over 2020-21. To address old-age poverty risks, the government, in 2022, approved a new minimum guaranteed universal pension (MGUP) for people over 65 years of age who do not belong to the richest 10% of the population, greatly improving the replacement rate for lower-income pensioners (OECD, 2022[3]). As it stands, for the minimum wage earners the replacement rate is 43% (not considering savings in individual accounts), which is below the OECD low earners' replacement rate of 63.8%. Moreover, the government proposed to reform the pension system and gradually raise the benefit to USD 272 per month (CLP 250 000), costing an additional 1.2% of GDP per year (see Box 1.1). Under this proposal replacement rates for minimum wage earners (not considering self-financed pensions) would increase to 50%, closer to the OECD average.

Further reform of the contributory pension system has been high on the political agenda in Chile for more than a decade and the current government put forward a reform in 2022. The reform under discussion in Congress aims at increasing pensions of current and future retirees and envisages an increase in pension contributions, enhancing the solidarity of the system.

To improve the adequacy of contributory pensions, several governments have proposed that employers pay a pension contribution of 6% of workers' salaries, on top of the 10% that salaried workers contribute to an individual account. Political disagreement on which share of the additional 6% to be assigned to workers' individual accounts, and which to a state-run solidarity fund to top up pensions for current retirees, women and lower-income contributors has stalled the reform. Raising pension contribution rates is critical to ensure the adequacy of contributory pensions, and the sustainability of the pension system. The view underlying the current government proposal is that higher contributions to finance collective pension savings, of which low-income formal workers would receive more than their additional contribution, could strengthen formalisation incentives. But this may depend on the degree to which workers value the additional pension promises made to them, with high uncertainty around the issue (BCCH, 2023[10]). Hence, the pension reform should be mindful of the effects it has on formalisation incentives, as increasing contribution rates leads to higher cost of formal employment and could further increase informality, particularly for low-income workers. Applying a progressive contribution or benefit rate schedule, as recommended in the 2022 Economic Survey of Chile, lower for low-income workers, particularly around

the minimum wage, and increasing gradually for higher wages would ensure strong incentives for formal job creation while increasing replacement rates.

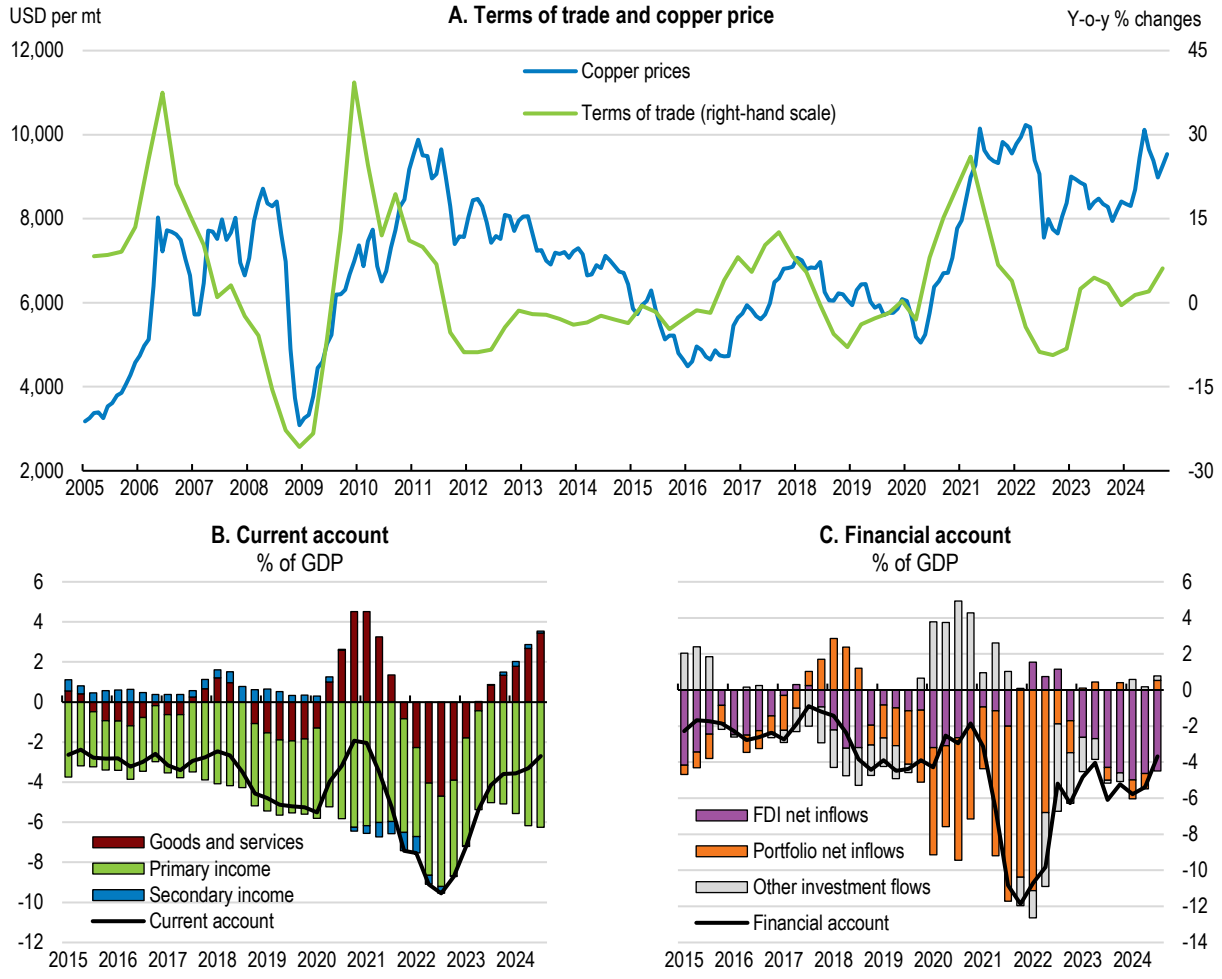
The reform also seeks to change the pension industry structure to promote greater competition and efficiency, reduce administrative costs and strengthen public trust in the pension funds managers (APFs), systematically among the least trusted institutions in Chile since 2015. The reform proposes a separation of the financial management of savings from the administrative processes, assigning the administration to a separate private, single-purpose corporation through a public tender for a 10-year period maximum. The proposed legislation also changes the system for charging management fees and the bidding mechanism for affiliates, and modifies investment strategies, transitioning from a *multifund* scheme to a *target date funds* system, reallocating contributors' savings to generational funds according to their age. Ensuring good governance of the pension fund administrators including transparency and accountability in the management and allocation of resources, would help to strengthen confidence and boost savings. Approving a pension system reform is necessary to raise pension payouts and replacement rates, increase domestic savings, and ensure fiscal sustainability. However, authorities should be mindful of the reform effects on capital markets and the functioning of the financial system (as it will lead to significant changes in the pension industry structure), the transition to target date funds, as well as governance and supervision, as described in section 1.3.

1.1.4. The current account has normalised

After the large deficit expansion experienced in the aftermath of the pandemic, the current account deficit significantly narrowed to 3.6% of GDP in 2023, amid improving terms of trade compared to 2022 (Figure 1.5, Panels A, and B), a decline in imports and lower domestic demand. The current account deficit widened sharply to 8.7% of GDP in 2022 due to terms of trade shocks, supply disruptions, ample policy stimulus and exceptional pension withdrawals over 2020-21. The current account deficit is financed largely by net foreign direct investment inflows, that in 2023 grew by 19.2%, and the issuance of government debt (Figure 1.5, Panel C).

Exports continue to rely on mining, representing more than 50% of total export volumes (Figure 1.6, Panel A). Exports as percentage of GDP have been falling in the last 20 years, from 37% in 2003 to 28% in 2023, in line with lower copper production overall, and relative to global production. The reliance on natural resource intensive sectors has limited exports diversification in terms of goods, firms, and destinations. Some progress has been made in developing comparative advantages in sectors such as wine, salmon, forestry, and fruit production, while manufacturing exports account for a third of total goods and services exports. Nevertheless, further diversification of exports and production structures remains a significant challenge, as pointed out in the 2022 Economic Survey of Chile. China remains Chile's leading trading partner (Figure 1.6, Panel B) posing upside and downside risks for Chilean exports. On the upside, growing demand for minerals amidst the green transition in China could support exports, while a protracted economic deceleration could hit export growth.

Figure 1.5. The external accounts continued rebalancing



Source: Central Bank of Chile; OECD Economic Outlook database.

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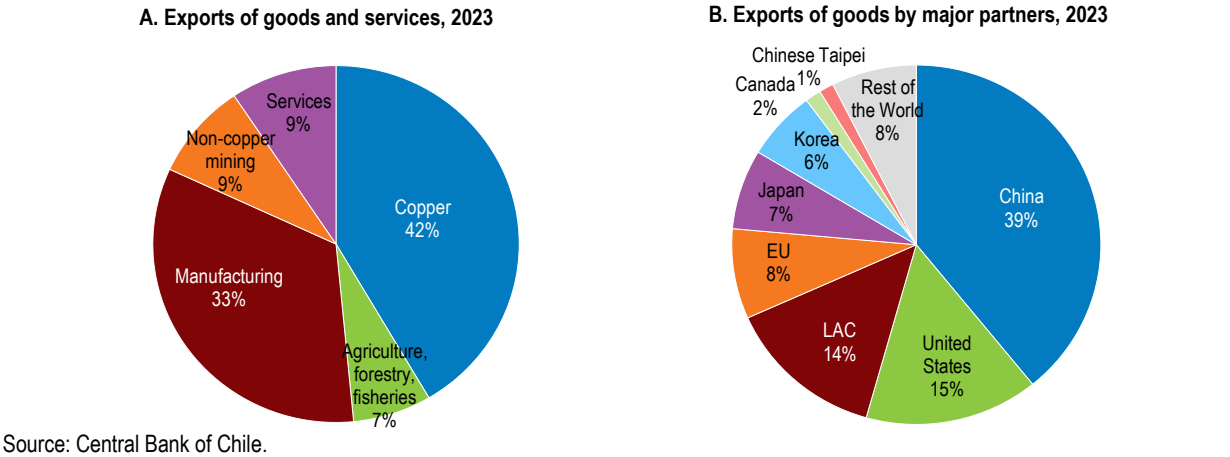
Figure 1.6. Exports continue to rely on mining industries



Source: Central Bank of Chile.

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1.1.5. Growth will remain solid in 2025 and 2026

Growth is estimated to have recovered to 2.4% in 2024 and projected to remain solid at 2.3% in 2025 and 2.1% in 2026 (Table 1.1). Recovering real wages and monetary policy easing will support higher real income and consumption growth. A gradual improvement of credit and financial conditions in Chile should increase access to credit for consumers and spur investment growth. Investment in mining projects for copper and lithium will grow on the back of sustained demand for minerals required for the global green transition. Exports will improve amid higher copper demand, while imports will recover along with consumption. The current account balance will narrow to 2.2% of GDP in 2024, 2.3% in 2025 and 2.5% in 2026, amid higher copper prices and better prospects for exports. The OECD also projects that government revenues will benefit from rising copper prices and additional revenues from the new mining royalty, and the fiscal deficit will narrow over 2024-2026. The unemployment rate will edge down further in 2024-2026, and job creation will grow in line with the projected economic expansion. Headline inflation will continue to fall in 2024-2026 and reach the central bank target of 3% in early 2026, whereas core inflation will close 2025 at around 3%. With inflation receding and expectations firmly anchored at the target, monetary policy is expected to continue its gradual, prudent, and data-based easing cycle.

Table 1.1. Economic growth is expected to improve in 2024 and 2025

Annual percentage change unless specified, volume (2018 prices)

	2019	2020	2021	2022	2023	2024	2025	2026
	Current prices (CLP billion)							
Gross domestic product (GDP)	**195,390.8**	**-6.4**	**11.6**	**2.1**	**0.3**	**2.4**	**2.3**	**2.1**
Private consumption	120,313.4	-7.5	21.2	1.6	-5.2	1.2	2.0	2.3
Government consumption	29,826.3	-3.5	13.2	7.1	2.2	3.5	2.1	2.0
Gross fixed capital formation	47,861.9	-11.1	15.9	4.2	-0.7	-1.3	4.6	2.5
Stockbuilding[1]	939.4	-1.8	2.4	-0.6	-1.2	0.0	-0.3	0.0
Total domestic demand	198,941.1	-9.5	21.5	2.4	-4.2	1.0	2.4	2.3
Exports of goods and services	54,354.9	-1.3	-1.4	1.0	0.2	5.7	4.0	2.5
Imports of goods and services	57,905.3	-12.6	31.6	2.0	-11.6	1.1	4.3	3.1
Net exports[1]	-3,550.3	3.4	-8.9	-0.3	4.6	1.4	0.1	-0.1
Memorandum items								
GDP deflator	. .	9.6	6.9	7.9	6.7	6.4	4.4	3.4
Consumer price index	. .	3.0	4.5	11.6	7.6	4.3	4.2	3.2
Core consumer price index	. .	2.3	3.8	9.0	6.7	3.5	3.4	3.1
Potential GDP	. .	2.5	2.4	2.4	2.1	1.9	1.8	1.8
Output gap (% of potential GDP)	. .	-7.5	0.7	0.5	-1.3	-0.8	-0.3	0.0
Unemployment rate[2]	. .	10.7	8.8	7.9	8.7	8.4	8.3	8.0
Current account balance[3]	. .	-2.2	-7.2	-8.5	-3.4	-2.5	-2.4	-2.5
Central government fiscal balance[3]	. .	-7.3	-7.7	1.1	-2.4	-2.3	-1.3	-1.0

1. Contribution to changes in real GDP.
2. As a percentage of the labour force.
3. As a percentage of GDP.
Source: OECD (2024), OECD Economic Outlook.

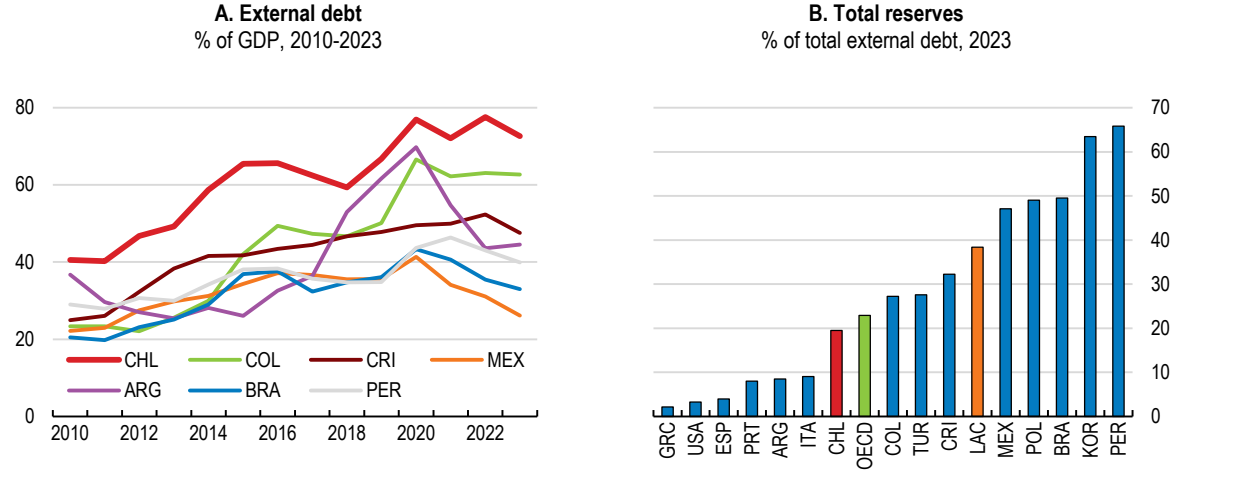
1.1.6. Risks around the outlook remain high

Chile continues to experience significant risks and could also be subject to severe shocks (Table 1.2). On the external side, a stronger and protracted slowdown in China, Chile's main trading partner (Figure 1.6, Panel B), could reduce demand for minerals and lower export prices, particularly in copper, hurting Chile's exports and growth. Additionally, uncertainty around the magnitude and pace of monetary easing in the main economic areas, and higher-for-longer interest rates in the US could increase Chile's borrowing costs, reduce capital inflows, and increase financial market volatility. The intensification of regional conflicts in the world may trigger greater risk aversion and increase financing costs and foreign exchange market volatility.

Domestically, the difficulty to reach political consensus may delay the implementation of reforms, while implementing policies such as additional extraordinary pension funds withdrawals, would be highly disruptive for the economy and the financial system. Additionally, climate-change induced extreme events like a stronger drought, heatwaves, floods, or more widespread wildfires could hurt crops and mining, and damage infrastructure, reducing growth, and requiring fiscal support. On the upside, the global green transition may result in increased foreign direct investment and output growth, given Chile's rich endowments with copper, lithium, and renewable energy.

Gross external debt at 72.6% of GDP has significantly risen over time and remains high compared to other countries in the region (Figure 1.7, Panel A). However, international reserves, representing around 18% of total external debt in 2023 can serve as buffer for immediate shocks, together with the two-year Flexible Credit Line (FCL) arrangement with the IMF renewed in August 2024 (Figure 1.7, Panel B).

Figure 1.7. External debt growth has moderated, and foreign exchange reserves provide some buffers



Note: LAC is a simple average of Colombia, Costa Rica, Mexico, Argentina, Brazil, and Peru.
Source: IMF IFS and WEO databases.

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Table 1.2. Events that could lead to major changes in the outlook

Uncertainty	Possible outcome
A stronger and protracted economic slowdown in the main trading partners, particularly China.	Lower export prices, particularly in copper, falling terms of trade, and lower exports and growth.
The intensification of regional conflicts in the world	Increase uncertainty, trigger greater risk aversion, raise the costs of imported goods, and weaken both domestic and external demand, slowing growth.
Higher global financial markets volatility coupled with more strained domestic financial markets after the massive pension accounts withdrawal.	Lower capacity to absorb external shocks and hindered investment and growth due to lower availability of financial resources.

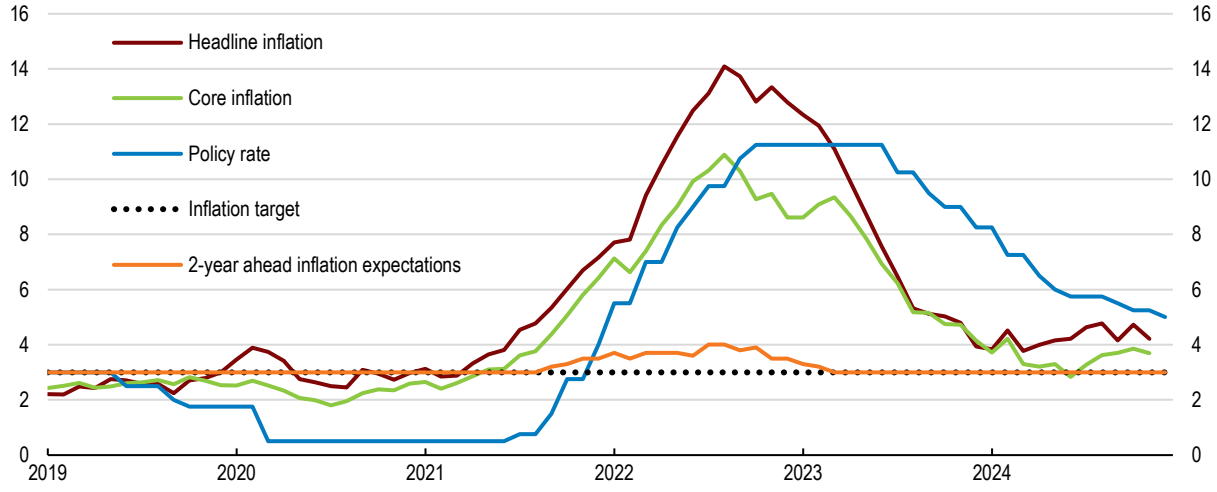
Additional extraordinary pension accounts withdrawals.	Increased disruptions in the financial system, particularly in capital markets, hindering investment and increasing dependence on external financing.
Increased environmental risks related to climate change and natural disasters.	More frequent and severe fires, droughts, heatwaves, floods, and water rationingas well as earthquakes, affecting certain economic sectors and regions, infrastructure damage, with potential negative economic, financial, and fiscal impacts.

1.2. Monetary policy reacted decisively to inflation pressures

Chile's central bank responded decisively and early to inflationary pressures and rising inflation expectations in the aftermath of the pandemic. Headline inflation swelled from 1.7% in February 2019 to a peak of 14.1% in August 2022 spurred by strong domestic demand fuelled by pandemic-related fiscal support of around 12.7% of GDP and extraordinary pension fund withdrawals in 2020-2021, aggravated by surging international food and energy prices. Monetary authorities timely and decisively lifted the policy rate from 0.5% in June 2021 to 11.25% in October 2022. These actions, along with the sizable fiscal tightening in 2022 and the decline in commodity prices, helped the economy to rebalance and inflation to drop (Table 1.1). Headline and core inflation significantly softened as the economy cooled down and headline inflation stood at 4.2% in November 2024, above the 3% target (Figure 1.8). Goods inflation fell faster than services inflation, consistent with a moderate pass-through of the exchange rate depreciation, lower global costs pressures, and the high inertia of service inflation due to some indexation (BCCH, 2024[11]). In 2024, headline inflation has slightly increased, in part due to the expected raise in electricity rates, however core inflation remains closer to 3%. One-year-ahead inflation expectations have remained close to the central bank target of 3% since July 2023 and two-year ahead expectations are firmly anchored at the target since the beginning of 2023 (Figure 1.8).

Figure 1.8. Inflation has fallen while inflation expectations are firmly anchored

%, y-o-y changes



Source: Central Bank of Chile.

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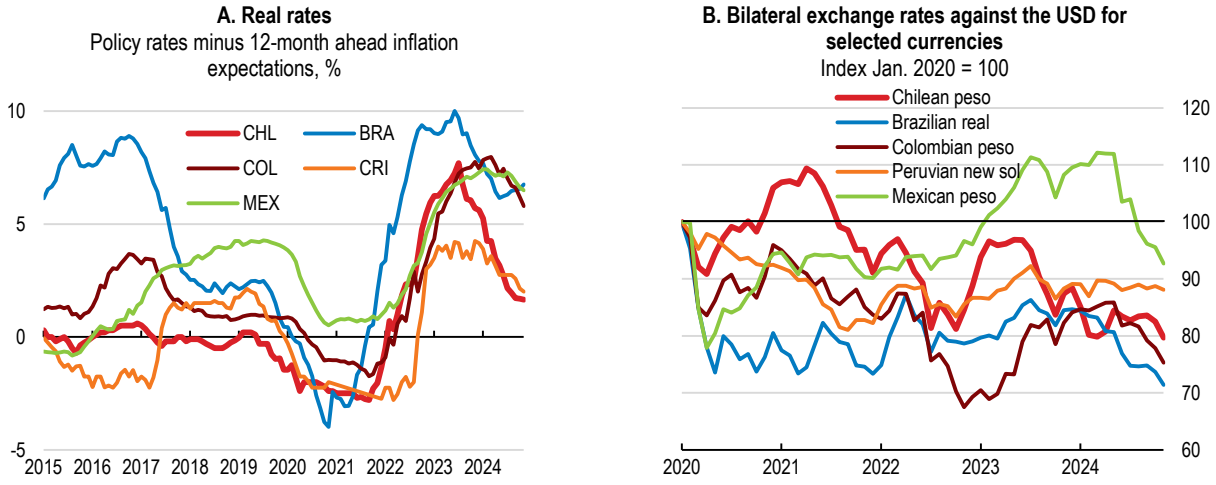
The central bank started easing monetary policy in July 2023 with an initial reduction of 100-basis points, gradually decreasing the size of cuts as inflation declined and real rates fell. The central bank has controlled inflation while lowering interest rates, with the policy rate reaching 5.0% in December 2024 (Figure 1.9, Panel A) (Table 1.3). Following the monetary policy easing, local financing costs have fallen, especially for shorter-term loans that typically have stronger pass-through from monetary policy actions (BCCH, 2024[7]). Financing cost for longer-term loans remain high, in line with external conditions.

Figure 1.9. Real interest rates have fallen and the exchange rate remains depreciated



Note: Panel B: a decrease implies a depreciation of the currency and indicates an improvement in competitiveness.
Source: CEIC; Banco Central de Colombia; Banco Central de Costa Rica; OECD Economic Outlook: Statistics and Projections.

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Table 1.3. Past OECD recommendations to improve macroeconomic policies

Past OECD Recommendations	Actions Taken
Maintain a restrictive monetary policy stance to ensure the return of inflation to target.	The key policy rate was increased to 11.25% in 2022. Inflation has fallen significantly, and expectations have remained well anchored.
Ensure that part of future pension contributions is saved and invested in the capital market.	The pension reform presented before the Congress considers additional contributions that would partially restore pension funds. The new Law to Strengthen the Resilience of the Financial System and its infrastructures plans measures to deepen capital markets.

Given firmly anchored inflation expectations and projected falling inflation, monetary policy can continue its gradual, prudent, and data-based easing cycle. Policy rate cuts are projected to continue in 2025, bringing inflation to target by early-2026. The nominal monetary policy interest rate is expected to return to a broadly neutral level, estimated by the central bank at between 3.5% and 4.5% (BCCH, 2024[12]) by the end of 2025. The central bank has enhanced its communication strategy throughout the years, notably by improving its forward guidance with the inclusion, in 2020, of an interest rate forecast corridor (BCCH, 2020[13]). Given high external uncertainty, it is necessary that the central bank clearly communicates its risk assessments to limit monetary surprises and to maintain the effectiveness of the monetary policy transmission mechanism. Inflation projections are surrounded by risks. While the pass-through of the sharp depreciation of the exchange rate in 2023 was limited (Figure 1.9, Panel B) (BCCH, 2024[11]), a peso depreciation in a context of additional monetary policy cuts and narrower short-term interest rate differentials with the US may push up inflation. On the contrary, higher copper prices could induce an appreciation of the peso, generating higher exchange rate volatility. This warrants the need for the central bank to continue closely monitoring inflationary developments and risks.

The flexible exchange rate regime has served Chile well as a shock absorber, and together with international reserves has played an important role against financial market disruptions. However, reserves are low compared to peer countries (Figure 1.7, Panel B). To replenish reserves used during the last exchange rate intervention in July 2022, the central bank started accumulating international reserves in June 2023, with a total USD 10 billion purchases programmed over a year. Notwithstanding, the programme was suspended in October 2023 in face of stressed global financial markets. To further strengthen Chile's international liquidity position, the central bank should resume the accumulation of international reserves when market conditions are favourable to reinforce external buffers.

1.3. The financial sector remains resilient

The financial system remains sound and financial stability risks are contained, even though the depth of financial markets has narrowed following the pension fund withdrawals. Vulnerabilities that emerged during the pandemic in specific sectors persist, specifically among indebted low-income households, smaller firms, and in real estate and construction sectors, largely affected by the pandemic and higher costs. Financial burdens started to recede as interest rates decreased, while banks hold adequate capital and liquidity levels to cope with stress (BCCH, 2024[14]). Banking system capitalisation exceeds regulatory minimums, even though Tier 1 capital is low compared to other countries (Figure 1.10, Panels A and B). Banks have adapted their capital levels to higher regulatory requirements converging towards Basel III rules, which are almost fully implemented, in line with the established schedule. As the financial sector remains liquid, solvent and well capitalised, the unwinding of extraordinary liquidity support measures, such as *Facilidad de Crédito Condicional al Incremento de las Colocaciones* (FCIC), proceeded as planned and ended in July 2024.

Financial authorities continued to strengthen the resilience of the financial sector through the implementation of the Resilience Law of the Financial System, the FinTech Law and the Framework Law on Cybersecurity and Critical Information Infrastructures, among others in 2023 (See Chapter 3), while incorporating tools to safeguard financial stability, such as the countercyclical capital buffer (CCyB). In May 2023, the central bank decided for the first time to activate the CCyB, setting the measure at 0.5% of risk-weighted assets for one year as a precautionary measure given the higher level of external uncertainty derived from the turmoil in the global financial markets in early 2023, as well as the local risk assessment scenario. In its financial policy meetings in May and November 2024, the bank maintained the CCyB level at 0.5% of risk-weighted assets. Evidence suggests that activating the CCyB along with the progressive implementation of Basel III requirements and other measures implemented since 2022, did not have a significant effect on aggregate credit supply but impacted some individual banks with lower capital buffers and less capacity to replace their funding sources (Cortés and Toro, 2024[15]). In November 2024, the central bank announced a CCyB neutral level at 1%, which will provide more certainty to the banking system.

Non-performing loans started to increase at the end of 2023, but banks are prepared to face a deterioration of repayment capacity. Furthermore, monitoring of firms' and households' indebtedness is likely to improve with the newly created Consolidated Credit Registry (Box 1.1). Among households, delinquencies raised particularly for consumer loans, while mortgage delinquencies remained at relatively low levels (Figure 1.10, Panel D). For commercial loans, delinquency rates raised largely explained by firms that received *state-guaranteed* loans during the pandemic, smaller firms and those in retail, construction, and real estate sectors. Banks remain adequately provisioned due to provisions accumulation since 2021, anticipating an increase in credit risk (Figure 1.10, Panels C and D). Bank profitability returned to historical levels after increasing in 2022 and early 2023 (Figure 1.10, Panel E) while keeping adequate capital and liquidity levels in face of stress scenarios modelled by the central bank and the IMF (BCCH, 2023[16]; IMF, 2024[17]; BCCH, 2024[14]). In line with the economy's rebalancing process, credit growth decelerated, across all loan types, reflecting the normalisation of the economy and the effects of tight monetary policy (Figure 1.10, Panel F). The slowdown was particularly pronounced for commercial loans but slightly

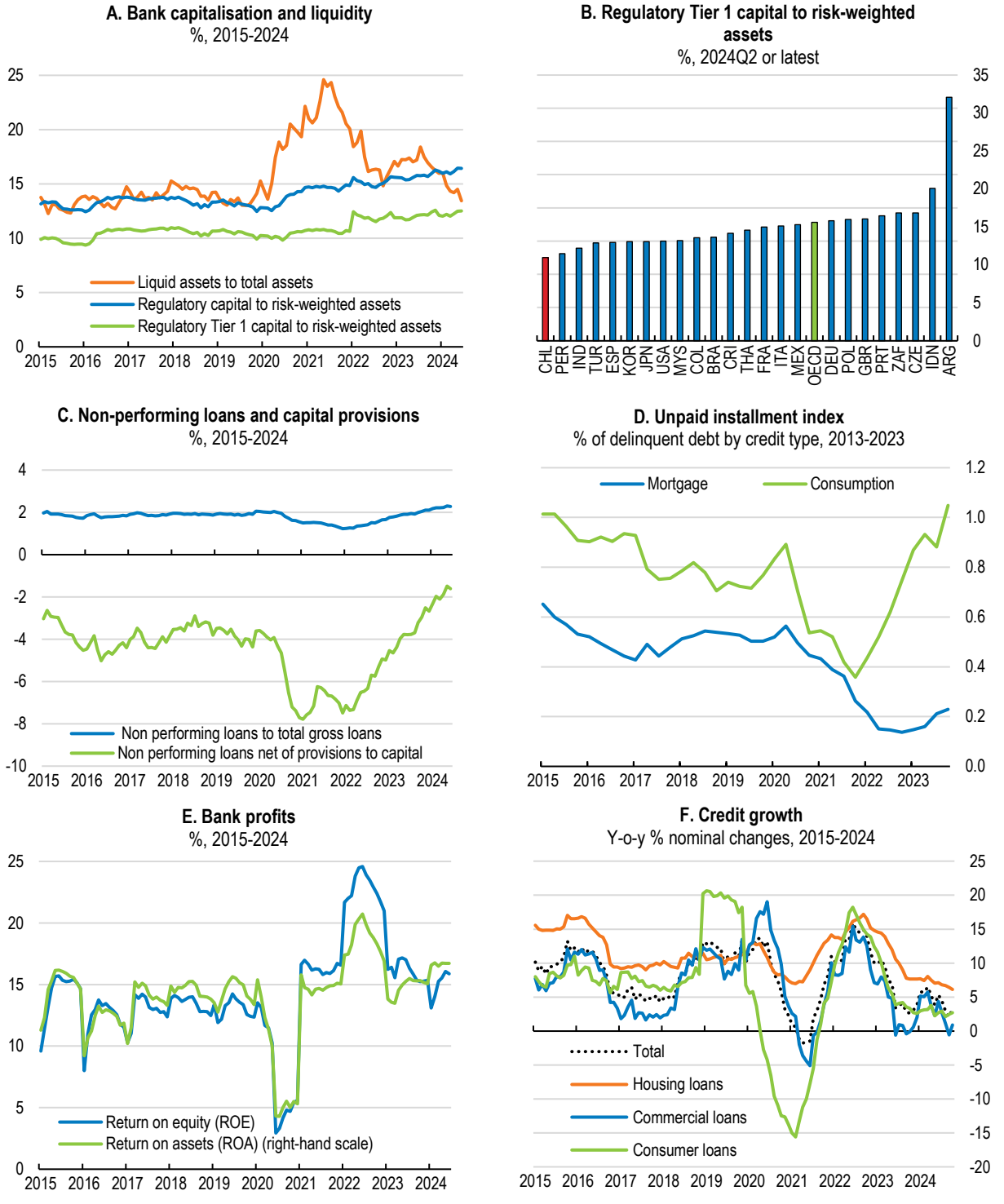
resumed by the end of 2023. Households and corporations remain financially sound with reduced debt levels in 2023 as compared to 2022 and no relevant currency mismatches (BCCH, 2024[14]), lowering financial vulnerabilities.

1.3.1. The depth of the financial market has fallen, increasing dependence on external financing

A sound financial system and deep financial markets have long benefited Chilean firms and consumers through low capital costs and expanded borrowing opportunities. Pension funds have played a key role in capital market deepening in Chile, serving market segments not covered by other institutional investors, favouring local equities and corporate bonds, showing more appetite for longer-term maturities, and acting as shock absorber (IMF, 2023[18]). However, pension withdrawals in 2020 and 2021 of around 20% of GDP (Figure 1.11, Panel A) structurally hurt the depth and liquidity of the domestic capital market (BCCH, 2023[19]), increasing Chile's vulnerability to external shocks and dependence on external financing. Several funds had to liquidate long-term assets in their portfolios, exacerbating increased volatility in long term interest rates and the exchange rate, while fixed-income trading activity in the stock exchange plunged. Total credit to the private non-financial sector as percentage of GDP fell around 9 percentage points between 2022 and 2023, but it remains high compared to other countries in the region (Figure 1.11, Panel B).

Shallower financial markets increase dependence on external financing, hindering savings accumulation, and limiting access to long-term financing in local currency, increasing external vulnerabilities and limiting the financial system capacity to absorb shocks. Promoting policies that encourage long-term savings will help capital markets to recover their shock absorbing capacity. The government and the central bank, through the Law to Strengthen the Resilience of the Financial System, the FinTech law, and the envisaged pension reform (see Box 1.1), are planning and implementing measures to deepen capital markets, including the development of a repo market, and a primary dealer system for government bond issuance, the creation of a fund of funds, facilitating cross border peso transactions, while promoting the development of FinTech, which has been growing in Chile in recent years and has the potential to expand even more (see Chapter 3). Since 2020, the central bank has the possibility to address increased volatility by temporarily buying government securities in the secondary market under extraordinary circumstances. Looking ahead, it will be crucial to avoid additional extraordinary pension withdrawals and to channel at least part of new pension contributions envisaged by the pension reform into savings invested in Chile's financial markets, while ensuring policies contribute to the development and recovery of capital markets to preserve Chile's distinct competitive advantage in access to credit.

Figure 1.10. Financial stability indicators



Source: IMF Financial Soundness Indicators; Central Bank of Chile.

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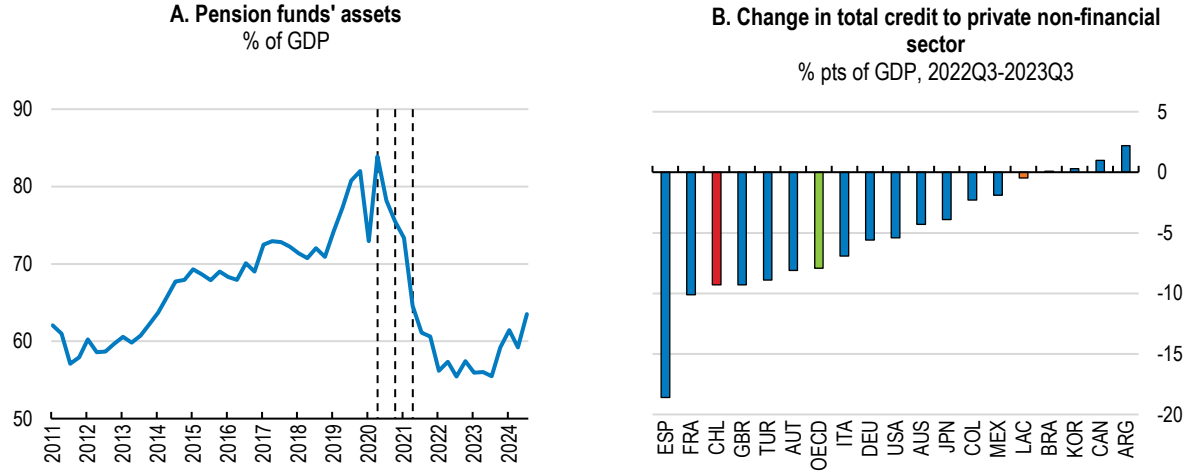
Figure 1.11. Financial and credit markets in Chile continue to be strained



Note: Vertical lines mark pension fund withdrawals. LAC is a simple average of Colombia, Mexico, Argentina, Brazil.
Source: Banco Central de Chile Financial Stability Report, second half of 2024; BIS.

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1.3.2. Preparing the financial system to cope with climate-related risks

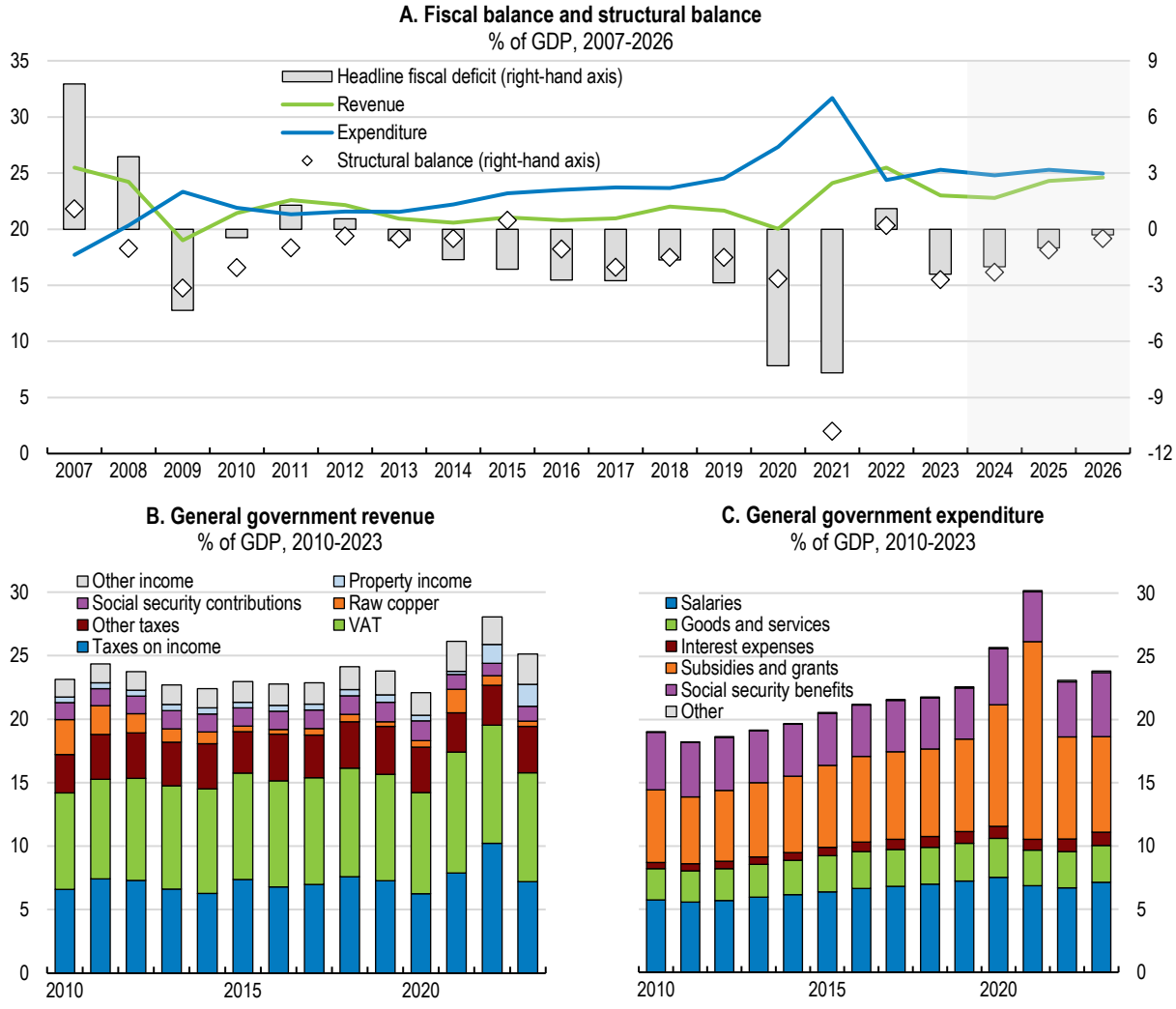
Extreme weather events are relatively frequent in Chile (Chapter 4), posing financial stability risks that should be assessed and integrated into the financial system's risk management frameworks. Since 2021, the central bank is member of the Network for Greening the Financial System (NGFS) and is working on integrating climate-related risks into regular prudential supervision, build awareness of climate-related risks among financial institutions, and integrating sustainability considerations into monetary policy. Since 2021, regulators have issued regulatory disclosure guidance mandating sustainability-related disclosures by banks, insurance companies and other financial institutions. Companies are also required to disclosed climate-related risks following the Task Force on Climate-Related Financial Disclosures (TCFD) lines. Financial sector authorities are developing the tools and capacities to identify, assess and monitor climate related risks and in 2024 updated their climate-related commitments, including new targets for public and private entities. A green taxonomy is under development largely based on the EU model to mobilise resources to finance Chile's transition to a climate resilient and low carbon economy (See Chapter 4). These commitments and advances are welcome, but implementation should accelerate given Chile's exposure to climate change.

Financial institutions in Chile present significant disparities in their climate-related risks assessments, mainly in terms of governance, disclosures, and risk management strategies (Mesa Público Privada de Finanzas Verdes, 2020[20]). Chile's financial regulators and supervisors are committed to build awareness of climate-related risks in the financial system and develop tools to assess these risks. The Financial Markets Commission (CMF) has progressed in the development of climate stress test for banks and insurance companies, however, further efforts are needed to help financial institutions understand and manage these risks, particularly institutions lagging the most. To further improve the understanding of climate issues and related risks among financial institutions, the central bank could publish its assessment of climate risks and stress tests. Moreover, to strengthen financial institutions' capacities to identify and incorporate the opportunities and risks of climate change in their strategies and decision making, financial authorities could further promote learning and knowledge sharing. Options include fostering e-training and developing workshops on sustainable finance, climate scenarios analysis, or financial instruments to mobilise resources for sustainable activities. Finally, in the medium term, authorities could envisage requiring financial institutions to integrate climate risk in corporate governance and risk management practices.

1.4. Ensuring fiscal sustainability should remain a priority

Chile's government is committed to debt sustainability and fiscal responsibility. The government implemented a sizable fiscal adjustment when coming to office in 2022 (Figure 1.12, Panel A), benefiting from revenue generated from lithium, the withdrawal of COVID-related support measures and spending cuts totalling 23.1%, significantly contributing to a fiscal surplus of 1.1% of GDP. However, as the economy slowed in 2023, weaker tax revenues, lower copper prices, coupled with higher spending from pension benefits and public wages, widened the structural fiscal deficit to -2.7% of GDP in 2023 (Figure 1.12, Panels B and C), above the target of -2.6%. Moreover, the government adopted by decree a prudent gross debt ceiling of 45% of GDP from 2022, even though the Fiscal Responsibility Law was only modified in 2024 to include it. Fiscal plans foresee some fiscal consolidation in 2024-2026, with a headline deficit of - 2.0% of GDP in 2024, -1.0% in 2025 and -0.3% in 2026. Government's planned adjustment comes from expected higher mining revenues, particularly in 2025, higher tax revenues due to the implementation of the tax compliance law, and less expansionary government expenditure, growing on average in real terms 2.6% per year in 2024-2026, compared to 4.9% over 2010-2019.

Figure 1.12. The government plans a gradual fiscal consolidation



Note: Data for the years 2024 to 2026 are current government plans.

Source: Chile Dirección de Presupuestos, Informe de Finanzas Públicas, Tercer Trimestre de 2024; Central Bank of Chile.

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Government medium-term fiscal plans are aligned with the fiscal rule and imply a broadly balanced structural fiscal position by 2028, and gross debt at 40.4%, below the prudent ceiling of 45% of GDP. The government's commitment with fiscal sustainability is reflected in the Pact for Growth, Social Progress and Fiscal Responsibility ("Pact for Growth") presented to Congress in early 2024, that pledges to increase permanent spending only if structural revenue increases (Box 1.2). The pact identifies as priority, higher spending in minimum guaranteed pensions, health, the national system of care, broadening childcare provision (*Sala Cuna para Chile)*, and security (totalling a cumulative 2.7% of GDP by 2028). Higher spending outlined in the pact is expected to be financed through ambitious measures to fight tax evasion, boost growth, modernise the state and increase spending efficiency (totalling a cumulative 2.1% of GDP by 2028). Caution is needed, as the measures outlined in the pact may not lead to the expected returns, in particular the ambitious gains anticipated from combating tax evasion and avoidance may not fully materialise. An income tax reform, that has yet to be agreed upon, is warranted to face increasing spending needs, as explained below.

Box 1.2. The 2024 Pact for Growth, Social Progress and Fiscal Responsibility (Pact for Growth)

The main measures reflected in the pact are as follows:

Spending measures:

- Gradually raise the Universal Guaranteed Pension to USD 272 (CPL 250 000), and increase employers' social security contribution rate to 6%. The fiscal cost is projected at approximately 1.2% of GDP per year over the next six years.
- Increasing healthcare spending (0.9% of GDP, per year by 2028), allocated primarily to reducing waitlists for surgical procedures, strengthening the Primary Health Care Universalisation Programme *(Programa de Universalización de la Atención Primaria de Salud*), especially through its extension to all communes, and constructing 30 Mental Health Community Centres.
- Increasing security spending (0.3% of GDP per year by 2028), to create a National System for the Protection of Victims and Witnesses of Organised Crime, invest in new prisons, improve street lighting and surveillance cameras, and increase border security.
- Increasing social protection spending (0.3% of GDP, per year by 2028) to implement a national system of care and expand childcare services (*Sala Cuna para Chile*) to all formal workers' children (aged 0-2) through a fund co-financed by the government and with employers' contributions (see Chapter 2).
- Implementing measures to increase government spending efficiency through reallocation measures in operational, IT, real estate and personnel expenditures, (cumulative savings of 0.1% of GDP).

Revenue raising measures:

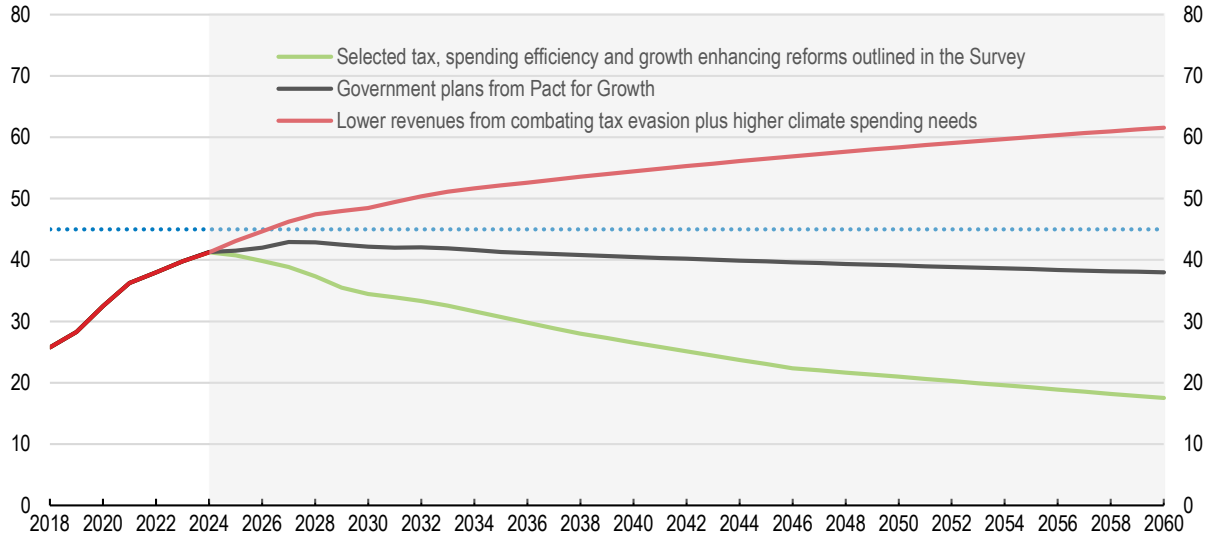
- A new law on tax compliance aimed at addressing tax evasion and strengthening the tax administration was approved in September 2024. The government expects to raise 1.5% of GDP from this reform.
- Implementing policies to boost growth through investment and productivity gains (increasing total revenues by 0.5% of GDP by 2028). The main reforms would be:
  - Introduction of preferential regimes to boost private investment with positive externalities, particularly in the green energy and digital economy sectors through a tax credit that can be applied against future income tax liabilities for certain investments.
  - Allow for instant depreciation of 50% for fixed asset investments made in the first year of new projects.
  - Cut the corporate tax rate from 27% to 25%.

Source: Pacto Para el Crecimiento, el Progreso Social y la Responsabilidad Fiscal (Ministerio de Hacienda, 2024[21])

In the medium term and considering that the government's medium-term fiscal plans presented in the Pact for Growth (Box 1.2) are fully implemented, OECD projections suggest that gross public debt will stabilise around 38% of GDP by 2060 (Figure 1.13, black line), below the debt ceiling of 45%. However, there are significant risks around this scenario. The ambitious gains from combating tax evasion and avoidance may not fully materialise, and higher spending will be needed for spending on wildfire assistance and prevention, and climate risk mitigation investment, estimated at 0.28% of GDP annually in the next 30 years (Gobierno de Chile, 2020[22]) leading the public debt-to-GDP ratio to increase significantly (Figure 1.13, red line). To put debt on a declining path, while addressing climate spending needs, will require higher tax revenues and to improve spending efficiency (see Table 1.4), as discussed in the next section. These, coupled with an ambitious package of structural reforms (Table 1.5), would raise growth and reduce the debt-to-GDP ratio, putting debt on a declining path (Figure 1.13, green line).

Figure 1.13. Scenarios for central government gross debt

Central government gross debt, % of GDP



Note: The dotted line reflects the prudent debt ceiling. The "Government plans from *Pact for Growth*" scenario assumes the government implements the *Pact for Growth* as presented in Box 1.2 with higher spending totalling 2.7% of GDP per year by 2028 and total tax revenues gradually increasing to 2.2% of GDP by 2028 and to 3.1% by 2034. This scenario also assumes real GDP growth and inflation to follow OECD projections over 2024-25 as in Table 1.1, after that, real GDP growth gradually converges to a potential output growth of 2.1%; the inflation rate is assumed at the target of 3%. The government primary balance is assumed to comply with the fiscal rule, and constant primary surpluses are maintained until 2060. The "Lower revenues from combating tax evasion plus higher climate spending needs" scenario assumes the committed expenditures as per the *Pact for Growth*, plus spending on wildfire assistance and prevention and climate risk mitigation investment needs amounting to around 0.28% of GDP annually, along with revenues from tax avoidance amounting to half the government plans at 0.8%, resulting in higher primary balances of 0.9% of GDP in 2025-2029 than in the "Government plans from *Pact for Growth*" scenario, leading to non-compliance with fiscal targets. The "Selected tax, spending efficiency and growth enhancing reforms outlined in the Survey" scenario assumes on top of the "Lower revenues from combating tax evasion plus higher climate spending needs" scenario, the implementation of tax measures comprising higher marginal tax rates at higher incomes, immovable property, transitory revenues from environmental and tobacco taxes, lower personal income tax exemptions and improved spending efficiency as recommended in Table 1.4 and the implementation of an ambitious package of selected growth-enhancing structural reforms as the ones recommended in Table 1.5 from 2026 onwards. All scenarios account for ageing-related costs, which are estimated to total 2.5% of GDP over the entire period to 2065 (Pessino and Ter-Minassian, 2021[23]).
Source: OECD calculations.

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Table 1.4 Long-term illustrative fiscal impact of the survey recommendations

Recommendation	Estimated impact on fiscal balance, % of GDP
Revenue side	
Additional revenues from lithium and green hydrogen 1/	0.5
Government policies to boost growth through investment and productivity gains including semi-instantaneous depreciation and reduction in permits1/	1.0
Government plans to lower corporate income tax 1/	-0.1
Government plans of improving spending efficiency through lower operational costs 2/	0.1
Higher carbon taxes 3/	0.3
Aligning diesel and gasoline excise taxes and phasing out tax expenditures that support fossil fuels 4/	0.5
Combat tax evasion and avoidance 4/ 6/	0.8
Mobilising additional tax revenues with higher marginal tax rates at higher incomes, transitory tobacco tax revenues, elimination of exemptions, and higher property tax on immovable property 4/	1.7
Total revenue side	*4.8*
Spending Side	
Government's planned additional pension spending 2/	1.2
Government's planned additional social protection spending, including expansion of the national system of care and creation of a fund co-financed with employers' contributions to provide childcare for children (0-2) 2/	0.3
Expand after-school care gradually 4/	0.1
Government R&D expenditure, spending on training and enhanced education outcomes 4/	1.2
Spending on prevention of wildfires and recovery assistance 4/	0.1
Additional public investment on climate change mitigation 5/	0.3
Total spending side	*3.2*

Source: 1/ Scenario B in the Report of the Expert Committee on Fiscal Space (Comité de Expertos, 2023[5]), 2/ Ministry of Finance (Ministerio de Hacienda, 2024[21]), 3/ (IMF, 2023[18]), 4/ OECD estimates, 5/ (Gobierno de Chile, 2020[22]) 6/ Government plans consider 1.5% of GDP.

Table 1.5. Potential impact of selected structural reforms recommended in the Survey on per capita income

Estimated impact of selected reforms on potential GDP per capita after 15 years

Reform	Impact on Real GDP, %
A. Higher female employment	3.3
B. Lower administrative burdens	1.0
C. Higher government R&D expenditure and enhanced education outcomes	2.9
Ambitious reform scenario: All the above reforms	**7.2**
Implied average annual growth increase (of ambitious reform scenario):	**0.5 percent points**

Note: Potential output estimation is based on a Cobb-Douglas production function with constant returns to scale based on the OECD long-term growth model (Guillemette and Château, 2023). Scenario A assumes that female employment rates reach the average employment rate for men by 2050. Scenario B assumes that Chile's administrative burden PMR score converges to the OECD average by 2050. Scenario C assumes government R&D spending converges to the OECD average in 10-15 years, a 1-year increase in schooling relative to today and that average PISA scores in reading, math and science converge to OECD averages by 2050. The individual reform effects do not sum up to the effect of the ambitious reform scenario due to non-linear effects in the model.
Source: Simulations using the OECD long-term model (Guillemette and Château, 2023).

1.4.1. Further refining the strong fiscal framework

Chile's strong fiscal policy framework has served the country well. Compliance with fiscal targets has been strong since 2001, when the structural fiscal balance rule was established, with 70% of compliance with fiscal targets in 23 years and most deviations occurring during crisis periods (Valdivieso Sastre et al., 2022[24]). Furthermore, the current administration has implemented a handful of enhancements to the fiscal rule to continue strengthening Chile's fiscal framework (Box 1.3), included in the most recent updates of the Fiscal Responsibility Law. Despite a strong fiscal framework, the structural fiscal balance rule has not been effective in containing gross public debt growth (Figure 1.14) that increased strongly between

2008-2022 (OECD, 2022[3]). Higher debt partially reflects increasing debt-servicing costs, which are expected to recede in the future. After the pension funds withdrawals in 2021, some factors raised debt servicing costs, including higher global interest rates and tighter domestic financial conditions, amidst higher risk premia and increased volatility in interest and exchange rates (BCCH, 2023[19]). Because of these dynamics, the Fiscal Responsibility Law was updated in July 2024 to consider a dual fiscal target encompassing the structural fiscal balance target and a gross debt ceiling. Additionally, the updated law incorporates an escape clause to allow future governments to deviate from the structural balance fiscal targets, for up to two years, in case of extraordinary and transitory events and a mechanism for corrective actions to return to the targets (Box 1.3).

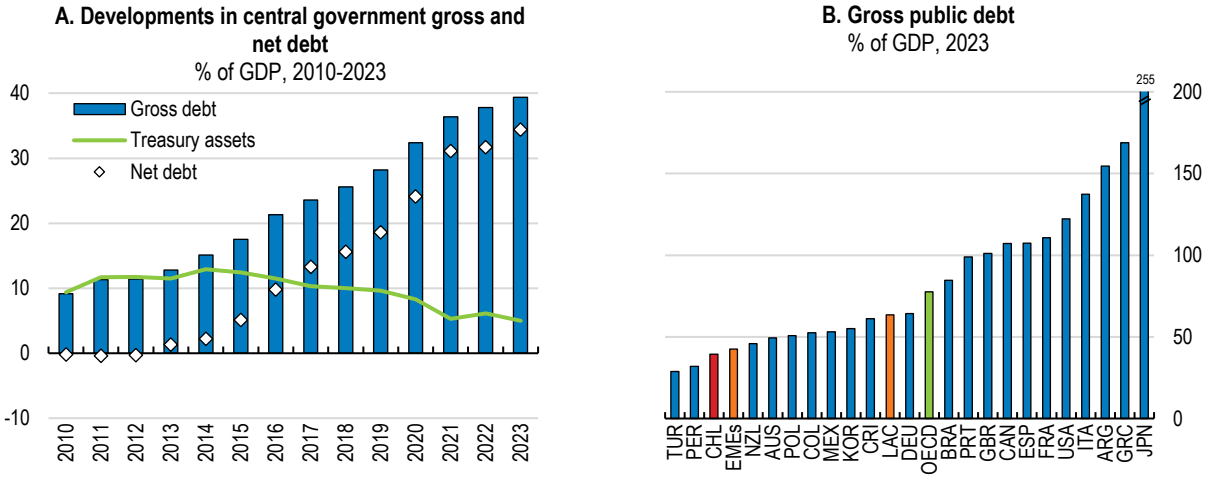
Every quarter, Chilean authorities publish medium term budgetary projections and risks to inform their plans to comply with fiscal targets in the four years ahead. To enhance fiscal sustainability in the longer term and account for long-term spending needs (including ageing- and climate-related costs), it is advisable that budget projections go beyond this time horizon. Chile could benefit from developing and publishing long-term budget projections on the impact of ageing and climate change at the beginning of each administration to shed light on long-term challenges and ensure budgetary discipline and alignment of medium-term spending plans with long-term needs. This would increase predictability of public finances and facilitate the adoption of multi annual budgets across administrations. For instance, Australia's Parliamentary Budget Office publishes projections of key budget outcomes over the next decade and a long-term fiscal sustainability analysis considering ageing and climate related costs (Parliamentary Budget Office, 2024[25]). The Netherlands budgetary framework is structured around multiannual expenditure ceilings, which promote budget control and transparency. Governments adhere to these pre-agreed expenditure ceilings over a four-year term, with exceptions to address unforeseen crisis. This medium-term projection assumes unchanged policies and includes an assessment of the long-term sustainability of public finances (Government of the Netherlands, 2024[26]).

Chile's sovereign wealth funds were established to encourage savings over time and have provided buffers to stabilise the economy in the face of shocks. Chile appropriately drew down the funds, especially the Economic and Social Stabilisation Fund (ESSF), to provide swift and impactful support to protect people during episodes of low revenues, such as the pandemic (CFA, 2024[27]; Ministry of Finance, 2023[28]). Chile will need to replenish the stabilisation funds gradually after its large draw-down to ensure government flexibility to respond to shocks. In adverse times if debt becomes too costly to roll over, having liquid assets allows the government to avoid rolling over maturing debt and frees resources to stabilise the economy. The ESSF assets declined significantly, with total accumulated stocks falling from 5.2% of GDP in 2018 to 1.9% in 2023, and it would be desirable to gradually restock the fund. The ESSF is closely linked to the structural budget balance rule, transferring the amount exceeding the structural balance under the fiscal rule, and follows international best practice in having flexible inflow and outflow mechanisms (IMF, 2024[17]). Rebuilding buffers by setting structural balance targets that allow a gradual building of the funds, especially the ESSF, while stabilizing debt below the prudent debt ceiling would be necessary, particularly if resources from this fund could also be used in case fiscal support is needed to face climate-related emergencies. Chile could take advantage of potential higher-than-expected natural resource revenues to accumulate assets in the funds.

Chile's fiscal council (*Consejo Fiscal Autónomo, CFA*) underpins the country's strong fiscal framework since 2019. Since its creation, the Fiscal Council has evolved significantly, supporting transparency and accountability, contributing to fiscal sustainability. Its main functions include monitoring compliance with the fiscal target, recommending mitigation measures in case of deviations, and evaluating the sustainability of public finances in the medium and long term. The council's technical team and budget have grown since its inception, while the new Fiscal Responsibility Law strengthens it by redefining rules to appoint counsellors, limiting the number of meetings, and establishing rules for information requirements from the Council. However, it still faces challenges in effectively fulfilling its duties (Caldera Sánchez et al., 2024[29]). For instance, the council has been costing the fiscal impact of reforms, in particular those that pose a risk

to fiscal sustainability, which often require high technical capacity and time, necessitating a larger technical team and more resources. The council's operational independence is limited by its dependence on other bodies for administrative matters and the fact that none of the board members are full-time (Caldera Sánchez et al., 2024[29]). There is also a need for better access to timely information and enhanced resources for communicating the council's work to the general public.

Figure 1.14. Public debt has increased but remains low in international comparison



Note: LAC is a simple average of Colombia, Costa Rica, Mexico, Argentina, Brazil, and Peru; Emerging Market Economies (EMEs) are a simple average of ARG, BRA, CHN, COL, EGY, HUN, IND, IDN, MYS, MEX, PER, PHL, POL, ROU, RUS, ZAF, THA, TUN, TUR.
Source: Ministry of Finance; IMF, WEO.

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Box 1.3. Amendments to Chile's Fiscal Rule since 2022

- Introduction of a lithium cyclical adjustment (2023). The fiscal rule was adjusted in 2023 to ensure that transitory revenue windfalls from lithium lease contracts are saved from 2024 onwards. This cyclical adjustment corresponds to the amount of revenue considered transitory and that should be saved. The new rule defines a new structural parameter –the lithium reference threshold– to be computed as the simple average of lithium revenues from mining contracts granted by Corfo, as a share of GDP, during the last five years. If revenues from lithium mining contracts are higher than the threshold, they are adjusted by an amount equal to the difference between the actual value and the threshold, whereas if they are lower no adjustment is made.
- Output gap estimations used by the Ministry of Finance to estimate the structural balance were improved by including a broader set of information (2023), addressing the limitations and biases of simpler versions. This enhancement addresses shortfalls that consistently led to negative output gaps, which allowed for higher spending.
- Setting of annual structural fiscal targets (2023). The setting of annual structural fiscal targets will increase the transparency and accountability of the fiscal rule and ensure that fiscal consolidation is not postponed to the last years of an administration.
- Inclusion of a prudent gross debt ceiling in the Fiscal Responsibility Law (2024), alongside the structural fiscal balance path, that links the annual budget operations to debt sustainability and considers the impact of below-the-line operations. Targets set by each administration should be evaluated by the CFA.

- Adoption of an escape clause (2024) that will allow governments to deviate from the structural balance fiscal targets, for up to two years, in case of extraordinary and transitory events, and mechanisms for corrective actions.

Source: (Ministerio de Hacienda, 2023[30]) Decreto 346 aprueba metodología, procedimiento y publicación del cálculo del balance estructural.

Chile's green transition is an opportunity to bolster fiscal sustainability, particularly considering the potential for lithium production (Chapter 4). Even though lithium represents a lower share of exports and fiscal revenues than copper, its participation has significantly increased (Table 1.6). Estimations suggest that revenues stemming only from higher lithium production in the Atacama salt flat could bring an additional USD 1 billion per year in 2028 and USD 400 million by 2034, taking only into account mining leases paid to Corfo (Comité de Expertos, 2023[5]). In a welcome step, the structural balance rule was amended in 2023 to ensure that transitory revenue windfalls from lithium lease contracts are saved from 2024 (Box 1.3). The fiscal council has warned that this amendment reduces the risk of assigning potentially transitory revenue to finance permanent spending but would not eliminate the risks completely (CFA, 2023[31]). The new rule considers revenues from Corfo (which represent between 66% and 80% of total lithium-related revenues) but leaves aside revenue from taxes on lithium companies because of data challenges to estimate those revenues. To further strengthen the methodology, the Council recommended applying an adjustment for the totality of lithium revenue and strengthening access to tax data on lithium mining companies, via agreements for data sharing with the Internal Tax Service. Refining the fiscal rule over time by accounting for the totality of revenues from lithium as the industry evolves would be desirable.

Table 1.6. The role of lithium and copper in exports and fiscal revenues

		2020	2021	2022	2023
Copper	Exports, % of total goods exports	52.0	55.5	44.5	45.8
	Exports, % of GDP	19.4	16.6	13.9	12.9
	Fiscal revenue, % of GDP	1.2	3.0	2.3	1.3
Lithium	Exports, % of total goods exports	0.9	1.5	9.2	7.1
	Exports, % of GDP	0.3	0.4	2.9	2.0
	Fiscal revenue, % of GDP	0.0	0.0	1.0	1.0

Source: IMF; Banco Central de Chile, Ministry of Finance.

The fiscal framework could be further strengthened by integrating fiscal risks associated with climate change. Chile's medium-term fiscal framework already provides budgeting planning and risk analysis over several years (Ministerio de Hacienda, 2024[32]), and the Ministry of Finance has been estimating climate-related costs. Starting in 2025, the budget will clearly identify which expenditures are climate-related. However, the fiscal framework could be further strengthened following the example of other OECD countries. Some OECD countries incorporate climate change considerations into their long-term fiscal plans. For instance, Denmark adopted macro-fiscal forecasting and modelling tools that incorporate climate and environmental impacts to inform the preparation of the country's fiscal budget. Sweden integrates climate and budgetary targets, presenting annually a climate report in its budget and every four years, designs a climate policy action plan detailing strategies for achieving climate targets. Chile could incorporate climate-related expenditures and revenue measures into the medium-term fiscal framework with macro-fiscal forecasting and modelling tools to align fiscal policies with climate objectives (OECD, 2024[33]).

Table 1.7. Past OECD recommendations on tax system reform and fiscal framework enhancements

Past OECD Recommendations	Actions Taken
Keep the pace of fiscal consolidation in line with current fiscal plans, including a strong reduction of public expenditure during 2022.	Fiscal consolidation took place in 2022.
Mobilise additional tax revenue through a comprehensive reform of personal income taxes, property taxes and improvements in tax administration.	A tax reform is under discussion aiming at increasing personal income taxes. The government presented a plan to increase revenues from spending efficiency and better tax compliance.
Enhance the fiscal rule with a debt anchor and an escape clause that defines conditions for departing from it, and a trajectory to return afterwards.	The Fiscal Responsibility Law which adopts a dual target fiscal rule was approved in 2024.

1.4.2. Raising additional tax revenues

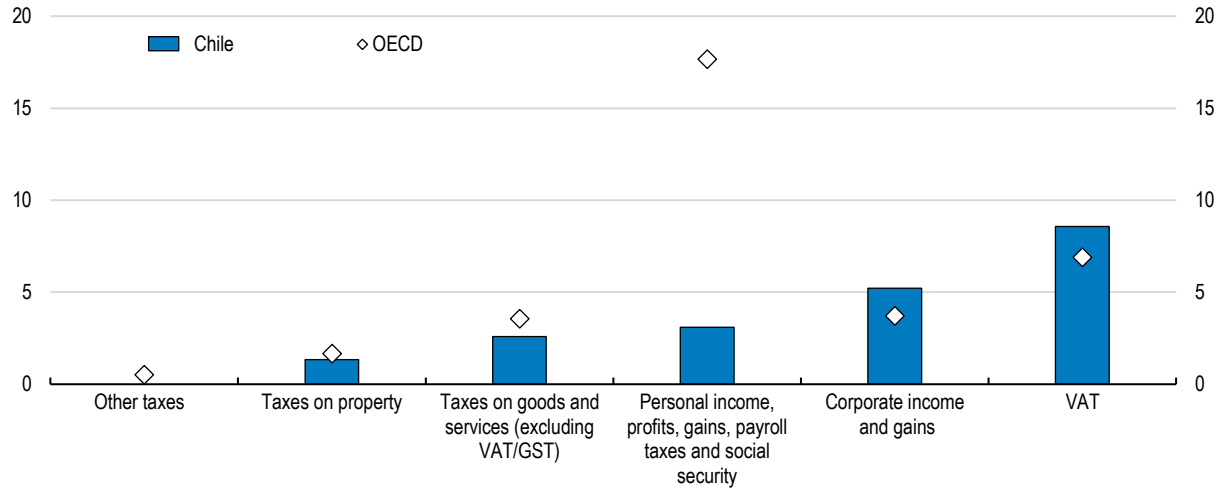
Chile's tax-to-GDP ratio of 21% is low compared with the OECD average of 34% in 2023. A comparison with the average OECD tax structure indicates that on average, OECD countries' revenues depend more on personal income taxes and social security contributions whereas Chile derives the highest share of its tax revenues from value added taxes and corporate income taxes. Personal income taxes are low (Figure 1.15) and this structure has been relatively stable in recent years. Social security contributions as a share of tax revenues gets closer to the OECD average when mandatory contributions to private sector pension funds are included (OECD, 2022[34]). Compulsory contributions to the private sector represented 5.8% of GDP in 2022 or 24% of total tax revenues, financing 85% of social security benefits in Chile.

Mobilizing more tax revenues will be needed to address spending needs in key areas, such as social protection, security, health, education, and climate change mitigation, while maintaining Chile's commitment with fiscal prudence. Aware of spending needs and the limited fiscal space, since 2022 the government has been promoting tax reforms. Following the rejection of the 2022 government wide-ranging tax reform proposal by Congress in March 2023 that aimed at raising 3.8% of GDP in additional revenues, the Pact for Growth envisages measures to raise revenues by 2.1% while an updated tax reform proposal is under discussion in Congress which foresees additional revenues coming from higher tax revenues from personal income taxes and on dividends, and lower revenues from reducing the corporate tax rate while offering incentives to investments. The reform would benefit from a broad consensus to ensure continuity and limit uncertainty for businesses and households.

The Pact for Growth and the tax reform would bring Chile's tax-to-GDP ratio to 23.3% by 2028 from 20.9% today, leaving Chile among the countries with the lowest tax intake in the OECD, such as Mexico and Colombia, and well below the OECD average. Additional transitory tax revenues to finance needed spending could come from increased environmental taxes, lower diesel exemptions and tobacco taxes as discussed below. There might be scope to increase taxes on property, which accounted for 1.3% of GDP in Chile in 2023 as opposed to 1.7% on average in the OECD. Implementing measures to strengthen public spending efficiency, including government plans to lower spending on IT, operational, real estate and personnel expenditures, could help to address spending needs.

Figure 1.15. Chile derives the highest share of its tax revenue from value added taxes

Distribution of total tax revenue, % of GDP, 2023



Source: OECD, Global Revenue Statistics database.

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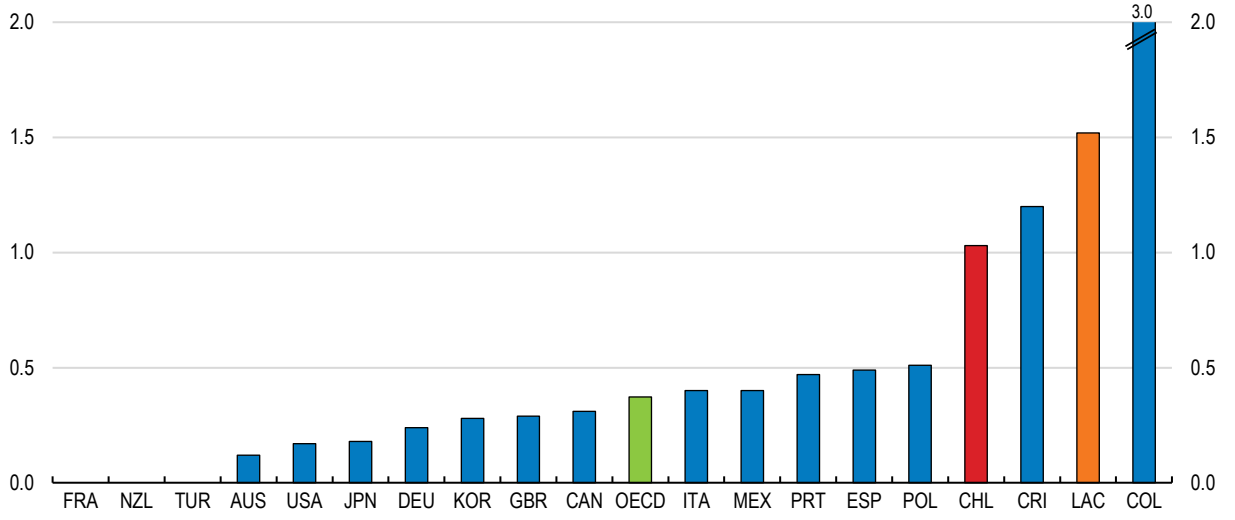
Reforming the Personal Income Tax can increase progressivity in the tax system

There is room to make the income tax system more progressive while raising more revenues by broadening tax bases, currently very narrow in Chile. Some changes to income taxes were implemented in recent years, for instance the number of tax brackets increased from seven to eight in 2021 and the maximum marginal tax rate was raised from 35% to 40% (OECD, 2022[34]). The proposed tax reform includes raising rates in the higher tax brackets for taxpayers whose income exceeds USD 6 300 per month. Marginal tax rates for affected taxpayers will increase by 3-5 percentage points. The current top marginal rate of 40% will raise to 43%, closer to current OECD average of 42.5% (OECD, 2023[35]). Some exemptions and deductions that mostly benefit the most affluent taxpayers should be lowered. For example, families with young children can deduce childcare costs up to USD 550 per month, with likely regressive effects, as those who do not pay personal income taxes cannot benefit from this deduction. It would be advisable to gradually lower these deductions and replace them with more targeted measures, particularly for vulnerable families with children, as explained below. Similarly, taxpayers are allowed to deduct interests on an unlimited number of mortgages with a deduction cap of approximately USD 5 500 per year, if certain income caps and requirements are met. Restraining deductions to only one mortgage, as the government envisages is desirable, as well as gradually eliminating income tax exemptions from leasing properties and corporate tax exemptions for investment funds.

In Chile, 74% of the eligible population is below the personal income tax exemption threshold, with only 20% of formal workers paying personal income tax in 2022 (Acosta Ormaechea, Pienknagura and Pizzinelli, 2022[36]). The top personal income tax rate in Chile is not remarkably high and it only takes effect at very high-income levels, while the basic deduction in Chile is very elevated relative to the average wage (Figure 1.16), and only about 2% of the eligible population is subject to a PIT rate above 20% (SII, 2024[37]).

Figure 1.16. Few people pay personal income taxes

Income threshold where single taxpayers start paying income tax, multiple of the average wage, 2022



Note: LAC is a simple average of Colombia, Costa Rica, and Mexico.
Source: Acosta Omaechea, Pienknagura and Pizzinelli, 2022; OECD, Taxing Wages 2023.

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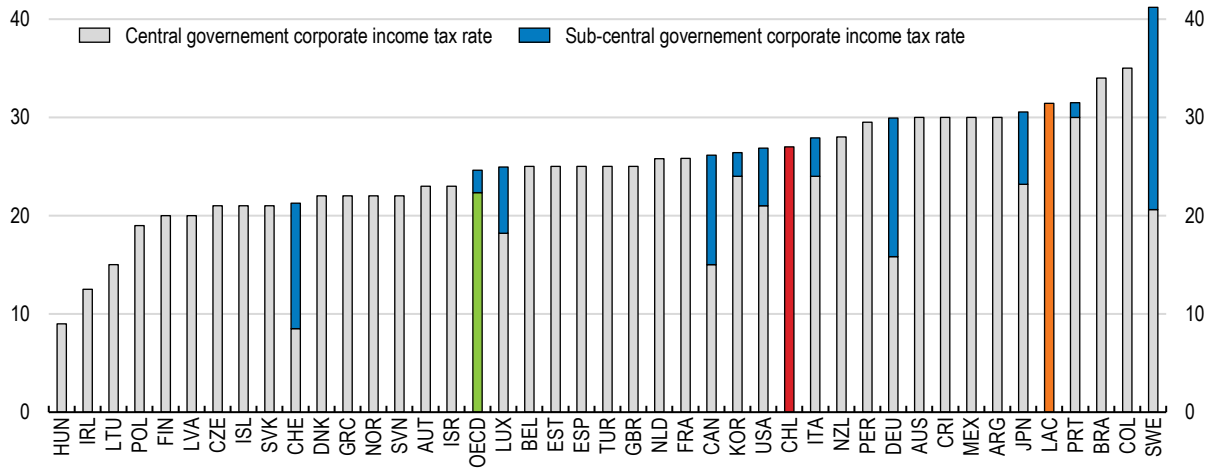
As in the 2022 proposal, the updated income tax reform plans to modify Chile's partially integrated income tax system into a semi-dual income tax, responding to the perception in Chile that the system has led to a low effective tax burden on capital incomes (OECD, 2022[3]). The current system grants a partial shareholder-level dividend tax credit for corporate taxes paid at the company level. The plan is to modify it into a semi-dual income tax, where capital income and capital gains are taxed at a flat rate of 16%. The total tax burden on dividends, including the corporate tax paid at the company level, would be reduced from 45% to 39% with this new arrangement, close to the OECD average and the top marginal personal income tax rate.

There is room to reduce the tax burden on businesses

To foster investment, the tax reform proposes lowering the statutory corporate tax rate from 27% to 25%. This is a welcome change that is likely to spur productive investment, which remains subdued, as discussed above. Moreover, Chile's statutory rate is high relative to the OECD average of 24% (Figure 1.17) and Chile had the highest effective average tax rate in 2022, at 37.9%, significantly above the OECD average of 20.2% (OECD, 2023[38]). Empirical evidence suggests that to foster investment, lowering the corporate tax rate might not be enough (Hanappi, Millot and Turban, 2023[39]), it should be accompanied by other measures such as lowering administrative burdens and permit time processing, as envisaged by the government, and discussed in section 1.1.1.

Figure 1.17. Corporations face a high statutory tax rate

Corporation income tax rate, %, 2024



Source: OECD Tax database.

StatLink https://stat.link/lrbxmp

Efforts to enhance tax compliance should continue

The Pact for Growth envisages an additional 1.5% of GDP in revenue from the recently approved tax compliance law which is set to combat tax evasion and avoidance, lower informality, modernise the tax administration, increase transparency, and implement measures against tax evasion and prevention of the use of legal loopholes (Box 1.2). These efforts are welcome given that Chile's tax authorities estimate the loss from evasion at 18% of VAT revenues and 51% for corporate tax revenues from 2018 to 2020 (Ministerio de Hacienda, 2024[21]). Moreover, they complement Chile's consistent efforts to improve and modernise its tax administration processes (see Chapter 3). Nonetheless, caution is warranted as the expected additional revenues are large, and the scope for reducing tax evasion is hard to assess. Relying too heavily on the expected yields from combating evasion could result in short-term fiscal pressures. Moreover, these estimations should consider that taxpayers typically adjust their behaviour and that it takes time to strengthen government capacities to effectively yield higher revenues, as the fiscal council warned (CFA, 2024[27]). To cushion against potential deviations from expected gains, the reduction of tax evasion should be complemented with other measures to increase revenues and improve government spending, such as implementing recurrent spending reviews to make it more efficient, increasing income taxes, reducing exemptions and subsidies, and increasing property taxes.

Environmental taxes are low in Chile

Plans to raise environmental taxes are not part of the current tax reform proposal, but the government is investigating this avenue and plans to propose a draft law in 2025. In 2022, the environmentally related tax revenue in Chile was 0.81% GDP, below the OECD average of 1.31% and the Latin American average of 0.99%. Raising environmental taxes are meant to induce behaviour changes among consumers to ultimately reduce GHG emissions and reach climate targets. In addition, these taxes would temporarily increase revenues which could be used to mitigate climate change effects (see Chapter 4). Chile has low carbon taxes, the design of excise taxes on fossil fuels has multiple distortions, including a tax rate for diesel much lower than for gasoline. For example, the potential revenue of aligning diesel and gasoline excise tax has been estimated as 0.5% of GDP (Brys et al., 2020[40]).

Increasing tobacco taxes could reduce tobacco consumption

Tobacco prevalence in Chile remains the highest in the Latin American region and one of the highest worldwide, at 30.1% in 2020, as compared to 12.8% in Latin America. Chile has made progress in rising the tax burden on tobacco over time, but the purchase of tobacco remains very affordable. Since the 2014 reform, tobacco tax design in Chile is aligned with WHO best practices, with a mixed system with a predominance of a specific component (indexed for inflation) accompanied by an ad-valorem uniform rate on retail price. The tax burden expressed as a share of the retail price exceeds the 75% threshold, aligned with the WHO recommendations. However, cigarettes are still very affordable. The effective tax burden on cigarettes has declined since 2014 because of the unchanged tobacco tax rates, other than the inflation adjustment, while the tobacco industry has continued to increase pre-tax retail prices at a larger pace than inflation. To induce a significant drop in tobacco prevalence, a significant tobacco tax increase would be needed. Additionally, this reform would yield transitory additional tax revenues, by around 0.1% of GDP, considering previous reforms' impact.

1.4.3. Making government spending more efficient and targeted

Chile's general government spending, at 25% of GDP in 2023 is lower than the average across OECD countries at 40% of GDP. However, spending has increased as a share of GDP over time (Figure 1.12) and spending pressures are rising due the green and digital transitions and population ageing, making the need to improve spending efficiency. Since 2019, Chile has a spending review unit in the budget directorate (DIPRES) in charge of spending reviews and improving efficiency and effectiveness of spending over the medium term, that has carried out two pilot spending reviews. The government commissioned a spending review to the OECD to identify areas where short term spending savings or reallocations could be made (OECD, 2023[41]). The review identified several areas (operational spending, IT, real estate, and personnel expenditures) where spending could become more efficient, amounting to savings of around 0.1% of GDP. These steps are welcome, however, continuous efforts to strengthen spending efficiency and to regularly use spending reviews would help generate efficiency gains in the medium term (See Box 1.4).

Chile has taken welcome steps to better target social benefit programmes and facilitate delivery. For instance, the Electronic Family Wallet (*Bolsillo Familiar Electrónico*), launched in May 2023, is an innovative electronic payment system designed to provide financial support to vulnerable households, facilitating the delivery and use of a monthly monetary contribution specifically for food purchases. Also, the household social registry improved with the introduction of more frequent updates, integrating tax records and allowing for self-declaration of income to better identify beneficiaries (Ministerio de Desarrollo Social y Familia, 2023[42]). At the same time, a guide with information about eligibility criteria and available benefits was recently published by the Ministry of Social Development, with the aim of raising the benefit take-up among low-income families. Additional plans include the creation of a one-stop window to access these programmes. The government's efforts to consolidate the social programmes and expand the take-up are welcome.

Efforts should continue to enhance the efficiency and effectiveness of social assistance programmes to better target the most vulnerable households by regularly revising the list of benefits and beneficiaries and adjusting subsidies when needed. After the increase of solidarity pensions, households including persons 65 years or older experience relatively lower poverty rates compared to vulnerable households with young children (IMF, 2024[17]) which calls for revisiting household subsidies targeted to this group.

Box 1.4. Best practices for spending reviews

Spending reviews are widely used in OECD countries. They offer a comprehensive analysis of government expenditure and identify opportunities for savings and reallocations to high priority spending areas. The OECD Best Practices for Spending Reviews identify the following key success factors based on OECD countries experiences:

- Formulate clear objectives and specify the scope of spending reviews.
- Identify distinct political and public service roles in the review process.
- Set up clear governance arrangements throughout the review process.
- Ensure integration with the budget process.
- Implement recommendations in an accountable and transparent manner.
- Ensure full transparency of spending review reports and the review framework.
- Update the spending review framework periodically.

Source: Tryggvadottir, Á. (2022), "OECD Best Practices for Spending Reviews".

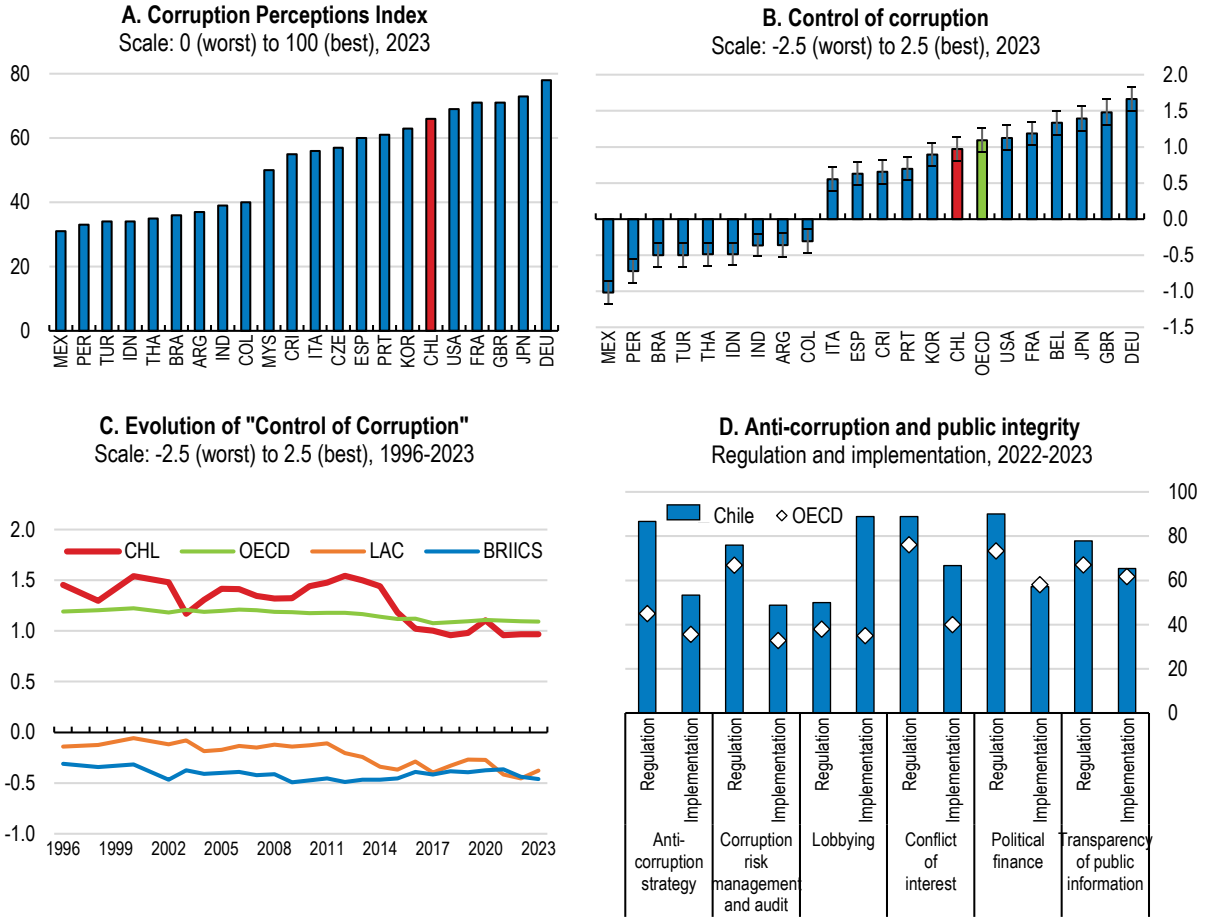
1.5. Fighting corruption

Chile has consistently shown a strong position in corruption indicators in several dimensions compared to OECD countries, including perceptions of corruption, anticorruption strategies, corruption risk management and audit, and several integrity efforts (Figure 1.18, Panels A, B and C). Chile surpasses the OECD average, both in regulatory and practical compliance standards on anticorruption strategy, risk management, lobbying, and conflict of interests (Figure 1.18, Panel D). However, challenges persist in electoral finance and transparency in public information, given that not all political parties comply with information requirements within the timelines defined by national legislation, and government data in Chile is not open by default. Also, tracking post-employment activities of public office holders remains a challenge in Chile, as in many OECD countries, making it difficult to ensure compliance with revolving-door rules (OECD, 2024[43]).

In December 2023, Chile adopted the National Strategy on Public Integrity 2023-2033 (*Estrategia Nacional de Integridad Pública*), the first strategy at the central government level. The strategy aims at enhancing transparency, integrity, and the fight against corruption through 200 measures comprising anti-corruption measures, protection of public resources, and conflict of interest prevention. The strategy, if adequately implemented, can reduce corruption at the local level, as corruption cases in municipalities have been increasing in the last years, with open investigations for corruption in 52% of all municipalities as of 2022 (Lubbert Alvarez, 2023[44]). Such increase can be attributed to lack of transparency and poor checks and balances along with limited areas of action of Chile's supreme audit institution, *Contraloría General de la República*, to pursue these cases (Lubbert Alvarez, 2023[44]).

Regarding public procurement, past evidence from the Competition Authority revealed that direct purchases were widely used in Chile (Fiscalía Nacional Económica, 2020[45]). Aware of these challenges, Congress approved a public procurement reform in 2023, which seeks to improve public spending quality, enhance probity standards and transparency, and promote small companies and local suppliers in the State purchases. Compliance with the new law has the potential to allow for some cost savings and increase resource-management transparency at all government levels. Efforts should be targeted to ensure the implementation of the law by clarifying institutional responsibilities, monitoring compliance, building civil servants' understanding and buy-in, and enforcing appropriate penalties (OECD, 2024[43]).

Figure 1.18. Corruption indicators



Note: Panel B shows the point estimate and the margin of error. Panel C: LAC is a simple average of Colombia, Costa Rica, Mexico, Argentina, Brazil, and Peru.

Source: Panel A: Transparency International; Panels B & C: World Bank, Worldwide Governance Indicators; Panel D: OECD Anti-Corruption and Integrity Outlook 2024.

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Table 1.8. Policy recommendations to further strengthen macroeconomic policies

MAIN FINDINGS	CHAPTER 1 RECOMMENDATIONS (Key recommendations in bold)
Headline inflation has slowed rapidly from a peak of 14.1% in August 2022 to 4.2% in November 2024, while inflation expectations are well anchored at the 3% target since 2023.	**Continue a gradual, prudent, and data-based monetary easing cycle to facilitate a gradual return of inflation to target.**
International reserves are low compared to peer countries.	Resume the accumulation of international reserves when market conditions are favourable to reinforce external buffers and strengthen Chile's international liquidity position.
A relatively high minimum wage reduces the prospects for low-income workers to obtain formal employment.	Establish a permanent commission to provide guidance for future changes to the minimum wage, in line with changing labour market conditions and productivity.
The permit system makes investment approvals costly and lengthy. The amount of time and money to comply with permits and licenses is excessive, imposing important burdens on enterprises. A reform to streamline permits and reduce administrative costs is being discussed.	Swiftly approve the permit system reform and ensure it is properly implemented.
The replacement rate for low-income pensioners has improved due to the minimum guaranteed universal pension, but many people still have inadequate old-age pensions, and low replacement rates, owing to low contributions and contribution gaps due to informal employment. Higher mandatory contributions raise the cost of formal job creation, driving many low-skilled workers into informality.	**Raise pension benefits and apply a progressive contribution rate schedule, ensuring strong incentives for formal job creation.**
Chile's traditionally deep financial markets are shallower since the extraordinary pension funds withdrawals of around 20% of GDP in 2020-2021. This hinders savings accumulation, and limits access to long-term financing in local currency, which increases external vulnerabilities and limits the financial system capacity to absorb external shocks.	**Avoid additional extraordinary pension withdrawals and ensure that the pension system continues to support deep and liquid long term capital markets by ensuring that part of future pension contributions is saved and invested in capital markets.** Ensure an adequate implementation of the FinTech and Market Resilience laws to deepen capital markets and to strengthen the financial system to face potential shocks.
Long-term spending needs are not explicitly included in fiscal projections, including ageing- and climate-related costs, which could generate misalignments in spending priorities and long-term needs.	Develop and publish long-term budget projections that align spending with the country's priorities and long-term needs.
The financial sector remains robust, although non-performing loans have risen in some sectors.	Continue monitoring developments and adjust countercyclical provisioning as necessary.
Consolidation efforts have reduced the fiscal deficit from pandemic highs. Planned consolidation for 2025-2029 heavily relies on significant government expenditure restraint. While government medium term fiscal plans comply with the fiscal rule, caution is needed, as the measures outlined in the Pact for Growth may not lead to the expected returns.	**Maintain fiscal consolidation in line with current fiscal plans and ensure compliance with the fiscal rule so that debt remains below the debt ceiling.**
The government appropriately drew down its sovereign funds from 10.1% in 2018 to 5.0% of GDP in 2023 to stabilise its economy. Adequate buffers in sovereign funds, especially the stabilisation fund, can facilitate the government response to shocks.	Gradually replenish the sovereign funds by setting structural balance targets that allow gradual building of the funds.
The fiscal rule was adjusted in 2023 to ensure that transitory revenue windfalls from lithium lease contracts are saved from 2024 onwards. The lithium industry will keep evolving and the fiscal rule will need to adapt.	Ensure that the fiscal rule is updated regularly to account for windfall gains and new developments in the lithium industry.
Chile faces substantial economic risks related to climate change. Chile's medium-term fiscal framework offers transparent planning and risk assessment over several years, but it does not include climate change risks systematically.	Incorporate climate- change mitigation and adaptation expenditures and revenue measures into the budget and medium-term fiscal framework, including the use of macro-fiscal forecasting and modelling tools.
Tax revenues of only 21% of GDP are insufficient to meet social demands while preserving necessary public investment in infrastructure, education, health, and climate change mitigation and preserving Chile's commitment to fiscal sustainability.	**Mobilise additional tax revenue through strengthening the tax administration and a comprehensive reform that raises more revenues from personal income taxes, reduces the tax burden on businesses, increases revenues from immovable property taxes, transitorily raises tobacco and environmental revenues, and gradually lowers regressive income tax deductions and exemptions.**
The government has identified scope for short term spending savings or reallocation of spending in several areas accounting for 0.1% of GDP.	Undertake regular and systematic public spending reviews following OECD best practices and ensure they are fully implemented and integrated in the budget process.
Chile has consistently shown a strong position in corruption indicators, but corruption cases in municipalities have been increasing. A National Strategy on Public Integrity and a reform on public procurement were adopted in 2023.	**Ensure the implementation of the new national strategy on public integrity and the public procurement law by clarifying institutional responsibilities, monitoring compliance, and enforcing penalties.**

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2 Enabling wider women's participation in the labour market

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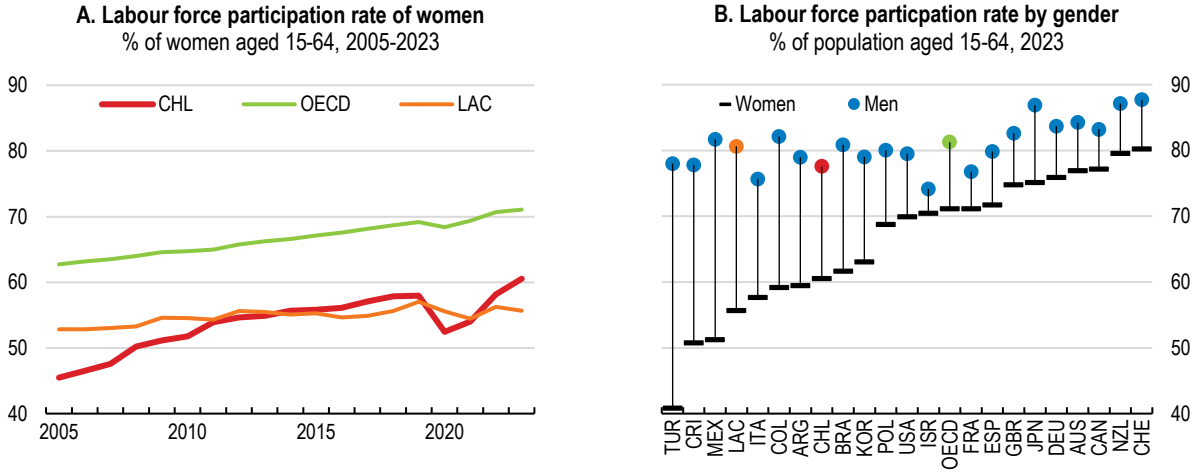
Social and economic inequalities persist in Chile between men and women, with significant gaps in labour market participation, earnings, and pension benefits. The Chilean government has targets to achieve higher gender equality; however, several challenges remain. To further facilitate women's participation in the labour market, including in better paid jobs, it is necessary to balance unpaid workloads between men and women, reduce education gaps in high-skill occupations and foster women participation in leadership positions.

Gender inequalities have declined in Chile but remain particularly visible in the labour market. The labour force participation rate among females increased from 45.3% in 2005 to 58% in 2019 recovering after the pandemic to reach 60.5% in 2023 (Figure 2.1, Panel A). Even though the labour force participation is higher than in other Latin American countries in 2023, it remains significantly below males' participation, of 77.6% and below the OECD average (Figure 2.1, Panel B). Gender equality has been a priority of different governments in Chile for many years, and notably of primary importance in this administration. Since 1994, governments have implemented policies for more equal opportunities between men and women through medium-term National Plans for Gender Equality, the most recent one an update published in 2023 (Ministerio de la Mujer y la Equidad de Género, 2023[1]) that have helped to narrow participation and wage gender gaps (Figure 2.2). Since coming into office in 2022, the current government has continued these efforts focusing on policies to facilitate women participation in the labour market, better combine work and care responsibilities, promote women in leadership positions and foster skills (Box 2.1, Table 2.1), however gaps persist in labour market participation, income and job quality.

Figure 2.1. Gender inequalities remain significant in the labour market



Note: LAC is a simple average of Colombia, Costa Rica, Mexico, and Brazil. Panel B: data for Argentina refer to the year 2021.
Source: OECD Labour Force Statistics.

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This chapter identifies policies to ensure more equitable opportunities for women to ultimately increase their well-being, boost economic growth and raise employment to lower future demographic pressures amid an ageing population in Chile. To achieve greater gender equality, Chile needs to increase women's participation in the labour market and foster female participation in better paid jobs to decrease income disparities (Box 2.2). This is especially true among women with care responsibilities, and those aged 55 and older, where gender differences are more remarkable. Despite the government's ample and well-directed initiatives and policies, additional efforts are needed to better balance unpaid workloads between women and men, reduce education gaps in high-skill occupations and foster women's participation in leadership positions across sectors. These efforts will ultimately decrease gaps in pay and pension benefits.

Box 2.1. Policies to promote women's participation in the labour market since 2022

Parental responsibility and childcare

- Since 2022, the parent who has not received their child's parental pension on time can request the pension withdrawal from the debtors' banking, investment, and pension accounts under specific circumstances.
- Increased the number of work leave days for parents of children or adolescents affected by a serious health condition.
- Introduction of a new regime of remote work and telecommuting for employees caring for children under 14 or individuals with disabilities or severe dependency.
- Labour regulations modified in 2023 to progressively reduce the working day from 45 to 40 hours per week and to provide flexibility to caregivers of children younger than 12 years old.
- The Sala Cuna para Chile bill (2024) aims to gradually expand childcare to all workers' children aged 0-2. All firms will be mandated to either provide childcare services or contribute financially towards them. They will have the option to access financial resources from a fund co-financed by new contributions from employers (0.2% of the taxable wages of all their workers) and the government (under discussion in Congress).

Women's protection

- Labour regulations were modified (2024) to prevent workplace harassment, sexual harassment, and violence against workers while companies and state bodies are required to develop protocols.
- Bill for the Creation of a National Care System (2024) that recognises the rights of caregivers, promotes programmes and services to reduce caregivers' workload, and facilitates access to training, capacity building and certification of care (under discussion in Congress).
- Promotion of wage equity through a bill (2024) requiring large firms to establish a committee for wage equity, to disclose gender wage gaps and to set up a plan for action to reduce wage disparities. It also allows workers, employers, and unions to directly raise concerns about wage inequalities to the Labor Directorate (under discussion in Congress).

Women in STEM

- The policy "Más Mujeres Científicas," launched in December 2023, seeks to encourage women's participation in STEM careers by offering additional slots only for women in these careers.
- The Ministry of Science, Technology, Knowledge, and Innovation has promoted gender parity through affirmative actions, and preferential quotas in master's and doctoral scholarships, both in national and foreign universities.

Gender representation

- Law approved in 2021 requires boards of public companies and state-owned corporations to have at least 40% of gender parity.
- Issuance of gender thematic bonds in 2023 linked to a commitment of 40% participation of women on corporate boards among companies by 2031. If the commitment is not fulfilled, coupons would increase 0.075% annually from 2034 until bond maturity.
- A 2022 bill was presented to Congress for mandatory gender quotas (40%) on boards of directors of corporations supervised by the Financial Markets Commission (FMC), with a gradual implementation (under discussion in Congress).

Table 2.1. Past OECD recommendations on gender

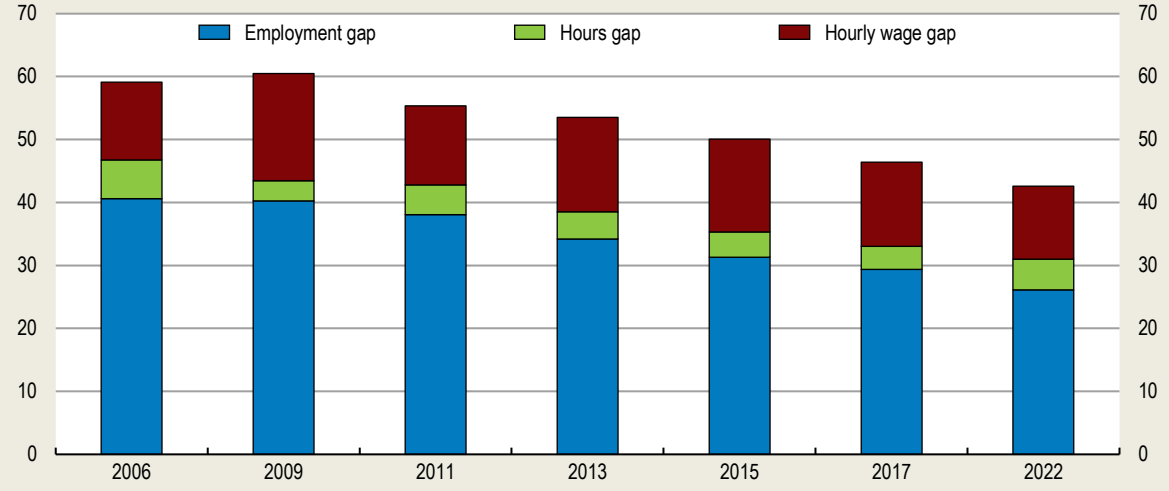
Past recommendations	Actions taken since the 2022 survey
Promote greater participation in STEM disciplines, especially among women.	Policy "Más Mujeres Científicas" encourages the participation of women in STEM careers.
Early childhood education is key for improving learning outcomes later in school, but funding is highly unequal across institutions. Female labour market participation is low, partly due to a lack of care facilities.	In May 2024 the government presented to Congress the bill "*Sala Cuna para Chile"*, that aims to expand childcare options for all workers' children aged 0-2, which would be co-financed with contributions from employers and government.
Align retirement ages for women and men and consider linking the retirement age to future increases in life expectancy.	The legal retirement age continues to be lower for women than men, however age requirement to benefit from the Minimum Guaranteed Pension is 65 years old for both men and women, regardless of gender and effective retirement age.

Box 2.2. Labour income disparities in Chile are mostly explained by low female employment

Gender inequality in Chile's labour market can be observed in the differences between men and women in employment rates, hours worked and payment per hour (Figure 2.2). The gender gap in labour income between men and women decreased from 2006 to 2022. The decomposition of this indicator shows that it is largely explained by the decrease in employment gap, followed by the hourly wage gap. This result highlights the relevance of continuing efforts to enhance women's incorporation into the labour market and foster female participation in better-paid jobs to decrease labour income disparities.

Figure 2.2. Decomposition of the gender gap in labour income in Chile

Percentage points, 2006-2022



Note: The decomposition divides the overall gender gap into the gender employment rate gap, the gender hours gap (e.g. the more intensive take-up of part-time work by women) and the gender hourly wage gap, as outlined in the OECD Employment Outlook 2018. The gender gap in income is defined as the difference between average annual earnings of men and women (20-64 years old) as a percentage of those of men. The population of reference includes all persons working at least one hour in the reference week even if they are engaged in informal activities but excludes unpaid family workers.
Source: OECD estimates based on CASEN.

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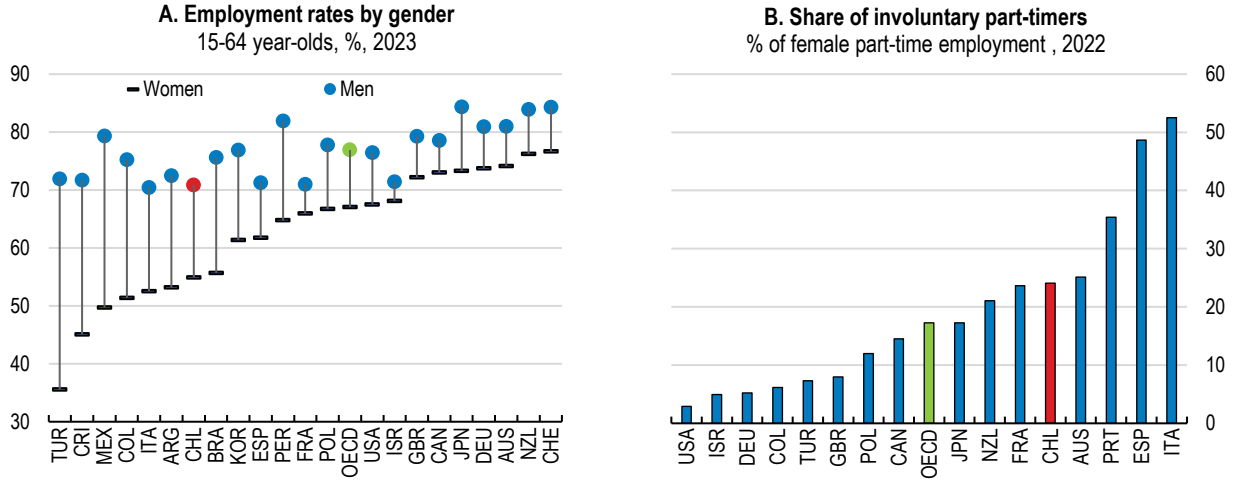
2.1. Economic benefits from closing gender gaps in the labour market

Gender equality can raise economic growth by increasing the size of the workforce and boosting productivity amid a better talent allocation. The female employment rate in Chile has been increasing over the years, and is above other Latin American countries, but remains 16 percentage points lower than the male rate, a gap much wider than the average of OECD countries (Figure 2.3). Moreover, evidence confirms that gender gaps in employment are significant across age groups, and even more among the older cohorts (21 percentage points for women between 25-54 years old, in contrast to 35 percentage points for women between 55-65 years old), which are also characterised by wider gender gaps in education and skills levels (OECD, 2021[2]). Gender gaps in unemployment and informality rates persist, though they are less pronounced than in participation and employment, at 1.5 and 7 percentage points, respectively. Efforts to reduce informality in general, and for women in particular, should remain a priority, as discussed in Chapter 1.

As in most economies, these disparities widen with parenthood as care responsibilities usually fall more on women (OECD, 2021[2]). In Chile, as of 2021, 44.5% of all couples with children under 15 years include one parent who does not work for pay, far higher than the OECD average of 25.9%. Recent survey data show that in Chile, 35% of women outside the labour market decide not to look for a job due to domestic and care work, as opposed to only 3.7% of men (CASEN, 2023[3]). At the same time, women spend between 2.2 and 2.8 times as much time on unpaid domestic and care work as men (Felipe, 2020[4]) while the OECD average is around 1.9 times. Part-time employment among women is twice as high as that of men in Chile, with a significantly higher share of involuntary part time employment among women than the OECD average (Figure 2.3, Panel B).

There are economic benefits from closing gender gaps in Chile's labour market by boosting the country's potential growth through a better allocation of resources and helping to alleviate the impact of an ageing population by increasing the labour force. Recent OECD estimates suggest that fully closing gender gaps in labour market participation and hours worked by 2060 would increase potential GDP per capita in Chile by more than 0.25 points on average per year, a greater improvement than in the average OECD country (Figure 2.4).

Figure 2.3. Important gender gaps persist in the labour market



Note: Data for Argentina refer to the year 2021.
Source: OECD Labour Force Statistics.

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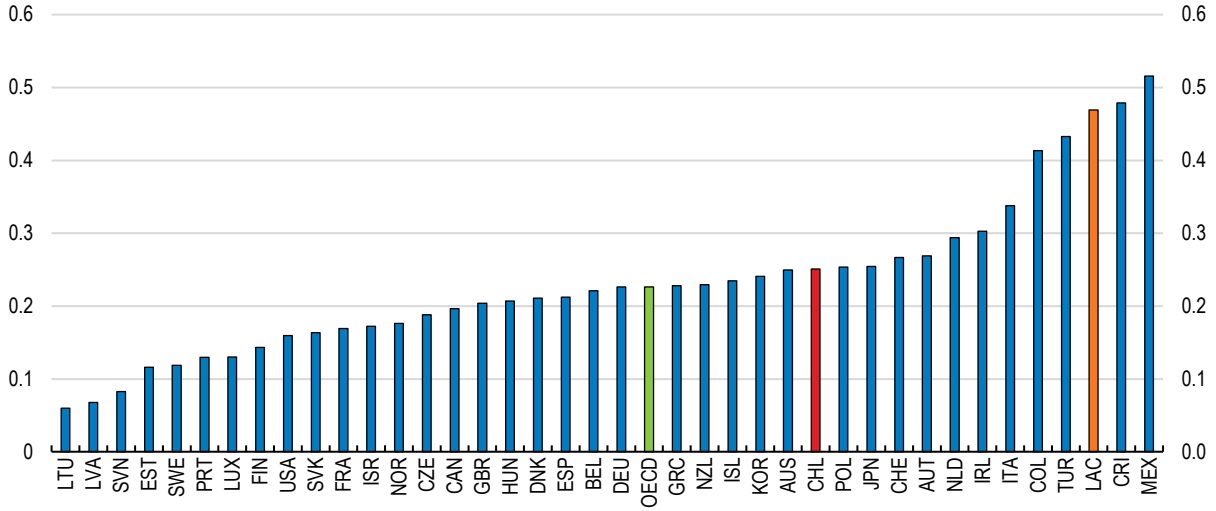
Figure 2.4. Chile could significantly gain from closing gender participation gaps in the labour market

Difference relative to the baseline in projected average annual rate of growth in potential GDP per capita



Note: LAC is a simple average of Colombia, Costa Rica, and Mexico. The simulation assumes that gender gaps in labour market participation and hours worked are closed by 2060; figures report the difference in potential per capita output growth relative to the baseline projection from the OECD Economics Department Long-Term Model; they refer to the average yearly difference in percentage points over the projection period; OECD refers to the simple average of 38 Member Countries.
Source: (Fluchtmann, Keese and Adema, 2024[5]) *Gender equality and economic growth: Past progress and future potentials*.

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2.2. Gaps in wages and pension benefits are the result of accumulated labour market disparities

Gender gaps in earnings and career advancement are the result of cumulative differences in employment rates, participation in part-time work, compensation, and work quality, which in turn affect women's financial autonomy and wellbeing. In Chile, the median wage gap among fully employed workers is around 15.4%, higher than the OECD of 11.5% and other Latin American countries (Figure 2.5, Panel A). This means that, in 2023 on average, a woman working full-time made around 85 cents for every peso a full-time working man makes at median earnings, as compared to the OECD average of 89 cents.

Motherhood, informality, and part-time employment accentuate income disparities among men and women. National estimates show that considering all workers, the average income gender gap is 10 percentage points higher for households with children under 3 years old, compared to households with no children or adolescents, while income gender gaps for informal workers are 1.6 times higher than for formal workers (INE, 2022[6]). A recent study found that gender labour earning gaps in Chile are five percentage points higher when accounting for workers in part-time, temporary, or informal jobs as compared to full-time permanent employed workers (IMF, 2023[7]). Increasing the number of women in full-time jobs could have a relevant impact on narrowing wage gaps, given the elevated involuntary part-time employment among women in Chile (Figure 2.3, Panel B).

Women usually work in lower-paying service sector jobs, while men are disproportionally employed in more lucrative jobs, adding to income inequalities. As an example, the three careers with the highest participation of women are basic education, early childhood education, and nursing, which have an average pay in the second year of graduation 42.1% lower than graduates from courses with a high

percentage of men, such as electrical civil engineering, and computer and information engineering (Ministerio de la Mujer y Equidad de Género, 2024[8]). Reducing stereotypes and encouraging more girls and women to choose higher-paid careers can alleviate future income disparities, as recognised in the "National policy for gender equality in STEM". Efforts to reduce gender stereotypes for both men and women should continue beyond STEM, by training teachers to become more mindful about gender attitudes and stereotypes, engaging the families in the process of creating gender-sensitive education, ensuring a proper implementation of the gender-neutral curricula, and promoting role models. For instance, Sweden provides training on gender-awareness for teachers and educators to reflect the gender equality objective included in its national curriculum (OECD, 2023[9]).

To reduce gender wage gaps and more specifically raise awareness about systematic pay differences within firms, pay transparency measures are increasingly used in many OECD countries (OECD, 2021[10]). Chile also requires firms in the financial sector to report wage gaps by gender for certain wage levels, and the government presented to Congress a bill to foster wage equity between men and women requiring large firms to establish a committee for wage equity, and to disclose both gender wage gaps and a plan for action to reduce wage disparities (Box 2.1). Fostering a culture of pay transparency across sectors could contribute to narrowing gender pay gaps and support underpaid workers to negotiate up their wages (Baggio and Marandola, 2023[11]). In the financial sector, where pay transparency is more prominent, additional actions can help decrease pay gaps even further, such as allowing individual workers to request pay information on comparable workers, encouraging the more widespread use of intentionally gender-neutral job classification systems, and improving the quality of reporting and follow-up action plans across firms (OECD, 2021[10]).

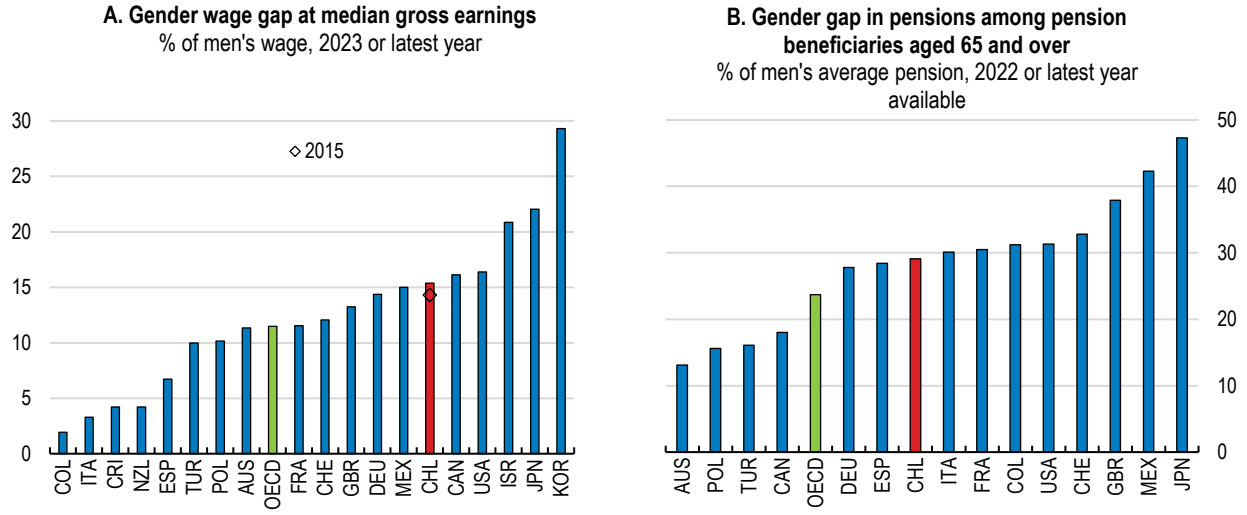
Income disparities continue accumulating over the life cycle and are reflected in pension gaps, that are important sources of inequality and increased risk for old-age poverty. At 29%, gaps in pension benefits between men and women are lower than in other Latin American countries, but still above the OECD average of 23.7% (Figure 2.5, Panel B). Several reasons explain why women have lower pension benefits in Chile. First, women contribute fewer years due to intermittence in labour market participation, informality, maternity, elder care responsibilities, and higher loads of unpaid work. Second, women have lower wages than men. Finally, women retire on average earlier than men and live longer.

Several policy measures have contributed to narrow the pension gaps over the years, including a grant per child to recognise unpaid caregiving (OECD, 2022[12]) and the minimum guaranteed universal pension (MGUP), in place since early 2022, which increased replacement rates and coverage particularly for women (Superintendencia de Pensiones and DIPRES, 2024[13]). The pension reform proposal (Chapter 1), currently under discussion, envisages further increases in the MGUP of around 17% to USD 272, which might help reduce pension gender gaps even further (Superintendencia de Pensiones and DIPRES, 2024[13]; OECD, 2022[12]).

Despite progress, women continue having lower pension benefits than men and low pensions in general (Superintendencia de Pensiones and DIPRES, 2024[13]). The significant pension withdrawals in 2020-2021 translated into lower benefits for retired women compared to men, while pension balances for women decreased further than for men, adding strains to women's retirement conditions. In Chile, the legal retirement age for men, at 65 years, is higher than for women, at 60 years. Even though effective retirement ages are higher for both, women retire earlier on average than men (62 for women and 66 for men). At the same time, life expectancy is five years higher for women, which also implies lower self-financed pensions as women's accumulated assets are lower than men's. Chile would benefit from gradually aligning the legal retirement ages of women and men, as recommended in the 2022 OECD Economic Survey of Chile (OECD, 2022[12]), while promoting the labour force participation of women, as discussed in this chapter. Beyond that, Chile could also consider linking retirement ages and life expectancy, as recommended in the 2022 OECD Economic Survey of Chile, following the example for several OECD countries, such as

Denmark, Estonia, Italy, the Netherlands, and Sweden, where retirement ages are legally linked to life expectancy (OECD, 2023[14]).

Figure 2.5. Earning and pension gaps between men and women are significant



Note: Panel A: Data refer to full-time dependent employees; data for Chile refer to the year 2022.
Source: OECD Employment and Labour Market statistics database; OECD Pension at a glance 2023.

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2.3. Reducing barriers to full time employment of women

Women across OECD countries continue to encounter barriers to enter employment, particularly full-time. The burden of dual work-family responsibilities, traditional gender roles, and the absence of affordable childcare options inhibit many women to work full-time, especially once they become mothers (OECD, 2023[9]).

2.3.1. Uneven care responsibilities widen gender disparities over the life course

In Chile, as elsewhere, career breaks around the age of childbirth account for a large fraction of earnings shortfalls women experience after childbirth, and an overall drop in job quality (Eberhard, Fernandez and Lauer, 2023[15]). Chile has significantly lower maternal employment rates than the average OECD country (60% and 71%, respectively), particularly for women with young children (Figure 2.6). Although mothers of young children generally only withdraw temporarily from the labour market, they will more likely work part-time or informally when they return (OECD, 2021[2]).

The low access to affordable and quality childcare, particularly for children aged 0-3, hinders women's full integration into the labour force. High-quality early childhood education has benefits for children and parents. First, better early childhood education has a positive effect on children's well-being, learning, and development in the first years of their lives, particularly for children from disadvantaged families (OECD, 2023[16]). Second, it facilitates women's integration into the labour market (Martínez and Peticará, 2017[17]). Although Chile has a mix of private and public provision of childcare, only half of 3-year-olds and only one third of 2-year-olds are enrolled in early childhood education (OECD, 2023[16]), and in many cases with limited hours not compatible with working hours.

Empirical studies for Chile have found that *Sala cuna*, a childcare system in place for more than a decade, has not been enough to incentivise women to enter the labour market and has negatively affected women's salaries in large companies (Prada, Rucci and Urzúa, 2015[18]). *Sala cuna* is financed by medium and large firms that have the obligation to provide childcare services to female employees if they employ more than

20 women. This obligation discourages employers from hiring women formally beyond the threshold and leaves women working for smaller or non-complying employers.

Past studies on gender disparities in Chile (OECD, 2021[2]) and the previous OECD Economic Survey of Chile (OECD, 2022[12]) have recommended the creation of a universal childcare system and abolishing the size threshold of firms hiring more than 20 women to provide childcare. The government presented a bill in early 2024, to gradually broaden a childcare system "Sala Cuna para Chile" for all formal workers' with children aged 0-2. The bill states that all-size firms should provide childcare options and foresees three possibilities for firms. First, companies can open a nursery in their premises, as it exists today for large firms. Second, companies can associate with other employers in the same sector or premises to set up a joint nursery (also exists today). Finally, companies can contribute to pay the nursery for their employees, and the law sets up a minimum contribution. Companies can finance the provision of childcare through a new fund that will be co-finance through new contributions from employers (0.2% of the taxable wages of all their workers) and government (see Chapter 1).

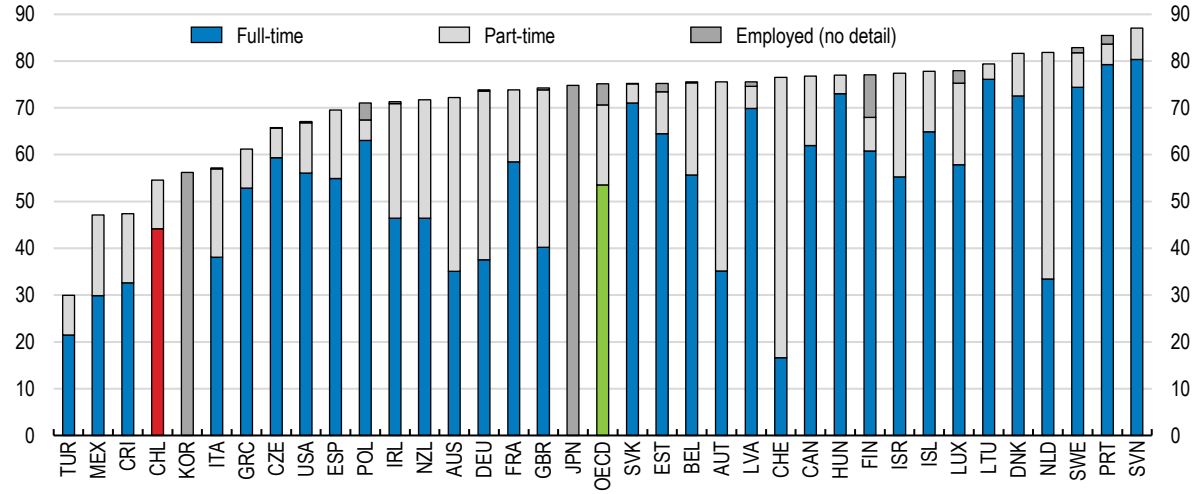
As the bill expands the obligation for all firms to provide childcare regardless of the number of employees, efforts should focus on facilitating that firms can fulfil this new requirement, especially SMEs. Issuing administrative guidance and helping firms to effectively use resources from the fund to pay for the requirement could minimise administrative burdens. Moreover, proper monitoring is also needed to check whether this new requirement decreases formalisation incentives. Finally, demand of public childcare is likely to increase with this bill as workers can opt to send their children to public nurseries, hence it should be advisable to gradually open new public high-quality day-care centres, as envisaged by the government, giving sufficient time to train and hire qualified personnel. In addition to expanded care options for pre-school children, families need more options for qualified after-school care. Empirical analysis found that increasing access to after-school care can raise female labour force participation in Chile (Martínez and Peticará, 2017[17]).

Parental leave systems support mothers staying in work and re-entering the labour market after childbirth. If these parental policies are well designed, they can also help at reducing stereotypes and implicit burdens women face in the workplace which affect their career paths after childbirth. Paid parental leave in Chile is significantly shorter for men, who can only take a total of 5 days, than for women, as new mothers can take the equivalent of 30 weeks of paid parental leave, with the possibility to transfer part of this entitlement to the father. Even though Chile has parental leave that either men or women can benefit from, few fathers take the leave, as in other countries (OECD, 2023[9]). To decrease the implicit costs of hiring women, rebalance gender norms, and encourage fathers' greater participation in care work, Chile could gradually increase reserved paternity leave weeks for fathers. Eight countries, including Canada, Denmark, and the Netherlands, introduced earmarked and nontransferable rights of leave for fathers or increased incentives for both parents to take leave (OECD, 2023[9]).

Teleworking options can help mothers remain in the workforce. In 2023, Chile amended the Labour Code by introducing a new regime for remote work and telecommuting arrangements for employees caring for children under 14 or individuals with disabilities or severe dependency (Box 2.1). This adjustment is welcome, however the use of telework is more predominant among women, which continues to reflect prevailing gender norms and management cultures, that do not necessarily work to the advantage of women. Some governments have recently strengthened teleworking regulations and expanded the rights of all workers to request flexible work arrangements regardless of care responsibilities (for instance Canada, Greece, Lithuania and Spain). Expanding teleworking facilities to all workers whose jobs allow it, can reduce the stigma with colleagues and employers for women to use these work options. However, policies must ensure that these arrangements do not carry negative effects on careers and pay. The government can promote that teleworking options are accompanied by other measures such as managerial training, policies promoting equal career opportunities between teleworkers and office workers and policies aimed at increasing telework take-up among men and non-parents (OECD, 2023[9]).

Figure 2.6. Maternal employment rates are low in Chile

Employment rates by part-time/full-time status of women aged 15-64 with at least one child aged 0-14, 2021 or latest available year



Note: Data for Chile refer to the year 2022.
Source: OECD Family database; CASEN.

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Taking care of the elderly also relies mostly on women. Around 86% of elderly care relies on female family members, particularly daughters and wives in Chile, adding layers of difficulties for women with unpaid long-term care responsibilities to join the work force and obtain higher economic autonomy. Chile would benefit from further expanding, geographically and across income groups, the *Chile Cuida* programme, which is the social protection programme for dependent people and their caregivers. In June 2024, the government presented a bill to Congress that aims at expanding it throughout the Chilean territory with the National Care System Reform (Box 2.2). Also, it recently introduced some adjustments to the programme, such as the creation of a caregivers' registry to target benefits and to expand in house- provision of elder care.

2.3.2. Strengthening skills and facilitating lifelong training

Individuals with higher levels of education typically have a higher probability of being employed and earning a higher income. In Chile there are no substantive differences in terms of school enrolment between boys and girls, but 2023 PISA results suggest that there are gender differences in performance (OECD, 2023[19]). Boys outperform girls in mathematics by 16 score points as compared to 9 points on average in the OECD, while in reading, girls, on average, score above boys, in-line with the OECD.

Even though education and skills disparities may seem low at early ages, these accumulate over time as women tend to make educational choices (vocational and tertiary education) that result in them entering occupations with lower expected earning, compared to men. These disparities are ultimately reflected in aggregate gender wage gaps and perpetuate gender stereotypes about career choices. Gender stereotypes as well as the absence of role models play a key role in determining both boys' and girls' field of study choices and career expectations. Through the "National policy for gender equality in STEM" Chile set a roadmap to eradicating gender stereotypes in education from an early age. Moreover, several initiatives are in place to expose girls to STEM careers, however these have limited scope, and take place outside the formal education system (CNEP, 2023[20]). Further efforts are needed to provide career guidance, expose girls and boys to a diversity of careers from a young age before they form stereotypes and make educational choices, train teachers to become more mindful about gender attitudes and

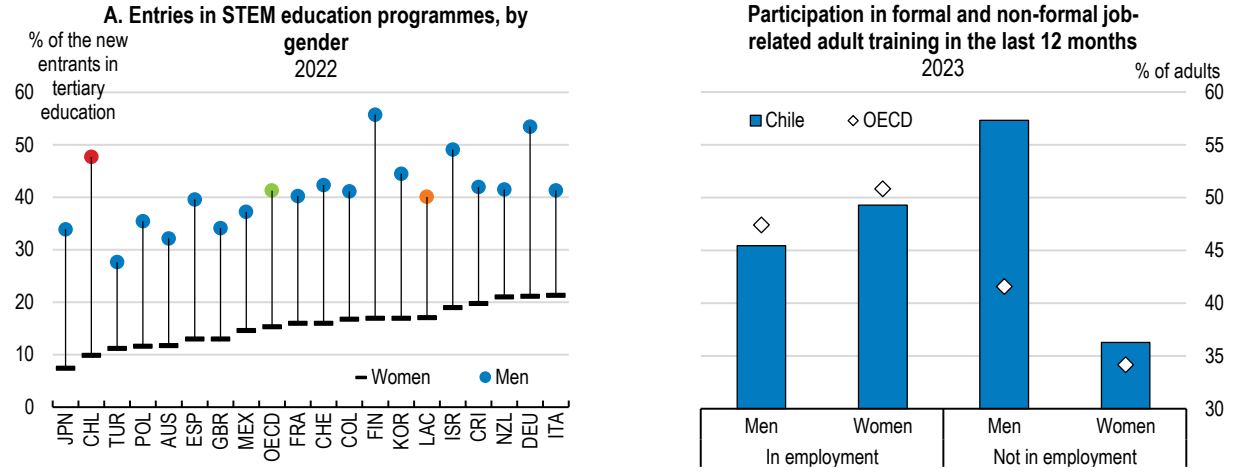
stereotypes, as explained above, and to incorporate STEM-related career courses in the formal education system.

In Chile, a slightly higher share of young women than men are university graduates, but women enrol less in STEM, digital and other high-return skills formation than men. The percentage of women entering tertiary STEM education programmes in Chile, at 10%, is among the lowest within the OECD, and even below the Latin American average of 18%. These low levels contrast with the 47% of men entering tertiary STEM education programmes in Chile which translates in one of the highest gender gaps in the OECD (Figure 2.7, Panel A). Few women studying STEM not only sustain gender pay gaps, with women less likely to enter high-wage jobs, but it also affects women's future job prospects, as the skills learnt in these programmes are particularly relevant for workers to benefit from the digital and green transitions (See Chapters 3 and 4).

Chile has several initiatives to increase women's participation in STEM and higher productivity activities (Box 2.1) by offering additional slots only for women in these careers and promoting women in master and doctoral programmes, with the guarantee that a minimum percentage of admitted students are women (affirmative action measures), along with dedicated scholarships for women. Empirical evidence supports a positive impact of affirmative action on women's enrolment in STEM careers in Chile (Bastarrica et al., 2018[21]), hence these programmes are welcome and should be expanded across the country. However, steps should also be taken earlier in the education system to boost a broader exposure to applied STEM courses in upper-secondary tracks, which are positively associated with enrolment and retention in STEM higher education programmes in Chile (Sevilla, Luengo-Aravena and Farías, 2023[22]).

Increasing participation in adult training can help to improve the skills of adults more generally, but specifically for women not in employment in Chile, who exhibit lower participation in adult training than men (Figure 2.7, Panel B). Greater participation in adult education and training can help women be better prepared for changes in skill needs brought about by the green and digital transitions (Chapters 3 and 4). To encourage greater participation amongst women, Chile can review current adult training courses, such as those offered by *Sence* (Training Service from the Ministry of Labour and Social Security), and gradually incorporate additional short and flexible options while facilitating access by gradually covering the direct and indirect costs of training for instance through subsidies and by providing childcare, to reduce overall time and resource related barriers (OECD, 2023[23]).

Figure 2.7. Women's skills can be enhanced to better confront the digital and green transitions



Note: LAC is a simple average of Colombia, Costa Rica, and Mexico. STEM refers to Science, Technology, Engineering, Mathematics.
Source: OECD Education at a Glance database; OECD Survey of Adult Skills (PIAAC, 2023).

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2.3.3. Further promoting female entrepreneurship

Entrepreneurship plays an important role in job creation, and in 2023, Chile ranked as the top country with early-stage entrepreneurial activity for both men and women, followed by Colombia and Mexico, while the entrepreneurship gender gap significantly narrowed between 2021 and 2023 (GEF, 2024[24]). Despite this remarkable improvement, with the vast majority (98.2%) of entrepreneurs in Chile being micro entrepreneurs (i.e., they start a firm with less than 10 workers), female micro entrepreneurs are more represented in the informal sector than men (69.5% vs. 62.3% in 2024) (OCEC UDP – ChileMujeres, 2024[25]). Micro enterprises tend to be less profitable, therefore policy efforts to increase labour market formalisation should continue (as mentioned in Chapter 1), to improve the business prospects of female entrepreneurs.

Women face higher barriers to entrepreneurship than men, even though Chile does not face second-earner tax distortions that could hinder taking a job or opening a firm. One of the main barriers stems as a side effect of a very restrictive marital law, which implies that for married women under the marital partnership scheme, it is difficult to start or close a business as they cannot access their collateral without the consent of their husbands, which undermines creditworthiness (OECD, 2021[2]). To facilitate female entrepreneurship, it is necessary to reform the marital law to abolish the default rule that foresees that the husband administers the marital property which reduces the wife's capacity to raise collateral.

Female entrepreneurs are less likely to seek funding to grow their business and they tend to use less strategically financial products (Piedrabuena, 2023[26]), even though financial skills and access to financial and credit products are similar between men and women. Differences stem from how intensely and what type of financial services women use (CAF - CMF, 2023[27]). To enhance women's strategies in dealing with financial matters and encourage take-up of financing, it is desirable to offer entrepreneurship-training courses for women that place greater emphasis on when to seek credit or other private or public-sector funding and how to go about obtaining it. The design of such programmes should pay attention to certain day-to-day needs, such as women's time schedules, and the need for assistance at home. Several OECD countries have implemented entrepreneurship training programmes for women, like the Women in Rural, Regional and Remote Enterprises (WiRE) programme in Australia, where participants reported an increase in entrepreneurship skills (OECD, 2023[9]).

2.3.4. Fostering female leadership in corporations and the public sector

Women leaders in corporations bring unique perspectives to the workplace, enhance decision-making diversity, and act as role models, which contribute to a pipeline of future female leaders. Recent data suggests that the percentage of women in leadership positions in the private sector has slightly grown since 2020, but most leadership positions are still occupied by men. For instance, in Chile, around 40% of workers in financial sector firms, are women but women representation decreases as the level of responsibility increases, with only 15% of female directors. In 2023, women represented only 23% and 15.9% of managers and directors among private institutions, suggesting that "leaky pipelines" persist (Ministerio de Hacienda, Ministerio de Economía Fomento y Turismo, Fundación Chile Mujeres y OIT, 2024[28]). The bill "*Más Mujeres en Directorios*" currently under discussion in Congress (see Box 2.1) establishes that persons of the same sex may not exceed 60% of the total number of board members, with a transition period of six years to comply with this requirement, and a commitment to regularly evaluate the policy. The bill is welcome and should be approved to boost women's participation in leadership positions. Increased transparency requirements in firms to disclose inclusion goals, progress, and payment information by gender would help to complement those efforts.

Women are better represented in the public sector and politics than in the private sector. About 23% of the members of Congress are women, yet still below the OECD average (33%) in 2022. Women's representation at the ministerial level has also increased to 58% in ministry cabinets, similar to the OECD average of 57% in 2023. This is the result of several initiatives that took place in Chile in the last years to

promote parity in leadership positions in the public sector and in politics, including hiring and promotion processes that follow diversity and inclusion policies, training, and mentorship programmes to create leaders in the public sector, and women networks.

Table 2.2. Main findings and recommendations

Main Findings	RECOMMENDATIONS (Key recommendations are bolded)
Women have lower pension benefits than men partly due to higher legal and effective retirement ages for men than women, while life expectancy is higher for women. This implies lower self-financed pensions for women.	Gradually align legal retirement ages of women and men, while promoting the labour force participation of women.
Women's labour force participation has increased but remains significantly below males', and women perform most unpaid work. Low access to affordable and quality childcare and after school care, makes entering and staying in the labour market more difficult for women. A new government bill aims at expanding childcare for formal workers with children aged 0-2.	**Eliminate the rule to provide childcare for companies employing more than 20 women and gradually expand formal high-quality early childhood education and after-school care, prioritizing lower- and middle-income families.**
Elderly care relies on female family members, increasing barriers for women to land a paid job. The government presented a bill that aims at expanding elderly care options.	Continue expanding, geographically and across income groups, the *Chile Cuida* programme.
Income disparities between men and women have fallen but remain significant. To identify systematic pay gaps, firms in the financial sector must report payment gaps information. A wage equity bill is in Congress since mid-2024.	Promote pay transparency measures across sectors.
Paid parental leave is shorter for men than women and few men take it.	Gradually increase reserved paternity leave weeks for fathers.
Given that most of those who request to telework are women, it could perpetuate stereotypes in the workplace with negative effects on careers and pay.	Complement teleworking regulations with measures that promote equal career opportunities for men and women independent of physical office presence.
Adult online and flexible training options exist in Chile, but adult training among women not in employment is low compared to men, impacting wages and employability.	Review current adult training courses and gradually incorporate additional short and flexible options while facilitating access by gradually covering training costs.
Chile has implemented policies to boost women participation in STEM, but the percentage of women entering tertiary STEM education is among the lowest in the OECD.	Provide career guidance and expose girls to a diversity of careers from a young age before they form stereotypes and make educational choices. Train teachers to support gender neutral practices. Encourage women to take applied STEM courses in upper-secondary education to boost enrolment and retention in STEM programmes.
Married women under the *marital partnership* face challenges to raise collateral because a marital law foresees that the husband administers the marital property, increasing barriers to women entrepreneurship.	Abolish the rule that foresees that the husband administers the marital property.
There are no gender gaps in financial skills, but female entrepreneurs are less likely to seek funding and to use financial products strategically.	Provide dedicated training schemes, coaching and mentoring to women focusing on financial strategies to support the growth of female-led enterprises.
Women participation in corporations is mainly concentrated in the lower hierarchical levels. A new law seeks to establish gender quotas in boards.	Promote women's participation in leadership positions in the private sector, accompanied by increased transparency requirements in firms to disclose inclusion goals, progress, and payment information by gender.

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3 Accelerating productivity through digitalisation and innovation

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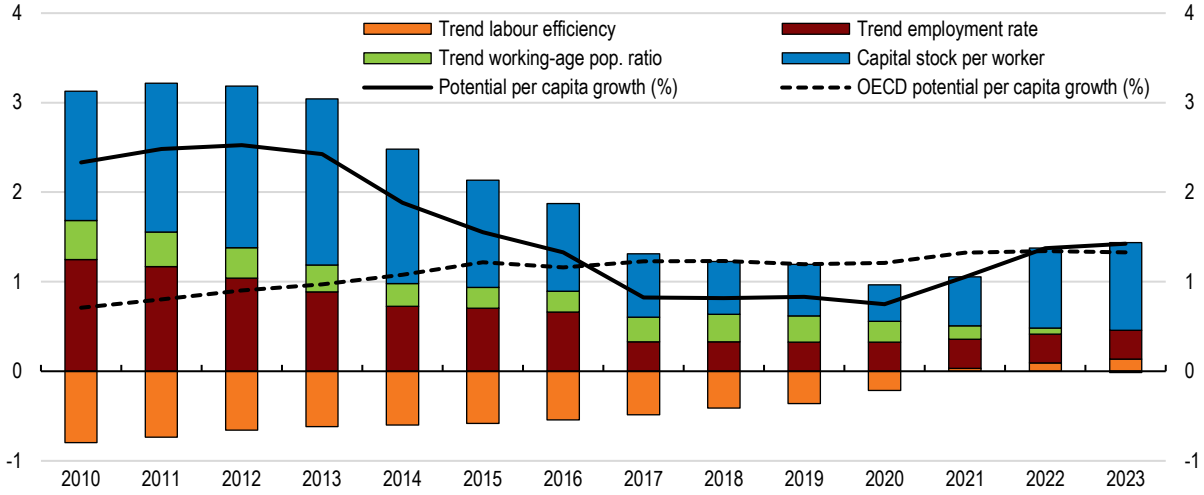
Over the last decade, Chile's potential growth has decelerated, partly due to declining total factor productivity. To further reap the benefits of the digital transformation and to leverage new tools such as artificial intelligence to boost productivity and growth, Chile needs to improve enabling factors including digital infrastructure and connectivity, pro-competition regulatory settings, skills and a more inclusive digital diffusion.

3.1. The economy's growth potential has declined in the last decade

Over the last decade, Chile's potential growth has decelerated, productivity has been stagnant or even decreasing and the contributions of employment and capital to potential growth have declined (Figure 3.1). A rapid process of population ageing will reduce Chile's labour force over the next years, and with that the economy's growth potential. Despite some expected beneficial effects from recent immigration, the ratio of working age population to people over 65 in Chile will be 2.3 times in 2050 compared to 5.3 times in 2022, while in Latin America and the OECD, this rate will decrease from 8.4 and 3.6 in 2022 to 4 and 2.2 in 2050, respectively (OECD/The World Bank, 2023[1]). Therefore, potential growth and Chile's long-term growth will likely decline unless productivity and investment increase. Chile can leverage the digital transformation to lift productivity across industries and promote the diffusion of knowledge across firms taking advantage of its good digital connectivity, its attractiveness to digital investors, and new technologies like artificial intelligence (AI). A more dynamic innovation environment could help address productivity and environmental challenges and leverage the opportunities created by the green transition, including the development of the lithium and hydrogen industry (Chapter 4).

Figure 3.1. The economy's growth potential has fallen in the last decade

Decomposition of potential output per capita growth, percentage points



Source: OECD Economic Outlook database.

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Chile has progressed in several digital aspects over the past decade. Mobile broadband penetration and fibre optic deployment have increased significantly since 2010, and so has the use of digital tools among enterprises (Cámara de Comercio de Santiago, 2023[2]). Some policies since 2022 aim at improving digital skills and promoting financial and electronic payments (Table 3.1). Chile has also become one of the main hubs for data centres in Latin America, with the potential to keep growing (InvestChile, 2023[3]). The government is developing a National Data Centre Plan (2024-2030) that aims at creating public-private partnership agreements to deploy new data technologies, such as artificial intelligence, and to set guidelines and measures to create favourable investment conditions.

Several challenges remain, however, as Chile's overall digital development remains below the OECD average (Figure 3.2). Even though internet access has improved over the years, getting closer to the OECD average, some gaps persist (Figure 3.2). Internet access is lower among households living in rural areas (85%) than among households in urban ones (95%). A similar divide exists between low income (89.6%) and high-income households (99.8%) (CADEM, 2023[4]), although more low-income households have internet access compared to the OECD average. The use of digital tools is low among small firms, business innovation remains low and digital skills gaps are significant. There are also persistent

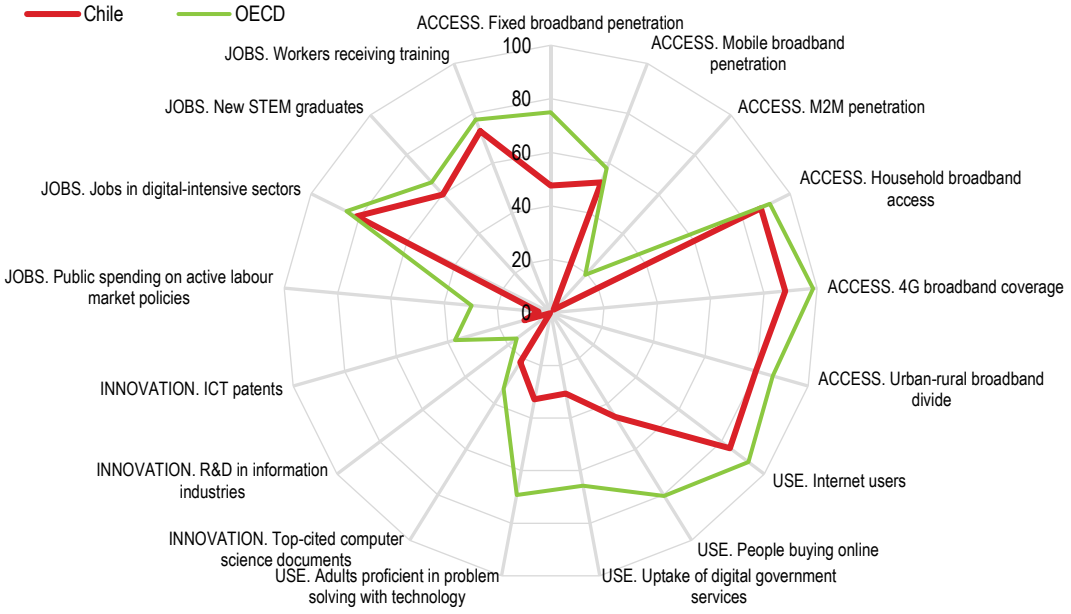
productivity gaps between a very small number of large and productive firms and a long tail of small and midsize less productive firms (OECD, 2022[5]), while the uptake of digital government services is relatively low (Figure 3.2).

To further reap the benefits of the digital transformation and to leverage new tools such as AI to boost productivity and growth, Chile needs to further improve its digital enabling factors including infrastructure, connectivity, pro-competition regulatory settings, adequate population skills, and foster a dynamic innovation environment. Further actions are also needed to improve government digital services, policies to boost adoption and diffusion of digital tools to drive productivity growth in firms, especially SMEs, and set a secure digital environment. This chapter identifies key priorities for action and recommendations across these areas, building on the OECD's Going Digital project (OECD, 2024[6]), the OECD Artificial Intelligence Policy Observatory (OECD, 2024[7]), and past OECD Economic Surveys of Chile (OECD, 2021[8]).

Table 3.1 Past OECD recommendations on digitalisation

Past recommendations	Actions taken since the 2022 Survey
Streamline permits and their process by implementing a zero-licensing procedure to encourage investment and simplify regulations for SMEs.	A law bill to reform regulatory procedures and make them more expedite is under discussion in Congress, including a one-stop-shop for all sectoral authorisation requests.
Boost public support to SMEs, in cooperation with the private sector, through targeted programmes to facilitate the adoption of digital tools.	Courses for workers and small enterprise owners have been created to increase the adoption and usage of the digital tools, especially in management and productivity.
Ensure low barriers to entry to the communication sector by replacing the existing regulation for concessions.	The approval of the Law of Internet as a Public Service allows providers to use concessions for services different than the originally specified, granting more flexibility and lowering entry barriers.
Monitor closely the competition in the financial and electronic payment sector and take further actions if needed.	A new FinTech and open banking law, published in 2023, established a regulatory and legal framework for FinTech companies to operate in Chilean financial markets.
Promote ICT programmes for the high-skilled jobs involving the private sector in the design of curricula and needs.	Public-private partnerships that promote ICT programmes like the Training Service from the Ministry of Labour and Social Security (Sence) and Fundacion Chile have expanded.

Figure 3.2. Chile's digital development is below the OECD average



Source: OECD Going Digital Toolkit.

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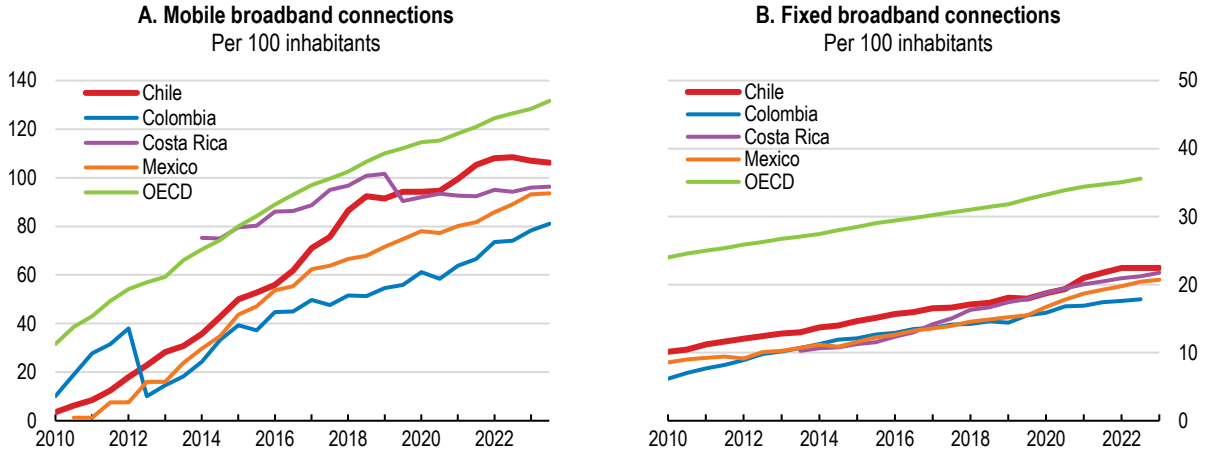
3.2. Closing connectivity gaps

Chile has one of the highest internet penetration rates in the Latin American region (OECD, 2024[9]) even if it still lags behind the OECD average (Figure 3.3). Speed connectivity has also increased with around 69% of fixed broadband connections being fibre optic connections in 2023, above the OECD average of 41% (OECD, 2024[9]). Investments in connectivity, storage, and safe data transmission have also increased since 2016 (InvestChile, 2023[3]). Moreover, its technological infrastructure has expanded, including the installation of the first underwater fibre optic cable that connects California with Valparaíso in 2019, a cable that connects the US and Chile through Central America, and the start of the installation of the Humboldt Trans-Oceanic Cable, in 2023.

Figure 3.3. Chile has increased broadband connections in the last decade



Source: OECD Broadband statistics.

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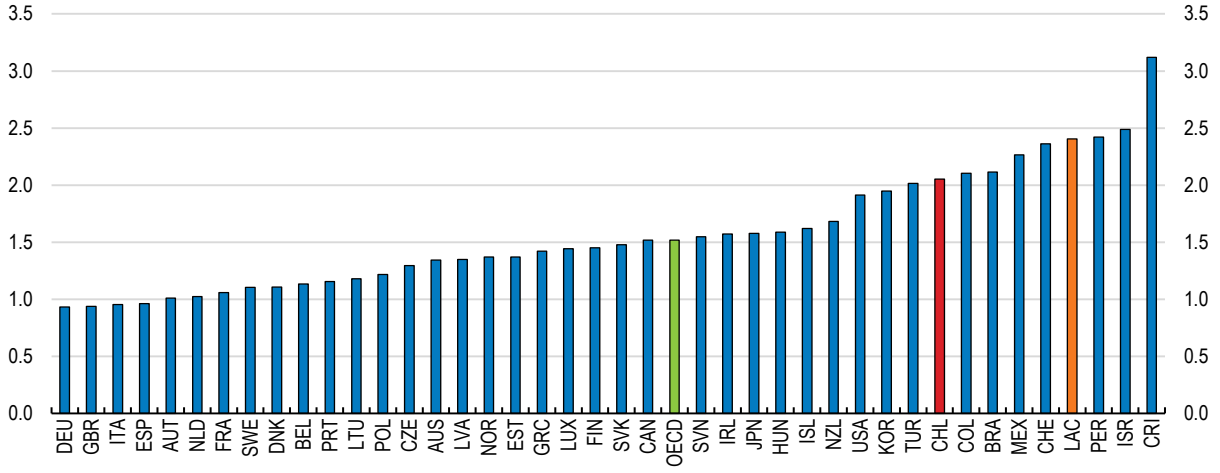
The government has launched a "2022-2025 zero digital gap" plan to further close connectivity gaps among regions. The goal is that fibre optic deployment reaches 100% of communes by 2025. A new law approved in July 2024, classifies internet as a public service, grants subsidies to the most vulnerable families to pay their internet bills and develops a connectivity registry to identify the connectivity status of households to facilitate internet provision. To narrow the gaps between urban and rural areas, licence obligations in the latest 5G bidding contest required to meet strict coverage conditions in rural areas. Despite these efforts and requirements to expand connectivity in rural areas, implementation remains burdensome and lengthy, particularly at the municipal level (CNEP, 2024[10]). Chile has continued the bidding for 5G Spectrum (band 3.5 GHz) in 2023 and 2024.

To further promote the deployment of infrastructure for fixed and mobile communications, important barriers to entry in the telecommunication sector need to be lowered (Figure 3.4). These barriers occur because of the existence of various cumbersome regulations which make it difficult for operators, especially incoming ones, to deploy their infrastructure and networks. The existing regulation for concessions needs to be eliminated, as recommended in previous Economic Surveys of Chile (OECD, 2021[8]). Adopting a single licencing regime that authorizes operators to provide all communication services throughout the entire Chilean territory (OECD, 2021[8]), would facilitate potential new operators to enter the market and incumbent operators to engage in new communication services.

Figure 3.4. High barriers to entry in the telecommunication sector remain

Barriers to entry in network sectors, index scale from 0 (least complex regulatory procedures) to 6 (most complex regulatory procedures), 2023



Note: LAC is a simple average of Colombia, Costa Rica, Mexico, Brazil and Peru.
Source: OECD 2023-2024 PMR database.

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3.3. Enhancing skills to make better use of digital technologies

Taking full advantage of the digital transformation requires that individuals have good foundational skills, the ability to navigate technology-rich environments and to use internet in a variety of ways. Complementary skills, such as communication, creativity, or working with others are also relevant for the digital transformation (OECD, 2024[11]). Many Chileans lacked the necessary skills to succeed in a digital world in 2023, with only 11.7% of adults proficient at problem solving in technology rich environments, well below the OECD average of 32.3%, and 41% of the employed adults who consider themselves as under-qualified for their job report inadequate proficiency in computer or software skills, close to the OECD average of 42% (OECD, 2024[12]). Even though internet use is high, it is mostly for recreational purposes. Productive use of the internet is low, 86.4% of users use it to obtain information, the most basic digital skill, but only 34.4% of users do online transactions and online procedures, and 30.3% use the internet for educational activities (CNEP, 2023[13]).

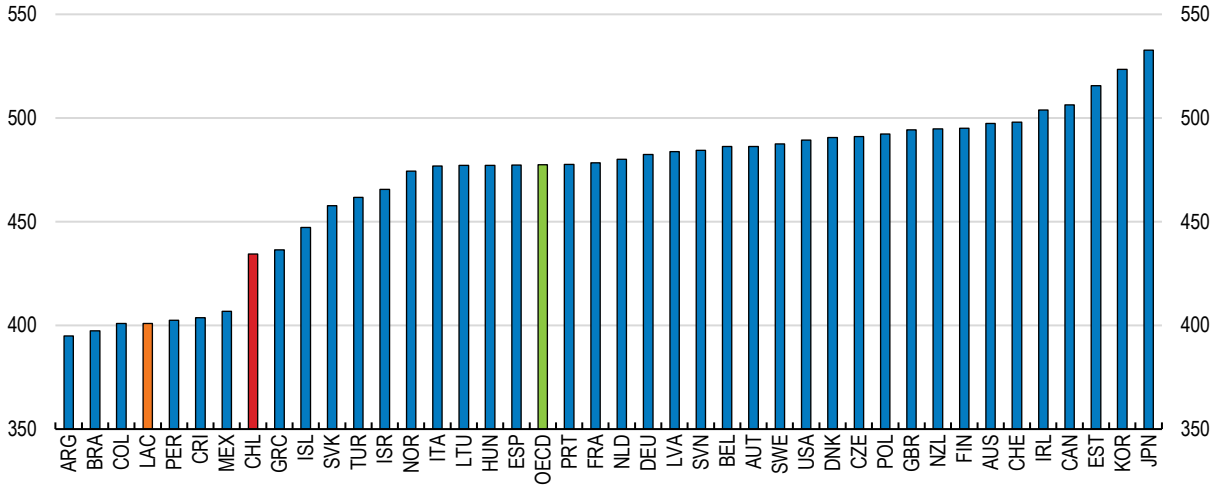
Good foundational skills are a precondition for developing digital skills. Even though improving access to high-quality education has been a key government objective for many years, literacy and numeracy skills are low among Chilean students, even if they are above other Latin American countries (Figure 3.5) (OECD, 2023[14]). Furthermore, Chile has many initiatives to expose children to STEM-related areas, but their scope is limited (CNEP, 2023[13]). The national curriculum which already includes the teaching of computer skills is currently under revision. Within this revision, more emphasis should be placed on developing digital skills beyond the simple use of computers, such as computational thinking and coding skills.

Adults' skills for the digital economy are low in Chile. Around 50% of workers in Chile are in jobs that have a high probability of being impacted by automation technology (OECD, 2021[8]), and many of them will need to be able to work with digital technologies. Moreover, Chile's green transition plans require sufficiently skilled workers to set up, operate, and improve equipment based on novel technologies, some of them still in development. Several initiatives have been implemented in Chile to boost training among adults. For instance, the programme, *Talento Digital para Chile (*expanded in the last years), brings together companies, training institutions and the government to help the unemployed gain digital skills to

find jobs and evidence suggests that it significantly increases employability among participants (Neilson, Egaña and Humphries, 2023[15]).

Figure 3.5. Foundational skills are low among Chilean students

Mean PISA score in mathematics, reading, and science, 2022



Note: LAC is a simple average of Colombia, Costa Rica, Mexico, Argentina, Brazil, and Peru.
Source: OECD, PISA 2022 Database.

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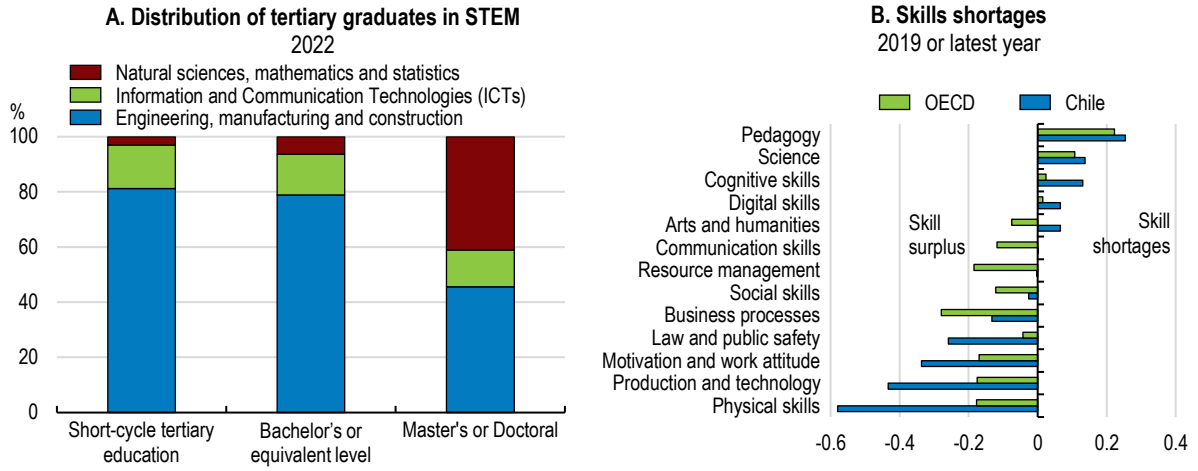
The training system is fragmented, leading to a diversity of programmes with similar purposes and target populations. Agencies lack coordination with each other, resulting in unconnected efforts among different public agencies (OECD, 2021[8]). Given the rapidly changing tech environment, Chile would benefit from consolidating current training initiatives and regularly evaluating training programmes to identify those courses that lead to an increase in wages and offer the greatest economic value, as Israel does. Also, expanding the online adult training offer and setting individual learning accounts would support better skills, for instance by making the offer more personalised and flexible so individuals face fewer barriers to training and have more incentives to participate. Chile could follow the example of France and the Netherlands to allocate training rights to individuals. Training rights, through training vouchers and individual learning accounts, can be spent freely by the employees and are portable from one job to the other (OECD, 2019[16]). Such voucher systems or individual learning accounts should be accompanied by solid career guidance and quality assurance mechanisms to help individuals make informed choices of quality training options.

Chile faces a deficit of ICT professionals and demand is likely to increase in the future, as the information technology sector keeps expanding. For instance, demand for cyber security professionals in Chile grew by 28.7% in 2022, 10 times higher than growth in other professions (OECD, 2023[17]). Despite a high share of graduates in STEM in Chile, gender gaps are among the highest in the OECD (See Chapter 2). Furthermore, Chile has significantly lower ICT graduates compared to other STEM subareas (Figure 3.6, Panel A) and companies report skill shortages and a deficit of ICT professionals (Figure 3.6, Panel B). Survey data shows that 70% of the companies surveyed find the lack of technical skills as one of the biggest challenges (SENCE, 2022[18]).

Seizing the benefits of technological change depends on the availability of ICT specialists: workers who can code, develop applications, manage networks, and manage and analyse Big Data, among other skills. To reduce skill shortages, matching ICT training programmes with expected skills needs in various industrial sectors, including the effective use and interaction with AI systems can help (OECD, 2021[8]). As

recommended in previous OECD Economic Surveys of Chile, continuous updating of vocational programmes, as well as of university curricula jointly with the private sector is essential to close the gap between supply and demand in the labour market. Moreover, providing better career guidance to students and adults and integrating working experiences in vocational and university programmes, can also help to improve employability. Establishing incentives through targeted subsidies and setting up sectoral levies to share the costs of training between firms could help foster training, increasing the number of ICT specialists. Austria, Germany and Switzerland, levies are collected by sectors; while in England (United Kingdom), only large employers contribute (OECD, 2021[8]).

Figure 3.6. There is a shortage of ICT professionals in Chile



Note: STEM stands for science, technology, engineering (including ICT fields), and mathematics. Panel B: The value of 1 represents the largest shortage and the value of -1 the largest surplus across OECD countries, skill categories and years.
Source: OECD Education at a Glance; OECD Skills for Jobs database.

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3.4. Sharpening incentives to take advantage of digital technologies

3.4.1. Strengthening competition to boost digitalisation and cope with new challenges

Stronger competition from their rivals can motivate firms to adopt digital technologies and improve firms' productivity. Chile has made good progress in reducing barriers to entry in product markets, getting closer to the OECD average since 2018 (Figure 3.7, Panel A). Chile's competition authority has contributed to foster competition by undertaking ex ante regulatory impact assessments and market concertation studies in key sectors, such as pharmaceutical, poultry farming, and notaries. Some of these studies have resulted in legislative initiatives and sanctions translating into savings of around USD 1.7 billion per year for the government and consumers, according to the competition authority estimates (FNE, 2021[19]).

Digitalisation reshapes competition dynamics creating new markets and transforming existing ones, generating new challenges for policymakers and competition authorities. In rapidly evolving markets, the competition authority must grapple with uncertainty, address new forms of misconduct, and examine markets whose precise boundaries are unclear to strengthen their technical capacity and knowledge to deal with the rise in the use of digital technology, particularly AI, to understand the competition implications of AI, as well pave the way for future legislation, investigation, and remedies.

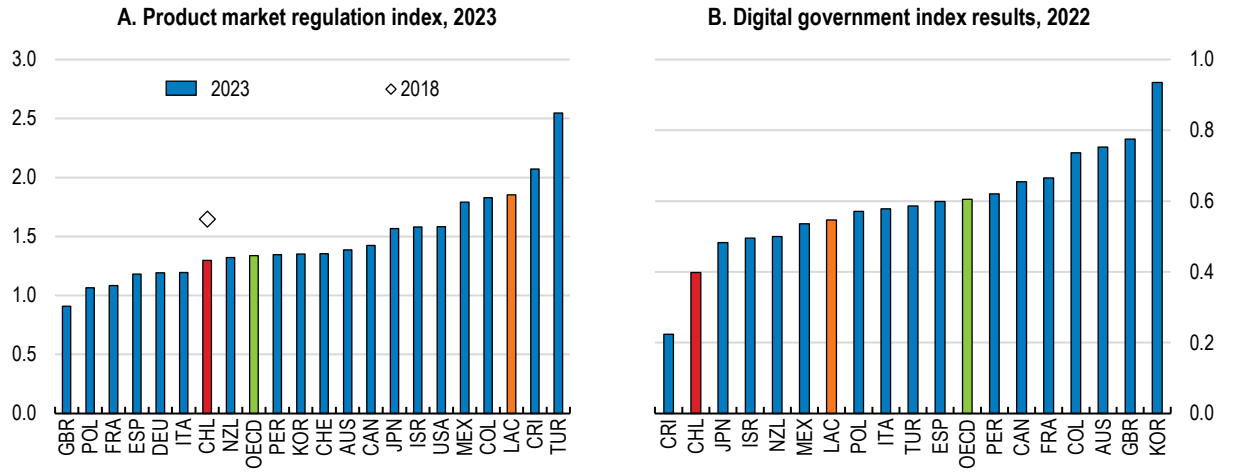
To further strengthen Chile's competition authority's capacity, options beyond expanding its budget to hire additional staff, include providing in-house training or upskilling of current staff, co-operating with other government agencies, or joining efforts with international counterparts. Some OECD countries have

undertaken in-house training supported by other agencies, for instance in Korea, forensic experts at the Digital Investigation and Analysis Division provided training for the Korea Fair Trade Commission employees, thereby improving its overall capability to investigate digital evidence (OECD, 2023[20]).

3.4.2. Advancing the digital transformation of the public sector

Digital government can enable more proactive public services, improving speed, accessibility, and easiness of services and administrative procedures, supporting the digital transformation in the private sector (OECD, 2020[21]). In 2021, the Digital Transformation Law came into force, with the objective of digitalising all administrative procedures by 2027. The Chilean government is undertaking several initiatives to advance digital government to generate more transparent and efficient administrative procedures, and to modernise public services, both at national and sub-national levels (OECD, 2021[8]; OECD, 2020[22]). The Digital Transformation of the State Act came into force in 2022, with the objective of digitalising all administrative procedures by 2027. In 2023 Chile strengthened its institutional framework with the creation of a Digital Government Secretariat that consolidates the digital governance under the Ministry of Finance. The number of digitalised government procedures has grown to 89% of total procedures as of early 2024, while the number of people using a single identification service (*ClaveUnica*) has grown fivefold since 2018, reaching 15.3 million people. A programme to eliminate red tape and to digitalise processes *(Estado Cero Fila*), has helped expedite government procedures.

Figure 3.7. Reaping digitalisation benefits require adequate market regulations and digital government



Note: LAC is a simple average of Colombia, Costa Rica, Mexico, Brazil, and Peru. Panel B: The digital government index benchmarks governments' efforts to establish the necessary foundations for the digital transformation of the public sector.
Source: OECD, PMR database; OECD Digital Government Index 2023.

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Despite this progress, Chile still performs below the OECD average on digital government (Figure 3.7, Panel B). Among other factors, this is explained by the need to consolidate ongoing initiatives into a clear and articulated strategic path to enable a whole-of-government digital transformation. For example, while public institutions are restricted from requesting citizen information that they already possess, government information systems remain fragmented, and each entity has its own platforms that do not always link with one another, posing important challenges for interoperability. As recommended in past OECD Economic Surveys (OECD, 2021[8]) and digital government assessments for Chile (OECD/CAF, 2023[23]; OECD, 2019[24]), it remains a priority to establish a public sector data strategy that enables sound and secure data governance in the Chilean government, supporting the identification of public sector data assets, registries and interoperability nodes, while making public sector data open by default (OECD, 2023[25]). Similarly,

further efforts are needed to strengthen the governance of digital public infrastructure, including the single identification service (*ClaveUnica)* by aligning its governance with the OECD Recommendation on the Governance of Digital Identity (OECD, 2023[26]). Stronger governance is key for the digital identity to be used by different service providers, including the private sector, as well as to enable trusted access to services across borders. In a welcome step, the government created the Digital Government Secretariat to strengthen digital governance and established a "Public-Private Data Governance Commission" to develop digital and data governance guidelines for a National Digital Identity.

3.4.3. Encouraging the adoption of digital tools in SMEs

While firms are increasingly adopting digital tools in Chile (Figure 3.8), SMEs, which represent most businesses in the country, still lag large firms (Ministerio de Economia, 2020[27]). In 2023, 35% of SMEs were at the two lowest levels of digital maturity in e-commerce, while 63% of SMEs were at the bottom two in technology and digital skills, according to data from the government programme "Digital Checkup 2023". Moreover, in 2023 only 31% of SMEs had a digital training programme for their workers and 47% continuously take steps to digitalise their firms, as opposed to 61% and 84% in large companies, respectively (Entel Digital, 2023[28]). To help SMEs overcome barriers to the effective use of digital tools, the government has put in place several programmes, mainly through training for business services, e-commerce, or to enhance the use of digital media (Box 3.1). However, many of these programmes focus on basic digital skills, while efforts should focus on facilitating SMEs acquisition of more advanced digital skills. One way to do so is by advertising the benefits of using the free self-diagnose and public training tools for the digitalisation of SMEs called "digital checkup" and by expanding the current online training catalogue to include more advanced online courses.

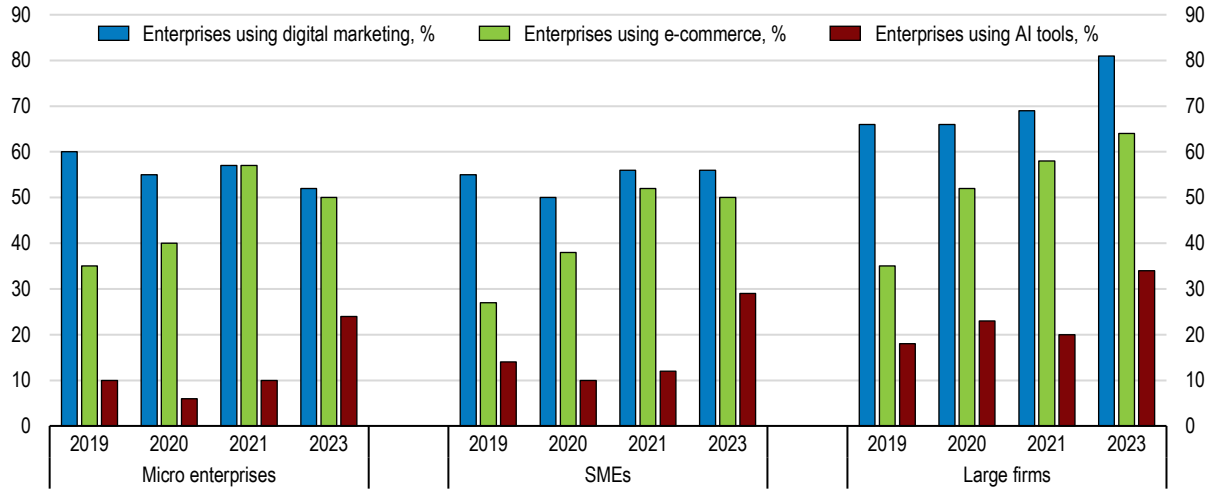
Box 3.1. Programmes to Enhance Digital Technology Adoption in SMEs

- "*Digitaliza tu Pyme*" (Digitalise your SME), led by the Ministry of Economy, Development and Tourism, coordinates, and offers resources through a dedicated platform for SMEs and entrepreneurs seeking to enhance digital capabilities.
- Training Service from the Ministry of Labour and Social Security (Sence) provides grants for SMEs that require specific training.
- *"Ruta Digital" (*Digital Route), a training platform by *Sercotec* (Technical Cooperation Service), offers financial support and online courses on management and collaboration, marketing, sales, inventory, finance and security, innovative business, and cybersecurity.
- *"Fortalece Pyme"* (Strengthen SMEs) is a Corfo programme that supports SMEs adopting digital tools and technologies through grants, training, and technical assistance.
- "*Pymes en Línea*" (SMEs Online) is a *Sercotec* platform for the digitalisation of SMEs and entrepreneurs, allowing them to learn about the digital world, including how to sell through the Internet.

Survey data shows that financial barriers are the most common factor hindering the technological expansion in firms, particularly SMEs (Entel Digital, 2023[28]). Chile's economic development agency (Corfo) and Start-Up Chile's programmes are the main instruments for SMEs capital financing. Banking financing is limited, especially for smaller firms that typically receive bank loans at less favourable conditions than larger firms (Gamboa, Ormazábal and Yáñez, 2019[29]). To support the digital expansion of SMEs, the state could continue to offer guaranteed bank credits. Additionally, the government can explore expanding subsidies to support SMEs' digitalisation, for instance via its agency for technical cooperation (Sercotec). Before expanding this support, the government should evaluate which subsidies are successful in improving digitalisation among SMEs, expand them, and eliminate non successful ones.

Additionally, FinTech companies may help fill in the funding gap for innovative firms through financial innovation and greater competition in the financial system, harnessing opportunities to develop new financial products and services. Chile has one of the main FinTech ecosystems in the region, with 300 startups in 2023, up from 179 in 2021 (Finnovista, 2023[30]). According to InvestChile, the growing popularity of FinTechs has been driven primarily by customer demand. The 2023 Fintech Law sets a regulatory framework for companies that offer financial services but are not currently regulated or supervised by the Financial Market Commission (OECD, 2024[31]) providing more certainty for FinTech companies to fully operate in the country. It aims at bringing FinTech activities, including crypto assets and open finance, into the regulatory perimeter and to fill the regulatory gap between new entrants and incumbent financial companies.

Figure 3.8. Disparities in the adoption of digital tools remain within firms



Source: Camara de Comercio de Santiago: E-commerce Innovation Summit 2023.

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3.4.4. Continuing efforts to enhance cybersecurity

The risk of digital security incidents grows as the digital transformation deepens. Chile ranks seven in the Global Cybersecurity Index within the Americas, below Brazil and Mexico (ITU, 2024[32]), and cyberattacks have increased between 2022 and 2023 moving Chile from the 7th to the 4th place among Latin American countries receiving more cyberattacks in the region (Entel Digital, 2024[33]). In face of these challenges, the government has established a team to respond to cybersecurity incidents and in December 2023, Congress approved the Law on Cybersecurity and Critical Information Infrastructure along with a National Cybersecurity Policy. The law regulates private and public institutions that provide “essential services” and imposes obligations resulting in sanctions for non-compliance. This legislation goes in the right direction as it focuses on prevention and increases cybersecurity awareness by developing a national cybersecurity and privacy plan to equip the entire population with basic cybersecurity knowledge and enhance cybersecurity education across all educational levels. Ensuring an adequate implementation and regular updates of the national cybersecurity policy should be a priority, as the use of data among public and private institutions is likely to increase in the future, making it necessary to maintain up-to-date policies. It will also be important that the policy outlines obligations and standards for government bodies to ensure public cybersecurity, and that it provides guidelines for adequate risk management and prevention framework.

3.5. Fostering innovation and enhancing a wider use of digital tools

3.5.1. Boosting investment in R&D and innovation

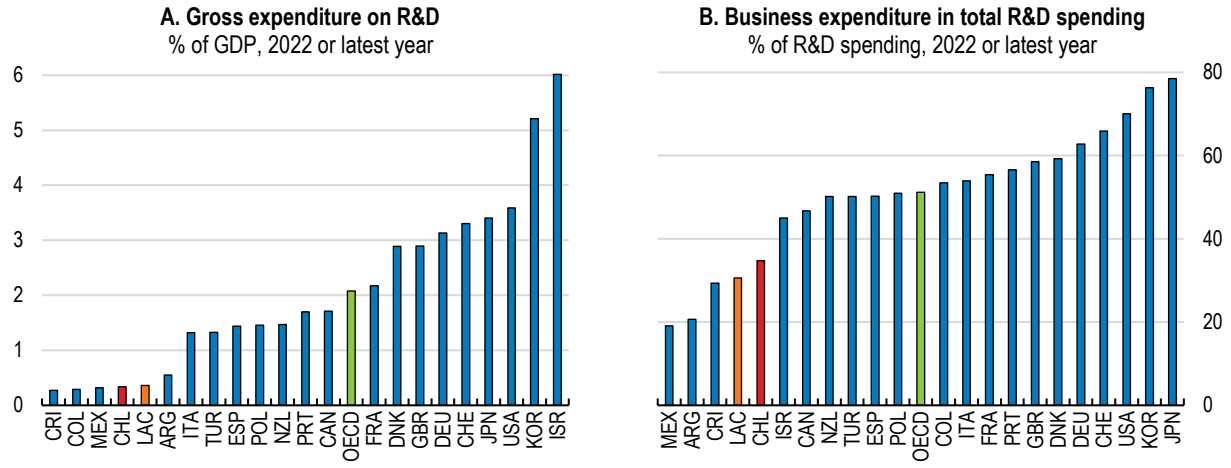
Digital innovation is a fundamental driver of the digital transformation, giving rise to innovative products and services, creating opportunities for new business models and markets, and driving efficiencies in the public sector. However, Chile invests relatively little in R&D, at 0.3% of GDP, well below the OECD average of 2.1% in 2022, with most resources coming from the public sector (Figure 3.9*,* Panel A) and a pronounced gap in business R&D with OECD countries (Figure 3.9*, Panel B)*. According to the most recent national innovation survey, the percentage of companies that introduced technological innovations was 16.7% in 2019-2020, compared to 35% in the rest of the OECD, with large firms innovating more than small ones (Ministerio de Ciencia, Tecnologia, Conocimiento e Innovación, 2023[34]). To seize the opportunities of the digital transformation, it is necessary to invest in research and development (R&D), promote innovation, facilitate access to finance and support knowledge sharing and diffusion schemes among businesses.

The main factors behind low investment in innovation in Chile are financial constraints and the cost of innovation (Zahler, Goya and Caamanio, 2018[35]). Chile has R&D tax incentives and grants to support business R&D. A tax credit of 35% of the investment in R&D (capped at USD 1 million per year), plus a tax deduction for the remaining 65%. Besides tax incentives, Chile's economic development agency (Corfo) and other government agencies provide numerous grants including innovation vouchers, like *Innova*. The National Research and Development Agency and *Fundación para la Innovación Agraria* (FIA) also provide R&D grants for research institutions and sector- related activities.

Despite the availability of programmes to boost technological innovation, public support to firms' R&D and innovation activity is complex with overlapping objectives and in some cases reduced accountability when run jointly by different agencies. Simplifying R&D investment programmes and increasing coherence and integration among them would improve impact and public spending efficiency. Further efforts to strengthen impact analysis of government business R&D grants would be welcome, as evidence of these grants in promoting business innovation is limited. After evaluating current R&D grants, spending on new R&D programmes could increase based on cost-benefit analysis.

Strengthening the collaboration between businesses and universities, that in Chile remains low, would also help. Less than 10% of large firms collaborate with universities, compared to 29% on average in the OECD in 2022. One way to boost collaboration is encouraging the set-up of technology incubators affiliated to universities to identify high-potential, scalable start-ups and to enable the interaction of researchers, private-sector, local governments, or non-governmental organisations to facilitate digital knowledge exchange on advanced technologies.

Figure 3.9. R&D expenditure is among the lowest in the OECD



Note: Data for Chile refer to the year 2020. LAC is the simple average of Colombia, Costa Rica, Mexico, and Argentina.
Source: OECD Main Science and Technology indicators database.

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3.6. Better harnessing the benefits of Artificial Intelligence

Artificial Intelligence (AI) has the promise to foster productivity and trigger an acceleration of innovation, though estimates of its impact are subject to significant uncertainty. Studies indicate that the extent to which new technologies are widely diffused or concentrated in a few leading firms, and the extent to which AI is labour enhancing as opposed to labour replacing matters for AIs potential effect (OECD, 2024[7]). To minimise drawbacks and fully harness the economic benefits of AI, governments need to put the right policies in place regarding safety, privacy, intellectual property rights, and information integrity (OECD, 2024[7]).

The share of firms using AI has risen rapidly in Chile, mostly large companies (Figure 3.8), while the public-sector is increasingly using AI tools in the judicial, social welfare, environment, and labour sectors. Around the world, governments are starting to use AI to automate simple tasks, engage with citizens, and improve education (See Box 3.2). Chile has an AI national strategy since 2021, that, based on the OECD AI principles, emphasizes the priority to cultivate local talent, strengthen the technological infrastructure, foster the use and development of AI, and ensure it is responsibly deployed. This strategy was updated in May 2024, placing more emphasis in governance and ethics and the role of AI in improving the state's capacity. Regular updates are welcome, as AI is further adopted, governments should remain vigilant, so AI initiatives do not outpace regulation.

Promoting a responsible AI use and ensuring that algorithms do not perpetuate and exacerbate social inequalities and divisions through algorithmic decision making is crucial for an ethical AI use. The Chilean government, jointly with a university and other international organisations, developed the *Ethical Algorithms* project to promote ethical data management and the responsible development and implementation of algorithms, automated decision-making systems, and artificial intelligence, both in the public and private sectors. Furthermore, Chile, as other countries in the region, has advanced in the development of an AI ethics policy. As part of these efforts, Chile developed the *State Data Strategy* that promotes transparency, responsibility, and innovation to guide the use of AI in the public sector. These measures are welcome, and efforts should continue to ensure an adequate implementation of the AI national strategy. Additionally, to harness the benefits of AI in government services and the procurement of AI related products and services, the government should enhance the training of some government officials by creating AI learning tracks, and invest in the development of skills of civil servants through

formal structured training programmes, and informal training -coaching or mentoring schemes, learning events or job rotation programmes (Burtscher, Piano and Welby, 2024[36]).

Box 3.2. Some experiences of AI use by governments

Law enforcement and criminal justice in Colombia: The "Recurrence Risk Profile for the Request for Incarceration Measures" (Prisma) is a tool for predicting the risk of criminal recidivism in individuals. The AI system was developed to support prosecutors when requesting preventive detention in jail. It also compiles all information available about the person under investigation.

Making work processes more efficient in Argentina: The Ministry of Finance of the Province of Cordoba developed an AI tool to automate tasks in bureaucratic procedures such as the verification of retirement contributions in the Social Security National Administration.

Using chatbots in the public sector in Brazil: *Jaque* is a virtual clerk based on AI to guide citizens through a digital catalogue that centralises all information on public services offered by the State Government of Alagoas. The tool provides a step-by-step explanation for each service and contains information on the length, availability, requirements, and location of processes.

Improving public employment services in Belgium: The Public Employment Service of Flanders' (VDAB) Competency-Seeker platform employs AI to help both jobseekers and employers enrich and refine the skills profiles they have and are looking for.

Source: (OECD, 2022[37])The Strategic and Responsible Use of Artificial Intelligence in the Public Sector of Latin America and the Caribbean and (Burtscher, Piano and Welby, 2024[36])

Table 3.2 Policy recommendations to accelerate productivity through digitalisation and innovation

Improving connectivity	
Chile has one of the highest internet penetration rates in the Latin American region, but still lags the OECD average. Despite progress to simplify the licensing process, barriers to entry in network sectors remain high.	Adopt a single licensing regime that authorizes operators to provide all communication services throughout the entire Chilean territory.
Enhancing digital skills	
Foundational skills are low among Chilean students. Chile has many initiatives to expose children to STEM-related areas, but their scope is limited and out of the formal education system.	Place more emphasis on the development of computational thinking and coding skills in the national school curriculum. **Promote STEM skills development at schools, including investing in teacher training and equipment.**
Many adults lack the necessary skills to perform adequately in a digital world, with only 11.7% of adults proficient at problem solving in technology rich environments, well below the OECD average of 32.3%. Programmes like *Talento Digital* have helped to increase employability, but its scope remains limited.	Expand public online training programmes to reach more adults and to include more personalised and flexible contents.
There is a shortage of high-skilled ICT professionals and demand for ICT workers is expected to outpace supply going forward.	Align vocational and university curricula with current and forecasted ICT skills in partnership with the business sector. Advertise the career benefits of ICT vocational and university training and strengthen career guidance. Integrate working experience in STEM vocational and university training.
About 50% of workers in Chile perform routine tasks with a high risk of automation and AI is likely to automate a significant number of increasingly complex tasks. The green transition will lead to reallocation of workers. Existing programmes such as *Reinvéntate*, provide training opportunities.	**Ensure that lifelong learning and reskilling programmes are prepared for labour market shifts caused by AI, automation and the green transition, through alignment of training to labour market needs and flexible adult learning provision to overcome barriers to participation.**
Sharpening incentives to take advantage of digital technologies	
Chile has reduced barriers to entry in product markets. The competition authority has fostered competition, but with the changing digital landscape the scope and complexity of its tasks are set to increase.	Strengthen the competition authority's technical capacity and knowledge through in-house training, and cooperation with other government and international agencies.
The government has several initiatives to advance the digital transformation of the public sector, but Chile still performs below the OECD average on digital government maturity.	Consolidate ongoing initiatives into a clear and articulated strategic path to enable a whole-of-government digital transformation.
SMEs, accounting for most companies in the country, still lag large firms in digital adoption.	Ensure the online training catalogue includes more advanced and tailored digital training for SMEs.
Cyberattacks increased from 2022 to 2023. The 2023 Law on Cybersecurity and Critical Information Infrastructure and the National Cybersecurity Policy focus on prevention and cybersecurity awareness. Data collection among public institutions is likely to increase in the future.	Continue efforts to enhance cybersecurity, including by adequately implementing and maintaining up to date policies that outline the obligations and standards for government bodies to ensure public cybersecurity.
Bolster effective adoption and use of digital technologies and innovation	
R&D expenditure is well below the OECD average and businesses spend relatively little in R&D. Programmes to boost technological innovation and grant public support to firms' R&D are complex and with overlapping objectives.	**Simplify public R&D grant programmes supporting technological innovation, increasing coherence and integration, and in the medium-term, increase R&D spending based on cost-benefit analysis.**
Better harnessing the benefits of Artificial Intelligence	
AI use has expanded, and Chile has an updated National AI strategy to foster the use and development of AI focusing on governance, ethics, and the role of AI in improving the State capacity	Ensure a proper implementation and regular updates of the AI national strategy.
AI use by government officials is expected to increase, while AI expertise within government is limited, hindering the procurement of AI-related products and services.	Create AI learning tracks for government officials.

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4 Achieving a green transition for a more prosperous Chile

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Chile has set ambitious decarbonisation goals while promoting green hydrogen and lithium. To meet its targets for reduction of greenhouse gases emission and enhance climate resilience, the country needs to strengthen policies to accelerate the pace of emissions reduction and improve adaptation to climate change. Higher carbon prices and the removal of fossil fuel tax expenditures are essential. To profit from a green hydrogen industry and increasing lithium production, Chile needs to promote investment, improve business and environmental regulations, and develop technical capabilities while ensuring protection of water and biodiversity. Additionally, improving the social protection system is crucial to support vulnerable populations during the transition.

Chile's solid policy framework has ensured macroeconomic stability and improved living standards. However, the country faces environmental pressures, as greenhouse gases (GHG) emissions have grown alongside its GDP. Additionally, hazards related to climate change, like floods and wildfires, increasingly threaten the economy and well-being.

Chile has committed to achieving net zero GHG emissions by 2050, with emissions projected to peak in 2025. Yet current efforts face considerable challenges to meet the 2025 and 2030 targets. Carbon sequestration, critical to reach net zero by 2050, is threatened by the growing frequency of wildfires. The country's decarbonisation strategy centres on green hydrogen, expected to contribute 21% of GHG reductions by 2050, alongside a shift towards renewable energy, which has seen wind and solar power grow from 1% to 31% of total electricity generation in a decade. However, with 63.5% of its 2023 total energy supply imported, and only 4.7% of oil and 20.2% of gas produced domestically (IEA, n.d.[1]), greater reliance on renewables is needed to ensure energy security and meet climate goals.

Chile's vast mineral resources, particularly in copper and lithium, offer growth opportunities and can support the global energy transition. While expanding lithium production will not directly cut emissions, it can generate public revenue and aid the worldwide shift to cleaner energy. However, without proper management, lithium and green hydrogen development could worsen local environmental impacts.

Chile's National Lithium Strategy and the Green Hydrogen Action Plan 2023-2030 aim to capitalise on these resources, but success requires strengthened energy and transport polices and coordinated fiscal, regulatory, and technological reforms. Key priorities include improving infrastructure, regulatory frameworks, and workforce skills to ensure the development of lithium and green hydrogen alongside environmental sustainability and social equity. Achieving these goals will demand significant private investment and ensuring that the financial system integrates climate-related risks. Achieving a green transition that benefits all the population, while equitably distributing environmental costs, will also require targeted policies to assist those affected by decarbonisation policies, ensuring that costs and benefits are fairly distributed.

This chapter reviews Chile's adaptation and decarbonisation progress and provides recommendations for achieving a green transition, building on previous OECD work (OECD, 2024[2]; OECD, 2023[3]; D'Arcangelo et al., 2022[4]). It discusses how Chile can leverage its advantages for green hydrogen and lithium production in a sustainable and fair way.

4.1. Adapting to climate change and other environmental hazards

Climate change is already impacting the economy and the lives of Chile's citizens and will continue to do so in the medium and long term. Temperatures have risen, water scarcity is acute in many parts of the country and climate hazards occur more and more frequently, threatening well-being, biodiversity, and infrastructure. Air pollution remains a significant health hazard. These challenges call for accelerating adaptation efforts.

Temperatures will rise in Chile in the next decades, especially in the Andes and the northern zone (Ministry of Environment and CR2, 2021[5]). A warmer, drier climate can increase the risk of wildfires, floods, and landslides (World Bank Group, 2021[6]). Close to one third of the country faces at least two climate-related risks, notably heat stress and flooding. Extreme heat has affected nearly a quarter of the population since 2018, potentially hindering labour productivity and GDP growth (Dell, Jones and Olken, 2014[7]). Wildfires, as the deadly ones in 2024, threaten a large share of the population, the third highest share in the OECD (Figure 4.1).

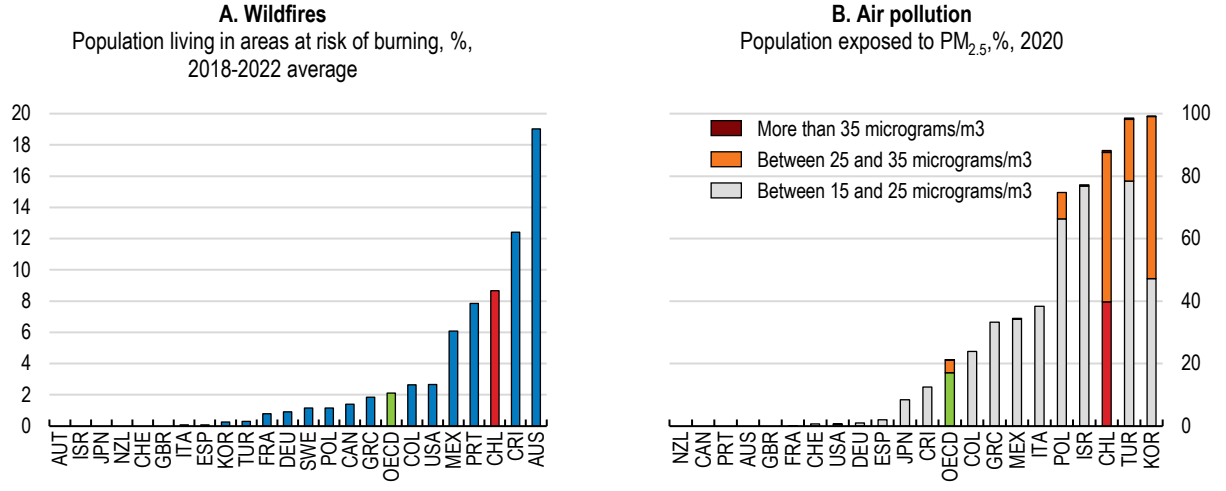
Air pollution in Chile is a serious public health issue, with $PM_{2.5}$ concentrations among the highest in the OECD and far above the World Health Organisation's air quality guideline of 5 micrograms/m^3 of $PM_{2.5}$ (WHO, 2021[8]), endangering the health of nearly 90% of the population (Figure 4.1). Chile has high levels

of access to drinking water, but it ranks 16th out of 164 countries for baseline water stress (World Resources Institute, 2023[9]), as availability of freshwater is falling due to resources over-use, drought and the effects of climate change on the hydrological cycle (OECD, 2024[2]).

A policy approach that considers regional differences in risks to economic growth and well-being is key in Chile, as climate-related risks vary significantly across regions (Figure 4.2). Estimates of changes in risk under a "business as usual" scenario show that the north and the centre of the country are under higher threat of health hazards related to heat, while drought and risks to plant biodiversity concentrate in the centre. All along the coast there are settlements with higher risk of flooding. Recent research has found that around 39% of the appraisal value and 37% of properties are exposed to climate risks, including, fires, floods, drought, and coastal deterioration, with higher intensity in the centre of the country (Cortina and Madeira, 2023[10]). Climate risks could pose threats to financial stability (see Chapter 1), lowering the value of physical collateral for banks, especially if not insured, leading to increasing credit requirements and heightened market volatility (Sutherland et al., forthcoming[11]).

Higher frequency and stronger intensity of natural disasters will also impact public finances. Direct channels include the immediate fiscal cost of providing disaster relief to vulnerable households and firms, repairing, or replacing damaged infrastructure, and fulfilling explicit and implicit contingent liabilities (Sutherland et al., forthcoming[11]). Extreme weather events can also reduce output growth and government revenue by eroding the tax base (Fuje et al., 2023[12]), while also posing risks to debt sustainability (Gagliardi, Arévalo and Pamie, 2022[13]).

Figure 4.1. Chile is highly vulnerable to wildfires, and air pollution remains high



Source: OECD Environment Statistics.

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4.1.1. Mobilising resources for investment in adaptation

The government is taking adaptation actions, as mandated by the Framework Law on Climate Change. The National Plan for Adaptation to Climate Change (PNACC) that coordinates adaptation actions across sectors, localities, and regions, is being updated and 12 sectoral adaptation plans have been published. However, limited capacity and financial resources hinder implementation (OECD, 2024[2]). Furthermore, the lack of precise information on specific adaptation financing needs makes it difficult to properly budget for expenditure in adaptation, disaster relief and prevention, leading to insufficient and ill-planned financing. Ensuring sufficient and stable funding for adaptation, including by regularly planning and budgeting for adaptation spending would enhance adaptation efforts. To further progress on adaptation, developing financing strategies, strengthening co-ordination across administrative levels, building capacity at the sub-

national level, and encouraging public-private collaboration will be needed as outlined in the 2024 OECD Environmental Performance Review of Chile (OECD, 2024[2]).

Increasing private investment in adaptation is crucial. Fostering private investment in climate-resilient infrastructure should be a priority, as every dollar invested yields about four dollars of benefits (OECD, 2024[14]). Chile could take several approaches to incentivise infrastructure operators to invest more in resilience. Integrating climate resilience clauses into public-private partnerships (PPP), as Colombia did in road concessions, could help spur private investment in resilient infrastructure (OECD, n.d.[15]). Chile could require that adaptation measures are integrated into transport infrastructure design, like in Spain, Colombia, or Costa Rica, or introduce financial penalties for climate-related service disruptions in critical infrastructure, like in Sweden and Norway. Chile could also make greater use of methodological tools to integrate environmental and climate considerations into project appraisal, like New Zealand did for monetising the benefits of resilience to earthquakes, volcanic activity, and extreme weather in its transport infrastructure (OECD, 2024[14]). Chile has considerable experience strengthening resilience to earthquakes, including through investment in research and training, strict building regulations that are updated based on data, and constant education of the public. The country could leverage this experience to foster infrastructure resilience to climate change.

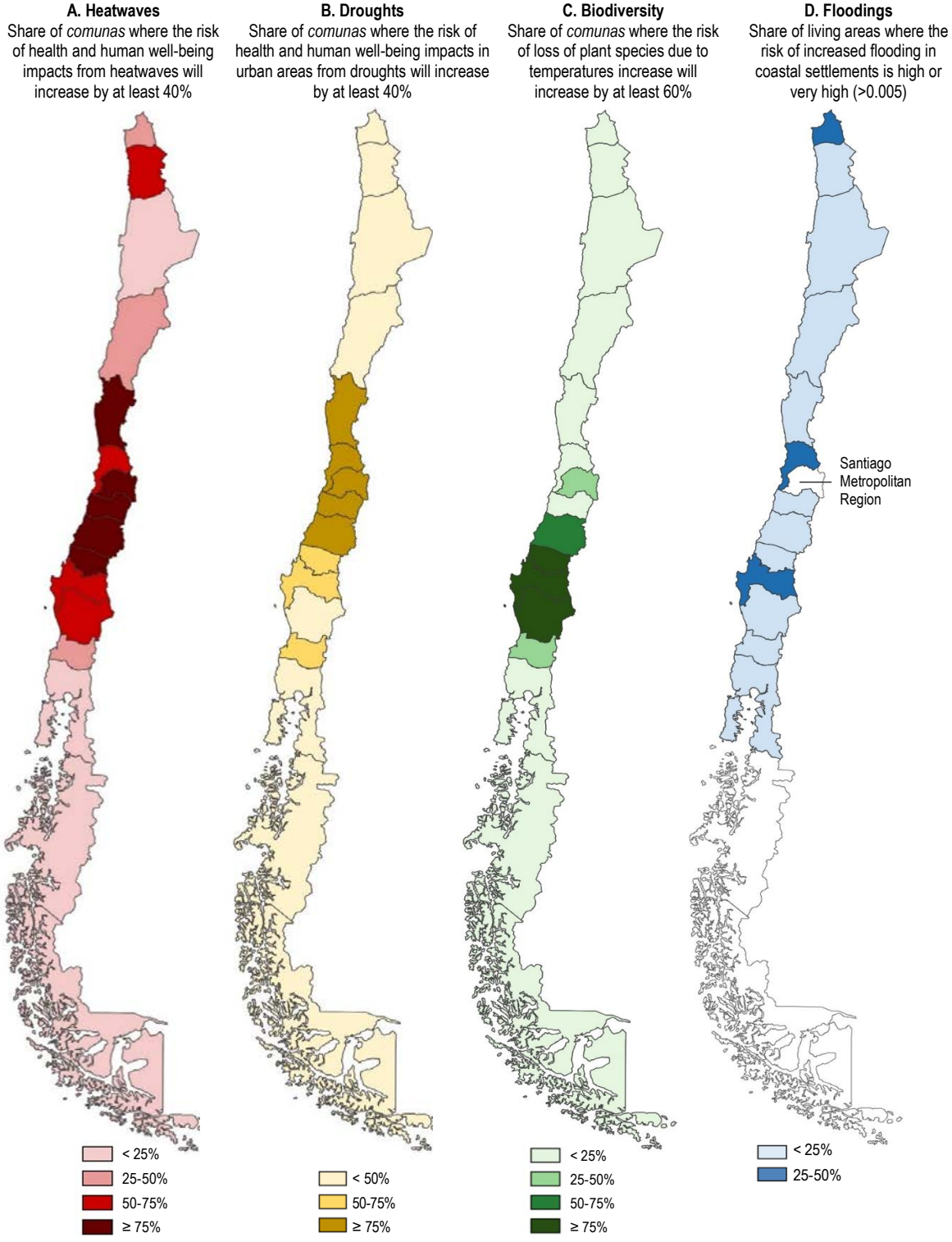
The public sector can also facilitate access to funding for investment in climate adaptation. The government is updating its Financial Strategy for Climate Change, to propose measures aimed at achieving its mitigation and adaptation goals. To help mobilise additional funds for green investment, including in resilient infrastructure, the government plans to create the Financing and Investment Agency for Development (AFIDE) (see Chapter 1).

4.1.2. Increasing access to insurance and knowledge about climate risks

Access to insurance for households and businesses could be improved to increase resilience to climate impacts. Moreover, widespread insurance can alleviate the negative macroeconomic and welfare impact of catastrophes and free public resources otherwise used for disaster relief or reconstruction of infrastructure. As part of a strategy to mitigate the impact of earthquakes on public finances, in 2023 the Ministry of Finance contracted insurance for around USD 630 million. However, the penetration rate for non-life insurance was 1.7% in 2022 in Chile, well below the OECD average of 5.1%. Only 3% of respondents to a recent survey had home insurance, which is critical given the risk of wildfires (CAF and CMF, 2023[16]), with households with lower levels of education less likely to have insurance (Madeira, 2023[17]). Increasing access to insurance requires raising awareness of climate-related physical risks, identifying, and supporting access to insurance for vulnerable segments, and increasing the availability of affordable insurance through insurance regulation (OECD, 2022[18]). The 2023 FinTech law (see Chapter 3) relaxes processes and requirements to foster lower-cost insurance and is a welcome step. The law explicitly allows index-based (parametric) insurance, which eases the process to claim the insurance after a sinister, and promotes insurance aimed at underserved segments of the population.

Insurance take-up can also be increased through stricter regulation. Fire insurance is already mandatory in Chile for all apartments and common areas in condominiums and is usually required by financial institutions when granting mortgages. Chile could consider extending mandatory insurance to all types of properties and other types of climate-related risks, like floods and landslides. For example, in France, flood insurance is mandatory for all properties, regardless of their location, while it is required for mortgages in Belgium and Denmark. To increase awareness of risks, sellers and landlords could also be required to disclose information on previous compensation paid on a property damaged by a natural disaster, as done in France and Australia. These measures should be complemented by tightening current regulations on new constructions in high-risk areas or by improving their enforcement, and by setting up means-tested subsidies to ensure that premiums are affordable for lower-income sectors, and that their access to credit is not curtailed (OECD, 2024[19]).

Figure 4.2. Climate-change threats to human well-being and biodiversity vary across regions



Note: A, B, C: The maps represent the proportion of comunas per region where the risk index will increase by more than 40% (60% in map C) between a historical average (1980-2010) and an average for 2035-2065 (derived from a high-emission climate scenario of "business as usual" [RCP 8.5 scenario] considering historical sensitivity and resilience factors). The predisposition to suffer impacts is considered, not its probability of occurrence. D: the risk is calculated as the multiplication of threat, sensibility, and exposition. Full methodological details available in (Pica-Téllez et al., 2020[20]).

Source: Atlas de riesgos climáticos, Ministerio de Ambiente, arclim.mma.gob.cl (Ministry of Environment, 2020[21]).

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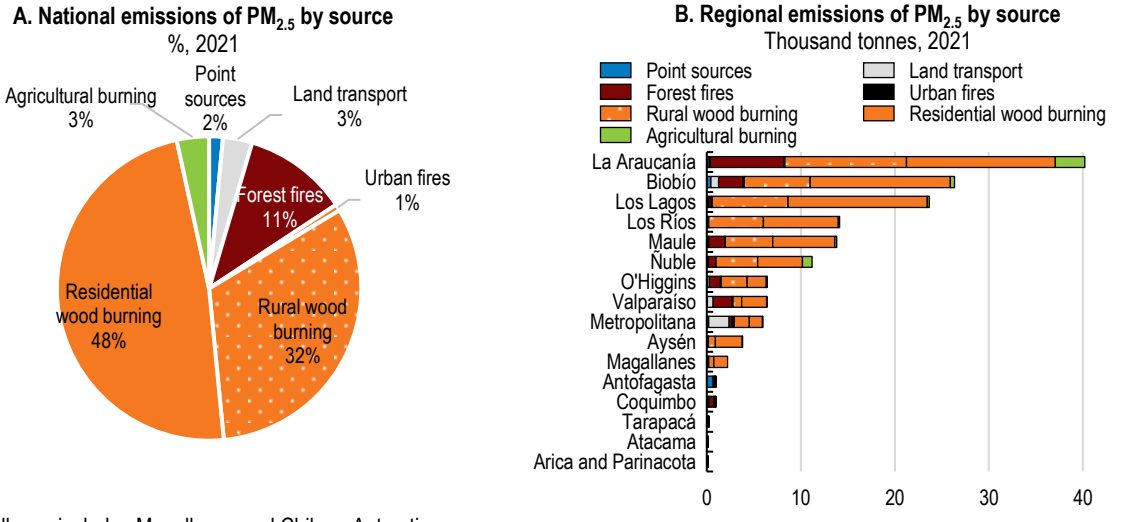
Raising risk awareness, as well as increasing knowledge about risk reducing and prevention measures is important for adaptation. Estimates suggest that one US dollar (USD) invested in prevention could save up to USD 7 in relief costs (FAO, 2021[22]). Chile has advanced in using technology to provide the population with tools to handle risks threats stemming from climate change. A Climate Risk Atlas geo-references current and projected climate-related risks at the communal level (Ministry of Environment, 2020[21]) (Figure 4.2), and the National Disaster Prevention and Response Service (SENAPRED) provides early warnings for flash floods and other climate-related events. The Ministry of Economy, Development and Tourism is also implementing an agenda to assess climate-change risks in supply chains to guide investment in adaptation measures. Chile could consider dedicating some public funding to further raise awareness among the population and develop risk reduction and prevention projects, as Colombia does with its National Adaptation Fund (OECD and World Bank, 2019[23]).

4.1.3. Reducing air pollution

Local air pollution in Chile remains a problem. Nearly 90% of the population is exposed to air with $PM_{2.5}$ concentrations much higher than the World Health Organisation's air quality guideline (Figure 4.1). Chile has been a pioneer in using taxes on emissions of local air pollutants, managing to reduce emissions of sulphur dioxide (SO_2), PM_{10} and $PM_{2.5}$ particulate matter compared to 2010 levels. However, emissions of nitrogen oxides (NOx) and $PM_{2.5}$ have continued to rise in recent years (OECD, 2024[2]). Residential wood burning is the main source of emissions of particulate matter, especially in central and southern Chile (Figure 4.3). Using charcoal or wood for cooking or heating is very common in several Chilean regions, like Araucanía, Los Lagos, or Los Ríos, where at least 84% of households do it (Ministry of Social Development, 2024[24]).

Air pollution carries high costs. Pollution with $PM_{2.5}$ particulates has been found to cause around 3 000 hospitalisations and close to 4 500 deaths in Chile each year (Huneeus et al., 2020[25]), and its economic cost has been estimated at 1.6% of GDP for Chile, and around 4% of the output of the Araucanía, Los Lagos, and Los Ríos regions (de la Maza et al., 2024[26]). As temperatures rise due to climate change, the risk of mortality related to respiratory disease for fine particulate matter ($PM_{2.5}$), nitrogen dioxide and ozone is also likely to increase (EEA, 2020[27]). Climate change has already led to more frequent wildfires and longer wildfire seasons, increasing emission of GHG and particulate matter, and hampering air quality for many people.

Figure 4.3. Wood burning is the main source of emissions of particulate matter



Note: Magallanes includes Magallanes and Chilean Antarctica.
Source: (Ministry of Environment, 2023[28]) Reporte del Estado del Medio Ambiente 2023.

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The government has issued a Law to Regulate Solid Biofuels, that covers their quality and conditions for sale, whose regulations are under consultation with indigenous communities to avoid affecting their traditional practices. The Ministry of Energy operates three programmes to foster a formal biofuels market and to support sellers to reach the quality standards set in the law: a fund to promote the use of drier firewood, which is less polluting; a quality seal for producers who meet standards; and a fund to promote the implementation of large-scale Biomass Centres in the Los Ríos region. Furthermore, the Ministry of Environment is promoting the exchange of wood-burning heaters for greener alternatives, like pellet stoves, which have been shown to significantly reduce the environmental impact of heating, although at a higher cost over the lifetime of the house (Larrea-Sáez et al., 2024[29]). The exchange often requires a co-payment, which could discourage poorer households from applying. To increase take-up while avoiding energy poverty, programmes for the purchase and operation of cleaner heaters could be scaled up, and co-payment requirements relaxed for poorer households.

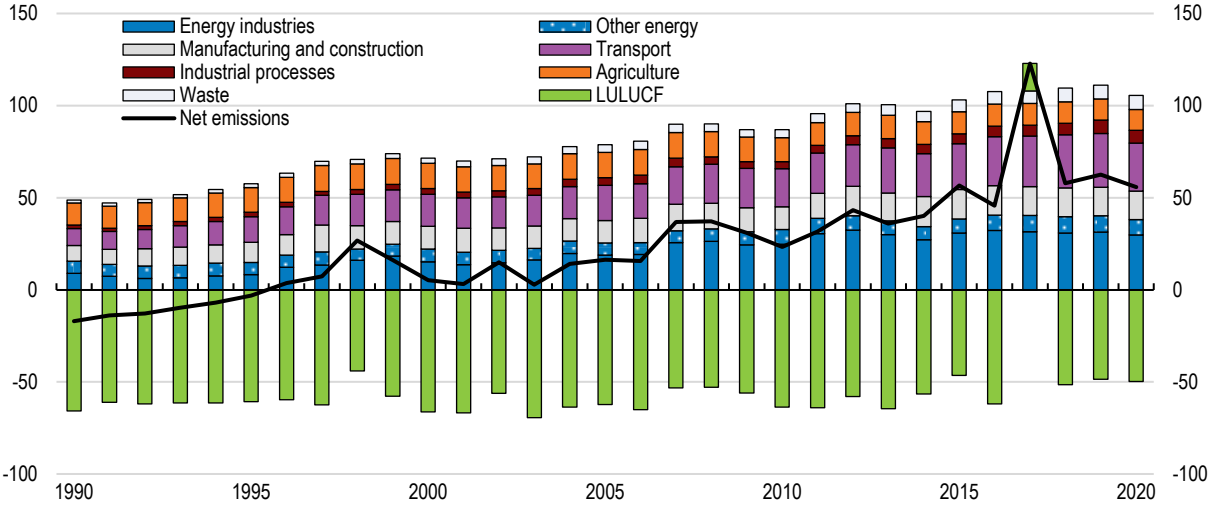
4.2. Meeting decarbonisation targets requires accelerating emissions reduction

Chile's GHG emissions rose by 48% between 2000 and 2020, driven by carbon dioxide (CO_2) emissions from fossil fuel burning, with a decrease in 2020 due to the COVID-19 pandemic, which allowed the country to meet its 2020 target (Ministry of Environment, 2022[30]). Energy industries and transport were the main contributors to emissions growth over the last 20 years and accounted for 30% and 26% of emissions in 2020, respectively (Figure 4.4). Land use, land-use change, and forestry (LULUCF) have consistently contributed to capture carbon, reducing emissions, except for 2017, when massive wildfires affected Chile and added to GHG emissions.

Chile will require stronger efforts to reduce emissions. Emissions may not meet the 2025 and 2030 targets (OECD, 2024[2]). According to Chile's targets, GHG emissions must peak in 2025; fall by 10% with respect to 2020 to reach the 2030 target of 95 Mt of CO_2-equivalent (CO_2eq); and reach net zero by 2050, which requires reducing emissions by around 31% compared to 2020 (Government of Chile, 2022[31]) (Figure 4.5). Moreover, government plans to reach net zero depend critically on meeting the target of carbon sequestration by LULUCF, of 65 Mt CO_2eq by 2050. However, carbon sequestration is very sensitive to wildfires, which are increasing in the country, as shown by widespread fires in 2023 and 2024.

Figure 4.4. Emissions have been rising

GHG emissions, Mt CO_2 equivalent



Source: OECD Environment Database.

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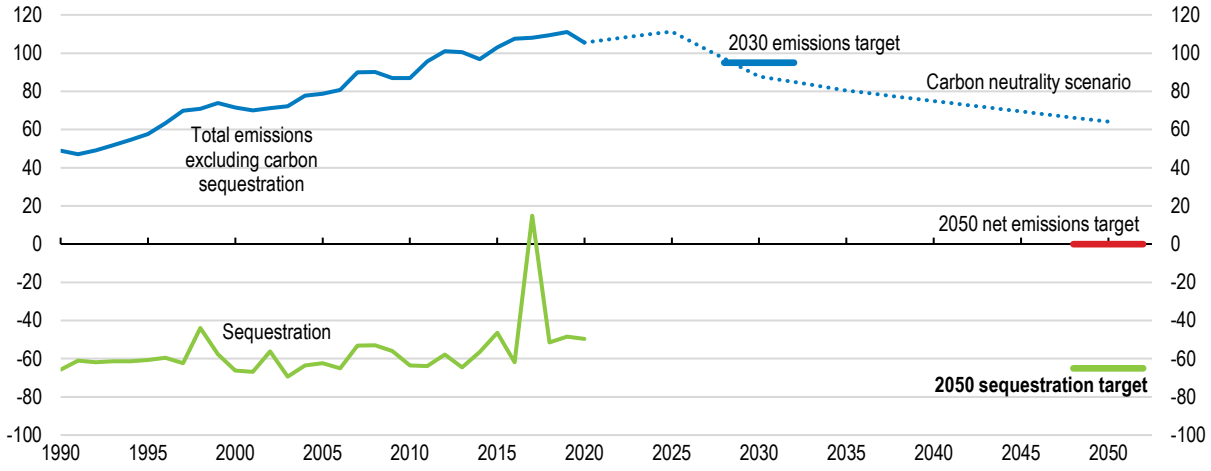
Figure 4.5. Chile faces considerable challenges to meet its 2030 emissions targets

Chile: historical GHG emissions, targets, and carbon neutrality projection, Mt CO_2eq



Note: CO_2eq = carbon dioxide equivalent. GHGs = greenhouse gases. LULUCF = land use, land-use change and forestry. NDC = nationally determined contribution. NDC targets are based on total GHG emissions excluding LULUCF. Chile presents specific targets for LULUCF additionally. The transition scenario reflects sectoral budgets needed to meet targets but are not projections of emissions based on current policies.

Source: (OECD, 2024[2]). OECD Environmental Performance Reviews: Chile 2024.

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Box 4.1. Chile has strengthened its institutional and legal frameworks for environmental policy

Main national instruments

- Long-Term Climate Strategy (ECLP), the roadmap to achieve the emission goal.
- The Nationally Determined Contribution (NDC), to be updated in 2025, that establishes the national mitigation and adaptation commitments in line with the Paris Agreement.
- Sectoral plans for climate change mitigation and adaptation.

The Framework Law on Climate Change formalises several bodies like the Inter-Ministerial Technical Team on Climate Change and the Regional Climate Change Committees. The law also creates a National System of GHG Inventory, to monitor coherence and quality of reported emissions; a Financial Strategy for Climate Change, to guide public and private contributions to financing decarbonisation; and also introduces emission standards and tradable carbon credits. Another significant improvement of the institutional framework is the creation in 2023 of the Biodiversity and Protected Areas Service (SBAP) to oversee biodiversity monitoring in protected areas.

Source: (Government of Chile, 2022[32]). Framework Law on Climate Change; (OECD, 2024[2]). OECD Environmental Performance Reviews: Chile 2024.

Chile has significantly strengthened its institutional and legal frameworks for environmental policy recently (Box 4.1). In June 2022 Chile published the Framework Law on Climate Change, which makes carbon neutrality legally binding by 2050 and sets the legal framework to implement long-term mitigation and adaptation measures for the country to meet its multilateral commitments (OECD, 2024[2]). Despite progress on implementation of the law, several challenges remain. The approval of regulations and normative changes mandated by the law is advancing, with 17 out of 20 approved by the council of ministers. Chile has a single system for monitoring of climate policies and citizen engagement, but its implementation faces challenges regarding inter-institutional coordination for information delivery, the

integration of existing platforms into a single system, and making the system accessible to all users. Furthermore, implementation of the law requires technical capacity at national and subnational levels, including personnel with relevant expertise (OECD, 2024[2]). Environmental risks vary significantly per region, yet regional and provincial administrations have played a minor role in environmental management, and local governments have little fiscal autonomy and lack resources for environmental services (OECD, 2024[2]). The Framework Law mandates local governments to develop regional and local climate change action plans that need to be aligned with national instruments.

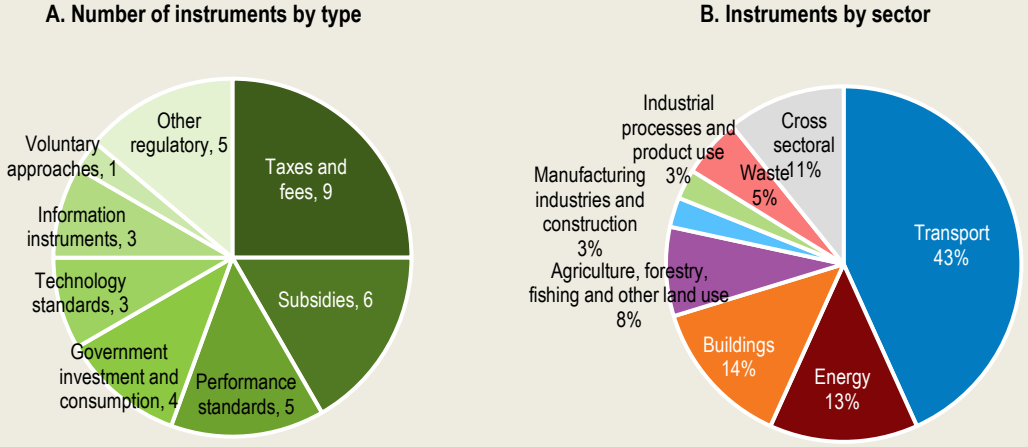
4.2.1. Strengthening environmental policies

According to the OECD's Inclusive Forum on Carbon Mitigation Approaches (IFCMA) stocktaking of climate change mitigation policies, Chile uses mostly taxes and subsidies rather than regulatory approaches to mitigate climate change, largely in the transport and energy sectors, the main emitters (Box 4.2). Work is underway to start a review of the effectiveness of regulatory measures to reduce CO_2 emissions. Overall, more consistent price signals and more stringent regulations are needed, coupled with the phase out of fossil fuels in favour of greener options, as discussed below.

Box 4.2. IFCMA Stocktaking and GHG mapping of climate mitigation policy instruments

The Inclusive Forum on Carbon Mitigation Approaches (IFCMA) is the OECD's flagship initiative to enhance the global impact of efforts to reduce GHG emissions through improvements in data collection and dissemination, and exchange of evidence-based experience on the effectiveness of different carbon mitigation approaches. One of two pilot studies that IFCMA is conducting is for Chile, including taking stock of its climate change mitigation policy instruments and estimates of the GHG emissions that these instruments cover. There are 36 main mitigation policy instruments (Figure 4.6), 9 of which are taxes and fees, and they are applied mainly in the transport and energy industries, the sectors that account for most emissions.

Figure 4.6. Policy instruments for climate mitigation in Chile



Note: Panel A: one instrument can be applied to several sectors.
Source: IFCMA Stocktaking of Policy Instruments, Chile pilot study.

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Chile has advanced regulation in several areas, like addressing air pollution through the Environmental Regulation Programmes (PRAs) and introducing a Law on Energy Efficiency to reduce energy intensity by at least 10% by 2030, but there is scope to strengthen environmental impact evaluations to adjust existing regulations to environmental objectives, as recommended in the 2022 OECD Economic Review of Chile.

Higher carbon pricing can accelerate the shift to cleaner energy

Meeting decarbonisation targets will require higher carbon prices, along with other measures. At USD 5 per tonne of CO_2, the tax on carbon emissions from stationary sources is low by international standards (Figure 4.7, Panel A) and significantly lower than the social cost of carbon, estimated by the government at USD 63.4 per tonne of CO_2 (Ministry of Social Development and Family, 2024[33]). The coverage of the carbon tax also needs to be broadened, as it currently covers only a third of GHG emissions (Figure 4.7, Panel B). Since 2022, the tax applies to all stationary sources that annually emit 100 or more tonnes of $PM_{2.5}$, or 25 000 or more tonnes of CO_2 per year, without exclusion of any sector (OECD, 2024[2]). This is an expansion of the tax base, which is welcome, as research suggests that it will increase the tax coverage from 39% to 45% of CO_2eq emissions (IMF, 2023[34]). Additionally, a 2023 reform effectively exempts power plants using renewable sources from the carbon tax as of 2024, in line with a recommendation from the previous OECD Economic Survey (OECD, 2022[35]) (Table 4.1), which is welcome since it eliminates a distortion that reversed the incentive to invest in cleaner technologies intended by the tax.

A medium-term objective of a carbon price of at least USD 35 per tonne would better reflect the true social cost of polluting, as suggested in the previous 2022 OECD Economic Survey of Chile, although even that would likely still be insufficient. Estimates suggest that if the carbon tax had been set at USD 15 per tonne of CO_2 in 2024 and then increased linearly to USD 60 per tonne of CO_2 by 2030 that would have brought GHG emissions in line with the NDC target by 2030, but that a more modest increase to USD 50 will fail to do so (IMF, 2023[34]). Other estimates suggest that to meet emission goals a much higher carbon tax would be needed (O'Ryan, Nasirov and Osorio, 2023[36]).

Table 4.1. Past OECD recommendations to make growth more sustainable and greener

Recommendations	Action taken since the 2022 Survey
Accelerate progress in decarbonising the economy through more stringent regulations and more consistent price signals, using both carbon taxes and cap and trade systems, while protecting the purchasing power of vulnerable households.	The government plans a reform to address carbon pricing but there is no date for this bill to be presented to Congress.
Consider accelerated exemptions for power plants using renewable energy sources from the carbon tax.	A 2023 reform exempting power plants using renewable sources from the carbon tax should be applicable from 2024 onwards.
Consistently apply the price of greenhouse gas emissions in public sector cost-benefit analyses, for example by using an explicit shadow price for greenhouse gas emissions.	The social price of carbon will be formally introduced in standards and procedures of the National System for Investments during 2024.
Explore measures to develop a market for hydrogen, including by creating demand through regulations, for example in the mining sector.	One of the lines of work of the Green Hydrogen Action Plan 2023-2030 deals with reviewing regulation to enable development of a green hydrogen industry. Corfo is supporting projects to increase adoption of green hydrogen in mining and the chemical industry through its Technological Programme for the Use of Hydrogen in the Chilean Industry. The Magallanes Pact seeks to foster public-private collaboration for the development of the hydrogen industry.
Publish information on tax collection and emissions at the level of individual emitters.	Emission levels are published at the individual emitter level at the Pollutant Emission and Transfer Registry (RETC), a public database maintained by the Ministry of Environment.
Develop indicators to quantify the emission reductions of switching to green hydrogen.	The Framework Law mandates that all industrial establishments report, through the RETC, the emissions of greenhouse gases and short-lived climate forcings that they generate. It is updated every two years, soon to be done annually.
Provide specific incentives for collaboration between research institutions and investors on hydrogen-related technologies.	Corfo's programme "Green Hydrogen Transforms Magallanes" aims to establish an R&D pole in that region, attracting scientists, technicians, and specialised personnel. It also supports the establishment of the first Technological Centre for Research on Green Hydrogen in the region. Implementation of the Innovation Centre Magallanes is ongoing.

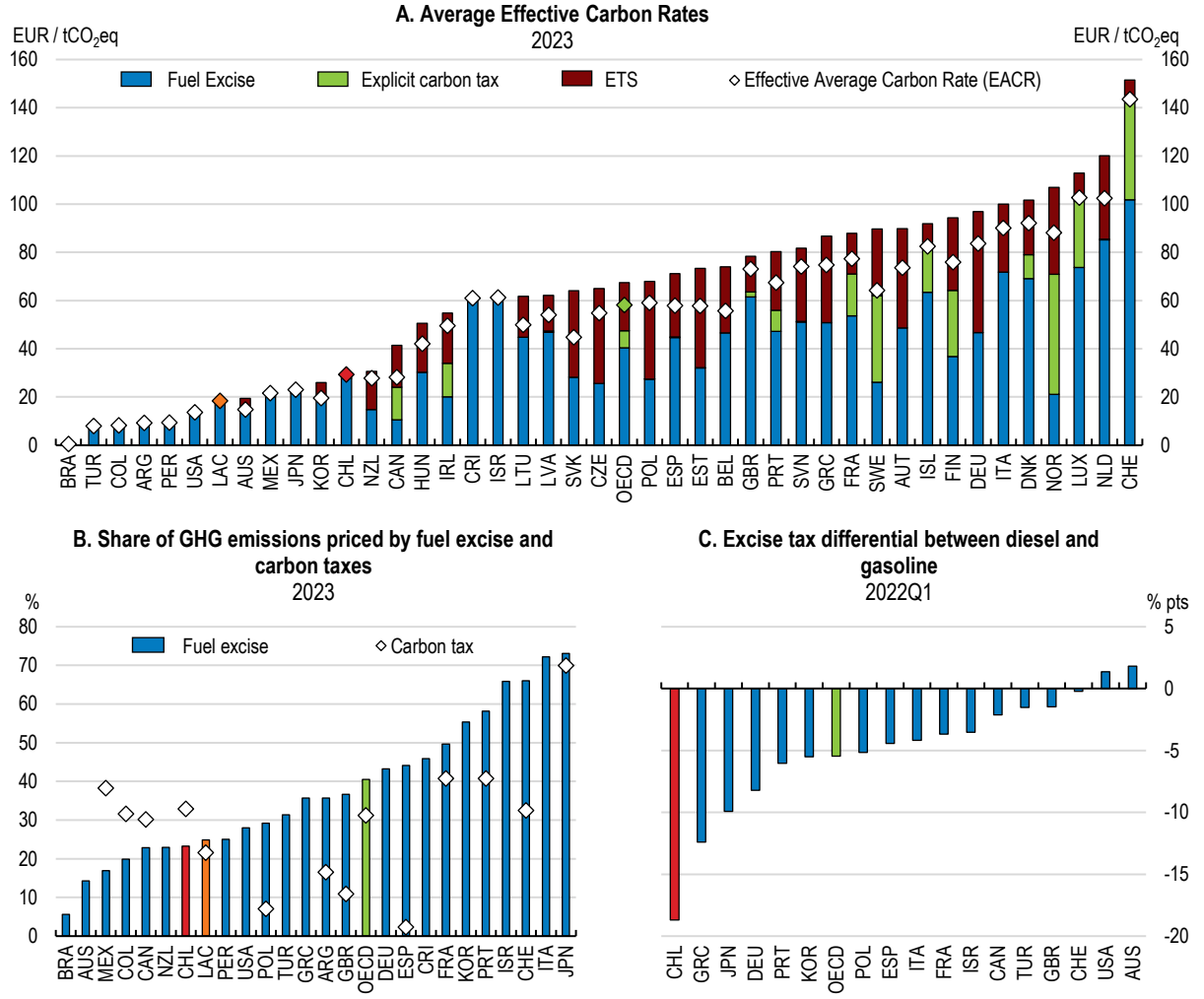
Before increasing the tax rate and coverage, the electricity price-setting mechanism needs to be reformed for carbon pricing to work effectively. Under current regulations, the tax levied on the system's marginal power plant does not count towards the determination of the wholesale market price of electricity (spot price). The tax is excluded even when the marginal plant is fossil-fuel based, which impedes the system from differentiating between plants with higher emissions and higher costs due to the tax, and greener, more competitive plants. To avoid this distortion, the carbon tax should be included in the variable cost of all plants in the economic dispatch of electricity (OECD, 2024[2]).

Taxation on mobile sources of emissions can also be improved as today the system includes excessive exemptions, and low tax rates for diesel. The tax on the sale of new fossil-fuelled, light-duty vehicles has many exemptions, like vehicles with nine seats or more that are used for passenger transportation, vehicles used as taxis, police and armoured trucks, tractors, and trucks for loads up to two tonnes. The tax does not apply either to taxpayers who pay VAT on the purchase of those pick-up trucks if they become one or their fixed assets.

The design of excise taxes on fossil fuels has multiple distortions and is inefficient. Fuel excise effective carbon rates are among the lowest in the OECD (Figure 4.7, Panel A), and excise taxes apply only to motor vehicle fuels, but fuel for the air, sea and rail transport sectors is exempt. Large-size cargo transport by truck and diesel for off-road vehicles also receive tax refunds. The tax rate for diesel is much lower than for gasoline (Figure 4.7, Panel C), which is not consistent with the difference in their carbon content (EIA, 2023[37]), and has led to Chile's per capita consumption of diesel to double the regional average. Broader carbon pricing on mobile sources could correct these distortions to help meet climate goals. First, the excise rate on diesel could gradually increase to be on par with that of gasoline, as recommended by the OECD (OECD, 2022[35]). Second, sectoral exemptions on the excise tax should be phased out, and exemptions on the tax on the sale of new vehicles could be reduced. Other alternatives are applying the carbon tax for stationary sources in the transport sector, but at a higher level; an ETS, or a hybrid system of higher carbon tax and an ETS (IMF, 2023[34]).

The Tax Modernisation Law introduced a carbon offset mechanism that allows companies to lower their carbon tax burden. Since September 2023, companies can offset their carbon emissions through government-certified GHG abatement certificates linked to projects developed in Chile (or in the municipality in the case of local pollutants). Projects must be approved by the Ministry of the Environment and the emission reductions they will generate must be verified by an external third party. Certificates are sold to companies, who proceed to request the compensation of emissions before the Superintendence of the Environment. The law establishes three general criteria for the projects to be eligible for offsets. First, emission reductions must be additional to any environmental or sector regulation that the taxpayer faces. Second, the reduction in emissions should be measurable and verifiable by the Ministry of Environment. Finally, emission reduction projects should operate during the time that the taxpayer is liable to the green tax. The initiative is slowly taking off, and as of 2024, 8 projects had been certified for the system. During its initial phase, the system will consider existing projects already registered in three internationally recognised standards: the Clean Development Mechanism (CDM) of the UNFCCC, the Verified Carbon Standard (VCS) of Verra, and the Gold Standard for the Global Goals from the Gold Standard Foundation. To avoid greenwashing, appropriate verification of emissions reductions needs to be in place and offsets should continue to be limited to projects located in Chile.

Figure 4.7. Carbon taxes have low effective rates and coverage



Note: LAC is a simple average of Colombia, Costa Rica, Mexico, Argentina, Brazil, and Peru. Panel A: Effective carbon rates are averaged across all GHG emissions, excl. LUCF, including those emissions that are not covered by any carbon pricing instrument, for each of the 79 countries. Effective Average Carbon Rates account for free allocation of allowances in emissions trading systems. All rates are expressed in 2023 EUR using the latest available OECD exchange rate and inflation data. Prices are rounded to the nearest eurocent. Other GHG emissions data are from CAIT (Climate Watch, 2024) while the data on CO_2 emissions from energy use are based on the IEA World Energy Balances (IEA, 2023). ETS coverage and free allocation estimates are based on the OECD's Effective Carbon Rates 2023, with adjustments to account for recent coverage changes, newly added countries and systems. Panel C: Differential between excise taxes as a share of final price.
Source: OECD Carbon Pricing and Energy Taxation Database; Pricing Greenhouse Gas Emissions 2024 (OECD, 2024[38]); IEA Database on energy prices and taxes.

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The government plans a reform to address carbon pricing, including revising the rebate system for the fuels excise tax and the design of the electricity dispatch system. The reform is also expected to include a "cap-and-tax" scheme, to be based on the Output-Based Pricing System Regulations of Canada, in which companies whose emissions surpass benchmarks will either pay the carbon tax or compensate emissions with offsets, while companies with emissions below benchmarks will issue certificates to be sold. The "cap-and-tax" is seen as a first step towards an Emissions Trading System (ETS) which would reduce emissions and help to meet mitigation commitments (Benavides et al., 2021[39]; IMF, 2023[34]). The framework law already introduced emission standards and tradable carbon credits. Chile should accelerate the development of an ETS and increase carbon prices, as the current carbon tax rate limits certificates to abatement efforts whose cost is below USD 5 per tonne of CO_2 (OECD, 2024[2]).

Fiscal support to fossil fuels should be reduced.

Although some subsidy programmes aim to help decarbonise the economy, like those promoting electromobility in taxis, buses and trains, there is still considerable fiscal support for fossil fuels that undermine decarbonisation efforts, like a refund scheme for the diesel excise. Support measures for fossil fuels averaged 0.23% of GDP over 2017-2022, 0.16 percent points corresponding to tax expenditures and the rest to direct transfers. This figure is below the average of 0.42% for the other Latin American OECD countries for the same period (OECD, 2023[40]).

The Stabilisation Mechanism of Fuel Prices (MEPCO) limits fluctuations in domestic prices of gasoline and diesel when international fuel prices change. It does so by adjusting the taxation on diesel and gasoline, depending on international oil prices and the exchange rate. A similar mechanism, the Petroleum Price Stabilisation Fund (FEPP), targets kerosene, which is widely used for heating. These mechanisms should remain neutral to avoid providing support for fossil fuels and weaken incentives to switch to greener sources of energy. Before 2021 and during the first half of 2023, MEPCO effectively stabilised prices without significantly subsidising fossil fuel consumption. During the first seven months of 2023, when international oil prices were below local prices, MEPCO helped raise an additional USD 0.7 billion in taxes on fossil fuels (OECD, 2024[2]). Chile's long-term focus should be on building resilience and investing in the clean energy transition with emergency relief for fossil fuel price volatility phased out eventually (OECD, 2024[2]).

4.2.2. Improving sectoral policies to accelerate decarbonisation

Decarbonisation efforts should focus on the energy sector. At present, around 30% of Chile's emissions are caused by energy industries, as fossil fuels remain the main source of energy supply, with 67% of the total in 2023 (Figure 4.8, Panel A). Decarbonising the transport and mining sectors, maintaining carbon sequestration capacity, and improving energy efficiency in buildings will also be key to meet climate goals.

Electricity: making the most of renewables potential

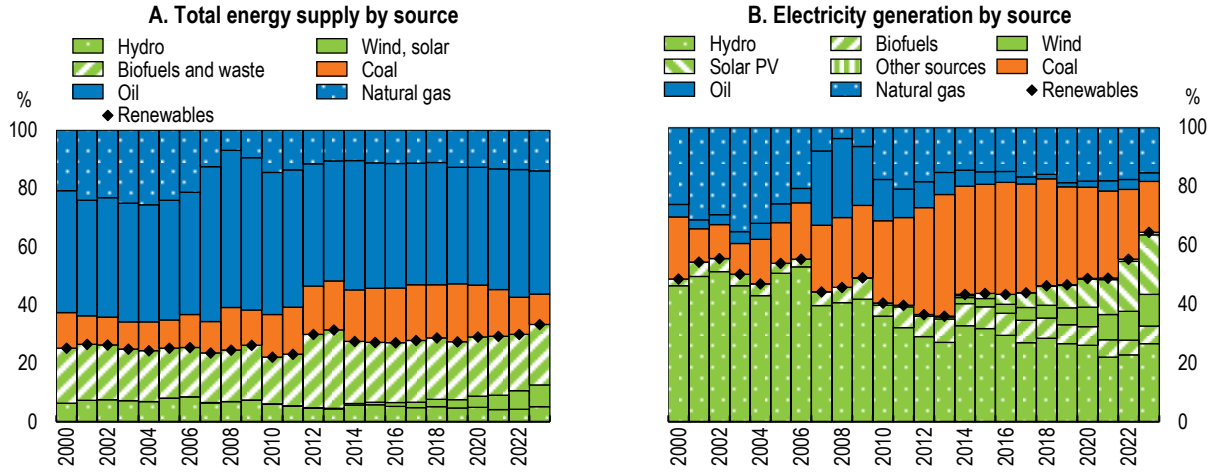
Chile can leverage further its remarkable potential for renewable energy generation at relatively low cost. The country is developing a hydrogen industry that can help decarbonise hard-to-abate sectors like heavy industry and cargo transport. According to National Green Hydrogen Strategy, more than 20% of carbon emissions could be efficiently mitigated with the use of green hydrogen by 2050.

A phase-out of coal-fired plants is ongoing: eight of these plants closed between June 2019 and December 2023, and by 2025 ten more will be ready for closure or reconversion, leading to a 65% decrease in installed capacity from 2019 levels. By 2040, the remaining 10 coal-fired plants will close or reconvert. The phase-out of coal-based power plants requires ensuring that the power sources that replace them maintain the security of supply requirements, which will involve additional investment costs for the electricity sector (Hauser et al., 2021[41]). In November 2024, the Ministry of Energy put to public consultation its Electricity Decarbonisation Plan, focused on modernising the electricity market and network, accelerating the reconversion of coal-fired plants, and engaging with communities affected by decarbonisation of power plants. Chile should complete the closure of remaining coal-fired plants adopting a stepwise plan and clear timeline.

Chile intends to reach 80% of electricity from renewable sources by 2030 and 100% from renewables and other energy sources with carbon capture in 2050, phasing out coal by 2040. Renewables already account for most of Chile´s electricity generation (Figure 4.8, Panel B), as the country has progressed in exploiting its considerable advantages. Its photovoltaic power potential is the highest in the OECD (Figure 4.9, Panel A), and it has the best onshore wind resources in the world, concentrated in the southern Magallanes region (Ministerio de Energía and GIZ, 2014[42]), along with high offshore wind technical potential (Figure 4.9, Panel B). Growing demand for electricity will put additional pressure on renewable generation.

Electrification of transportation and some mining processes, and the government intention to develop a green hydrogen industry will require significantly increasing the current capacity. Producing green hydrogen is particularly electricity-intensive, as the annual production of a million tonnes of green hydrogen requires 20 gigawatts (GW) of renewable power generation (Gielen, Lathwal and López Rocha, 2023[43]). The Energy Transition law, under discussion in Congress, aims to increase the contribution of renewables to the energy mix through efficient development of transmission networks, by improving tender processes and promoting energy storage.

Figure 4.8. Fossil fuels still account for most of the energy mix



Note: Total energy supply includes all the energy produced in or imported to a country, minus that which is exported or stored. It represents all the energy required to supply end users in the country. Panel B: Other sources include solar thermal and geothermal.
Source: International Energy Agency.

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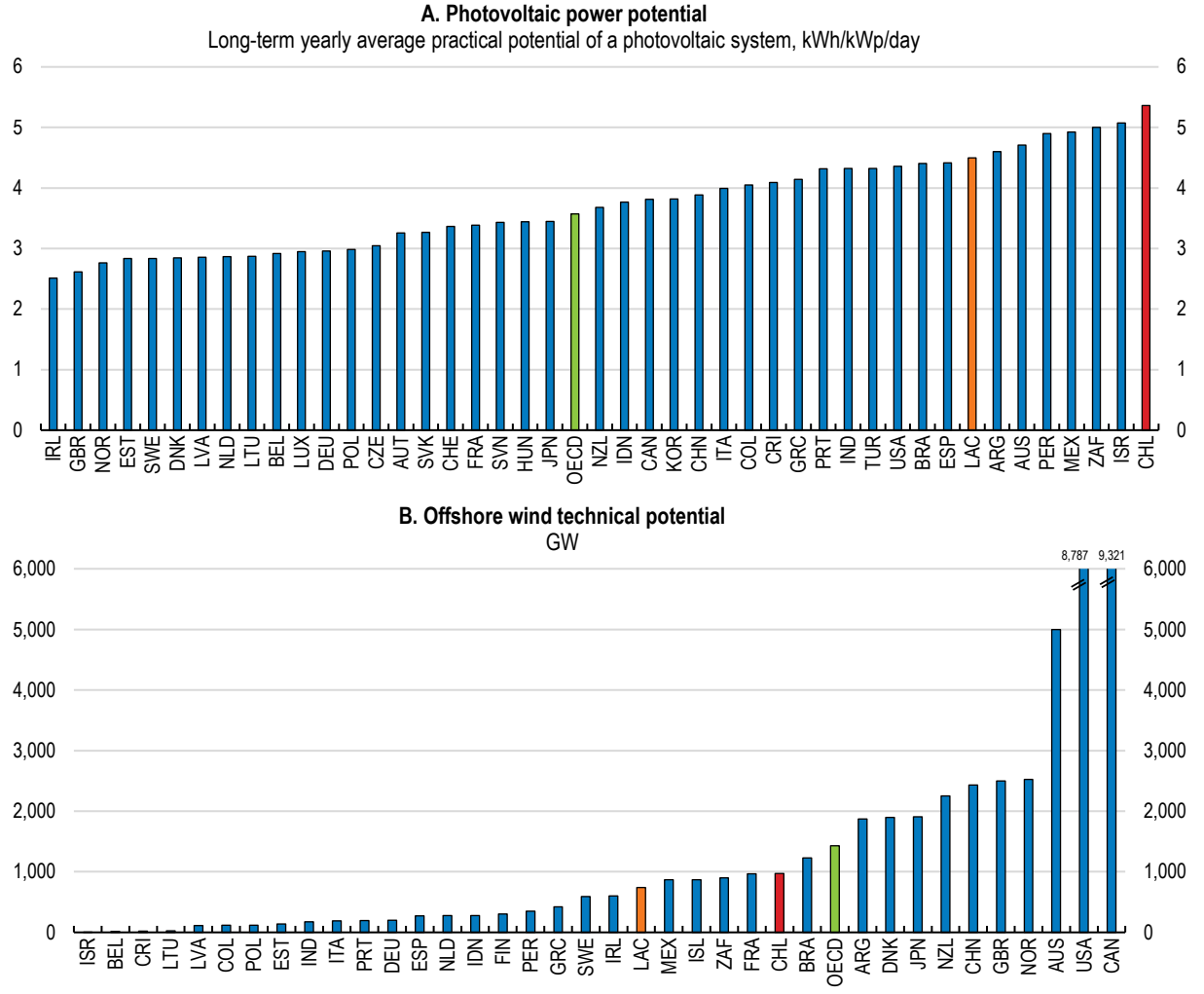
Chile should accelerate the expansion of transmission lines to further integrate the electricity market to ensure the take up of renewable electricity. Lack of transmission lines from renewable generation in the north and south to the centre of the country meant that up to 290 GW hour of solar- and wind-generated electricity were not used in 2022 and has also led to electricity price disparities between supply and consumption areas (OECD, 2024[2]). Recent research has shown that market integration through grid expansion reduces regional price disparities, boosts investment in renewables, and lowers generation costs and pollution (Gonzales, Ito and Reguant, 2022[44]). Modernising the electricity market and grid infrastructure is one of the goals of the Decarbonisation Plan being implemented by the Ministry of Energy. Reducing administrative barriers and ensuring coordination with local governments and communication with local communities, are crucial for the efficient planning and execution of grid expansion projects, while also safeguarding the environment and the well-being of residents. The transmission line project to connect Kimal (north) to Lo Aguirre (centre), which is key to advance decarbonisation of the electricity mix, is in the environmental assessment phase and is expected to begin operation in 2030.

Figure 4.9. Chile has remarkable renewable energy potential



Note: LAC is a simple average of Colombia, Costa Rica, Mexico, Argentina, Brazil, and Peru. Panel A: Data for Chile exclude land south of parallel 45°S. The estimation excludes land with identifiable physical obstacles to utility-scale photovoltaic plants. Panel B: includes potential fixed and floating foundations.
Source: World Bank (2020), Global Solar Atlas; World Bank (2020), Global Wind Atlas.

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Increasing energy storage capacity will also help to optimise renewable energy generation and deployment, given the inherent variability in solar and wind power generation. Chile is making progress on increasing short-term storage capacity, but also needs to further develop long-duration energy storage solutions. By late 2023, most solar and wind projects submitted for environmental assessment included energy storage facilities, and in 2024 the largest storage battery park in Latin America opened in northern Chile. Battery parks and similar short-term storage can usually manage intra-day intermittence, which is especially helpful for solar power. However, wind generation can have longer periods of intermittence requiring long-duration energy storage (LDES) solutions that can handle intermittences of days or even weeks. A supporting policy framework for LDES development needs to include creating pathways for access and uptake, providing long-term market signals on the trajectory of the energy system, and establishing clear revenue mechanisms that enhance the viability of projects (LDES Council, 2023[45]). The government aims at having 2 GW of total storage capacity installed over 2025-2027. Chile updated in 2024 its regulations for capacity transfer between energy producers to also include energy storage systems.

This amendment defines a remuneration scheme which will help potential investors in energy storage to estimate future revenues, reducing uncertainty and promoting investment. The reform of rules on coordination between producers, and operation is pending and should be prioritised.

Developing the green hydrogen industry

Chile's potential for renewable generation has made green hydrogen a key part of its decarbonisation plans, as it is expected to contribute 21% of GHG reductions by 2050. Hydrogen does not pollute the air when burned and can be produced by applying electricity to water in a process called electrolysis. If the electricity used comes from renewable sources, the product is green hydrogen. Hydrogen can also be turned into synthetic fuels like ammonia, methanol, or methane. Given that it is highly reactive, hydrogen is expected to help decarbonise hard-to-abate sectors like mining and heavy transport.

The government launched an ambitious hydrogen strategy in 2020, aiming to reach 5 GW of electrolysis capacity by 2025 and 25 GW by 2030 (Box 4.3). Four years later, the strategy is falling behind its goals. Total capacity of operational projects is unlikely to reach the goal set for 2025. As of December 2023, there were only six projects in operation in Chile, three projects in final investment decision or under construction, and 72 projects in the concept stage, under feasibility study or under environmental assessment (IEA, 2023[46]; H2 Chile, n.d.[47]). Recent modelling suggests that to profit from its green hydrogen potential, Chile should start as soon as possible to develop hydrogen production through electrolysers, keep investing in wind and solar generation, reinforce the power transmission grid, foster the use of hydrogen for long-haul trucks and interprovincial buses, and develop seasonal hydrogen storage and hydrogen cells (Ferrada et al., 2023[48]).

The successful development of a green hydrogen industry can boost employment in several regions, attract investment, increase exports, and support growth. Additional revenues from the industry could be used to help diversify the economy and protect the environment. However, realising current plans requires additional technological progress in several areas, including desalination of seawater, improving regulation, and training enough workers with the skills needed for the industry. Moreover, Chile needs to improve licensing processes to provide certainty to firms and attract investment, ensure the provision of an adequately prepared workforce, and develop appropriate infrastructure, including ports and pipelines.

The Magallanes region, which is poised to become a green hydrogen hub, has shallow ports that lack infrastructure and move little sea freight. The Action Plan for Green Hydrogen aims to develop additional port infrastructure, with better road and rail connectivity, and mandates the state-owned oil company (ENAP) with transforming existing fuel-logistics installations to be used for green hydrogen. The government expects that the Magallanes Pact, announced in 2024, will help develop critical infrastructure, human capabilities, and productive linkages through collaboration between local and national governments, and green hydrogen projects in the region.

Estimates suggest that green hydrogen production costs in Chile are around USD 2 / kg (COCHILCO, 2022[49]), while estimates for other parts of the world range from USD 3 / kg to USD 10 / kg (Lee and Saygin, 2023[50]). However, developing a green hydrogen industry will require significant investments, whose financing and execution will determine how cost-effectively Chile can scale up its production capacity. A common rule of thumb is that the annual production of a million tonnes of green hydrogen requires 10 GW of electrolysers and USD 30 billion in investment (Gielen, Lathwal and López Rocha, 2023[43]). This would mean that reaching the strategy goal of 25 GW electrolysis capacity by 2030 requires an investment of around USD 75 billion, or 22% of GDP. An investment of this size requires diversifying and sharing risks, for example through public-private partnerships and blended finance, to avoid compromising already strained public finances (see Chapter 1 and section 4.4). Chile has announced a financial facility of USD 1 billion to help GH2 investment projects reach their final investment decisions.

There is room to lower electricity costs for green hydrogen projects. More than 50% of the cost of producing green hydrogen comes from renewable energies, so it is key to ensure that energy supply and prices are stable and predictable (Frankfurt School of Finance & Management, 2023[51]). The cost of energy to make viable green hydrogen projects assumed in the 2020 Strategy did not include other costs of energy like transmission system costs and ancillary services. Adding these costs results in uncompetitive final prices for hydrogen and ammonia. A promising measure to lower electricity supply costs is implementing grid enhancement technologies (GET) (Finat, 2024[52]). These technologies include control devices, sensors, and analytical tools that improve the efficiency in the transmission of electricity across the existing infrastructure, reducing congestion when electricity demand is high, and helping delay the need for building new transmission lines. Allowing generators of non-conventional renewable energies to participate in the market for ancillary services that support the transmission of power from generators to consumers, which is possible under current regulation, can also lower costs (Finat, 2024[52]).

Building an enabling environment is also key to attract funding for green hydrogen, especially regarding the ease of doing business and regulatory transparency. Regulatory and administrative burdens remain comparatively high in Chile (see Chapter 1), with complex sectoral permitting processes that lack systematised and readily available supporting information, with long durations (Figure 4.10), multiple rounds of observations, and high rates of rejection (CNEP, 2023[53]). Environmental impact assessments are long, taking on average 25 months, and institutions can make observations in matters outside their remit, delaying investments. For example, a desalination plant, crucial for large-scale electrolysis of sea water, can take more than 11 years before it can start working (CNEP, 2023[53]).

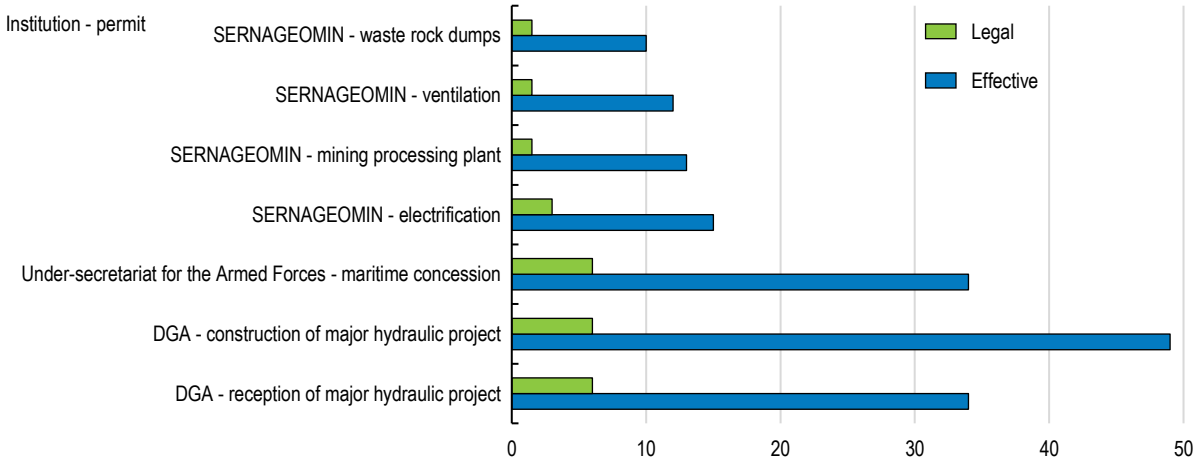
Two recent initiatives to improve and update regulation for decarbonisation and energy transition can increase Chile's attractiveness for green hydrogen projects. The bill of the Law for Sectoral Authorisations aims to cut by a third the time to obtain all permits to start a business (see also Chapter 1). It establishes maximum periods for all procedures, introduces proportionality criteria, clarifies the rules for the application of "silence is consent" provisions, requires an assessment of admissibility before starting a permit review process, and creates a one-stop-shop for all permits. Another bill of law strengthens the technical nature of the environmental assessment process by eliminating political bodies from the decision chain. Additionally, to streamline processes and reduce timelines, the government has allocated additional resources to hire professionals and implement management measures in public services dealing with the most critical bottlenecks.

Support from the government can lower the high capital burden for investors in green hydrogen projects until the market can attract more private capital. The government is providing funds to boost green hydrogen production through several programmes (Box 4.3), and the Action Plan will create tax credits to promote green hydrogen projects that foster the transfer and development of new technologies, including decarbonisation of production. Direct support can be more transparent than tax incentives and their effectiveness must be regularly evaluated to ensure that public funds are being used efficiently. Including green hydrogen in national taxonomies can also help attract investors.

The government has received nine expressions of interest from companies to set up production plants for electrolysers and plans to provide incentives for these companies from 2024. The government is also funding R&D on green hydrogen to reduce knowledge gaps on technology and infrastructure, scale up capacity and reduce costs. Corfo and the regional government of the Magallanes region are running the programme "Green Hydrogen Transforms Magallanes", to establish an R&D pole on green hydrogen and its derivatives, and expects to attract scientists, technicians, and specialised personnel. Corfo expects to replicate this programme in the Bío-Bío region.

Figure 4.10. The review of permits often exceeds legal times

Legal vs. effective reviewing time, average 2018-2022, months



Note: SERNAGEOMIN: National Service of Geology and Mining, DGA: General Directorate for Water.
Source: (CNEP, 2023[53]) Análisis de los permisos sectoriales prioritarios para la inversión en Chile.

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On the demand side, the government wants to assess potential demand for hydrogen and its derivatives by developing a long-term planning methodology. Other initiatives include gauging demand in the industrial sector through reconversion and processes adaptation to switch to hydrogen and using green hydrogen in mining trucks. The government is preparing regulations to encourage hydrogen demand, including for fuel stations, hydrogen quality standards, and road transportation of hazardous loads. A careful assessment of whether using hydrogen makes sense is needed to avoid promoting its use in applications where it might be replaced by cheaper or more convenient alternatives.

Safety considerations could discourage some workers or communities from engaging in the hydrogen sector. The Action Plan aims to increase coordination between the Ministry of Health and the Superintendency of Electricity and Fuels to speed up the approval of permits regarding worker and community exposition to risks. Reducing gaps and overlaps on supervision by both entities should be prioritised. Furthermore, improving communication to reduce gaps between perceptions and reality of risks, establishing training standards for safe hydrogen handling, and ensuring that technical education curricula comprehensively cover hazard reduction, can help assuage safety concerns (OECD, 2023[54]). Reducing the environmental impact of the green hydrogen industry is also key to increase its attractiveness. In Chile, water for electrolyser plants in the Magallanes region would come from desalinated seawater, which would produce substantial amounts of leftover brine. Disposing brine in the sea can harm the surrounding marine environment. Regulations associated with the extraction and desalination of seawater should be strengthened, including the management of environmental impacts (OECD, 2024[2]). Recent technical breakthroughs have allowed to produce hydrogen directly from untreated seawater and to use brine to make valuable chemical byproducts. Fostering innovation through continued support for R&D and technical education can prepare the hydrogen industry to implement these advances under local conditions to reduce environmental impacts.

Box 4.3. The National Green Hydrogen Strategy and the Action Plan 2023-2030

Goals of the National Strategy

The Strategy was launched in 2020. An advisory board with experienced public policy and climate action experts will advise the Ministry of Energy. The Strategy foresees three waves of implementation:

- *Wave I: 2020-2025*: Domestic ramp up and export preparation. The goal is to have an electrolysis capacity operating and under development of 5 GW, and to be the top destination for green hydrogen investment in Latin America.
- *Waves II & III: 2025-2030 & 2030 onwards*. The goal is to produce 25 GW by 2030, with the lowest cost in the world, and becoming leaders in export of green hydrogen and its derivatives.

The Action Plan

- *First window (2023–2025):* which aims at establishing the regulation required and strengthening ties with potential customers. This will require an efficient permitting system, setting fiscal incentives, amending regulation, establishing environmental and social standards, and promoting local demand.
- *Second window (2026–2030):* focused on starting to develop productive capacity, with attention to local development. This phase entails establishing tailored land management instruments, establishing the required regulation, and training enough workers.

Government funding for green hydrogen development

The Chilean government provides funding for green hydrogen production through several initiatives:

- Corfo, the Chilean Economic Development Agency, is promoting R&D in green hydrogen (20 initiatives in evaluation), innovation in technology (36 initiatives in evaluation), and increasing competencies in green hydrogen. It has also provided USD 50 million in direct subsidies to firms developing green hydrogen projects larger than 10 MW with operation starting before 2025.
- Facility for the Development of Green Hydrogen and its Derivatives: The facility (USD 1 billion) aims to provide collateral and credit for financial entities to support green hydrogen projects, including wind and solar plants, transmission lines and desalination facilities, as well as fostering local demand for green hydrogen, providing capacity building, supporting innovation and entrepreneurship, and strengthening local supply chains and export capability. The facility was set up with USD 250 million from Corfo, and credits from the Inter-American Development Bank (USD 400 million), the World Bank (USD 150 million) and USD 100 million each from the KfW Development Bank and the European Investment Bank.

Source: (Government of Chile, 2020[55]). National Green Hydrogen Strategy. (Government of Chile, 2024[56]). Plan de Acción de Hidrógeno Verde 2023-2030, and Corfo.

Transport: stepping up progress towards electromobility goals

Decarbonising the transport sector, which currently represents 26% of GHG emissions and has high emission intensity (Figure 4.11, Panel A), will be key to meet climate goals. However, energy consumption by transport rose 35% since 2010, to reach one third of total consumption in 2020. Chile's GHG emissions scenarios for 2020-2030, based on sectoral carbon emission budgets under current plans, allow transport emissions to increase the most relative to other sectors. This suggests that it will be difficult to meet the target of reducing transport-related GHG emissions by 40% by 2050 compared to 2018 levels (OECD, 2024[2]). Chile should set more stringent intermediate GHG emission targets for the transportation sector, along with investing in public transport infrastructure and promoting affordable electromobility.

Public transportation outside Santiago needs to improve. The efficiency of Chile's train services was ranked 61 out of 103 in the 2019 World Economic Forum's Global Competitiveness Report, far below OECD countries. Outside Santiago, there is little integration between buses and other transportation means, with exceptions like Valparaíso and Concepción. The Trains for Chile project will link communities in Valparaíso with the Greater Santiago area by 2030, but Chile needs to keep expanding investment in sustainable public transportation and improve its accessibility, efficiency, and coverage in urban areas with a specific focus on small- and medium-sized cities (OECD, 2024[2]).

Chile has an ambitious Electromobility Strategy aiming that by 2035 all new urban transport units and sales of light vehicles and heavy machinery will be zero-emissions, by 2040 all sales of machinery and all urban public transport buses, and by 2045 all inter-city buses and land freight units. To reach the targets, progress needs to pick up, as light and medium electric cars were only 3% of sales in 2023 (Figure 4.11, Panel B), one of the lowest shares in the OECD (IEA, 2023[57]). Reducing access to high-emitting vehicles and deploying sufficient public charging infrastructure is needed to speed up the uptake of greener vehicles (ITF, 2023[58]).

Fiscal incentives, such as tax incentives, can increase the uptake of low and zero-emission vehicles, but must be carefully designed to avoid some of their pitfalls and only be used after careful cost-benefit analysis. Low- and zero-emission vehicles pay reduced or no vehicle circulation tax in Chile, and owners can apply a shorter useful life for tax purposes. However, there is evidence that a sizable portion of subsidies can go to consumers who would purchase a low-emission vehicle even without the incentives (Fournel, 2023[59]). Incentives should be targeted at the most polluting vehicles, like schemes where buyers of low-emission vehicles receive a financial payment to retire their less efficient models (Fournel, 2023[59]; Camara, Holtsmark and Misch, 2021[60]), or, preferably, to programmes aimed at heavy vehicles, like the "Change your truck" programme implemented in Chile in 2009-2011. For these schemes to reduce emissions, subsidies should not apply for the purchase of fossil-fuel vehicles and be conditional on the vehicles to be retired (Linn, 2020[61]). Several OECD countries have subsidy programmes for the acquisition of electric trucks, like the Netherlands, where the amount depends on the size of the company buying the vehicle, or France, where grants can reach up to 40% of the cost of a new electric truck (IEA, 2023[62]).

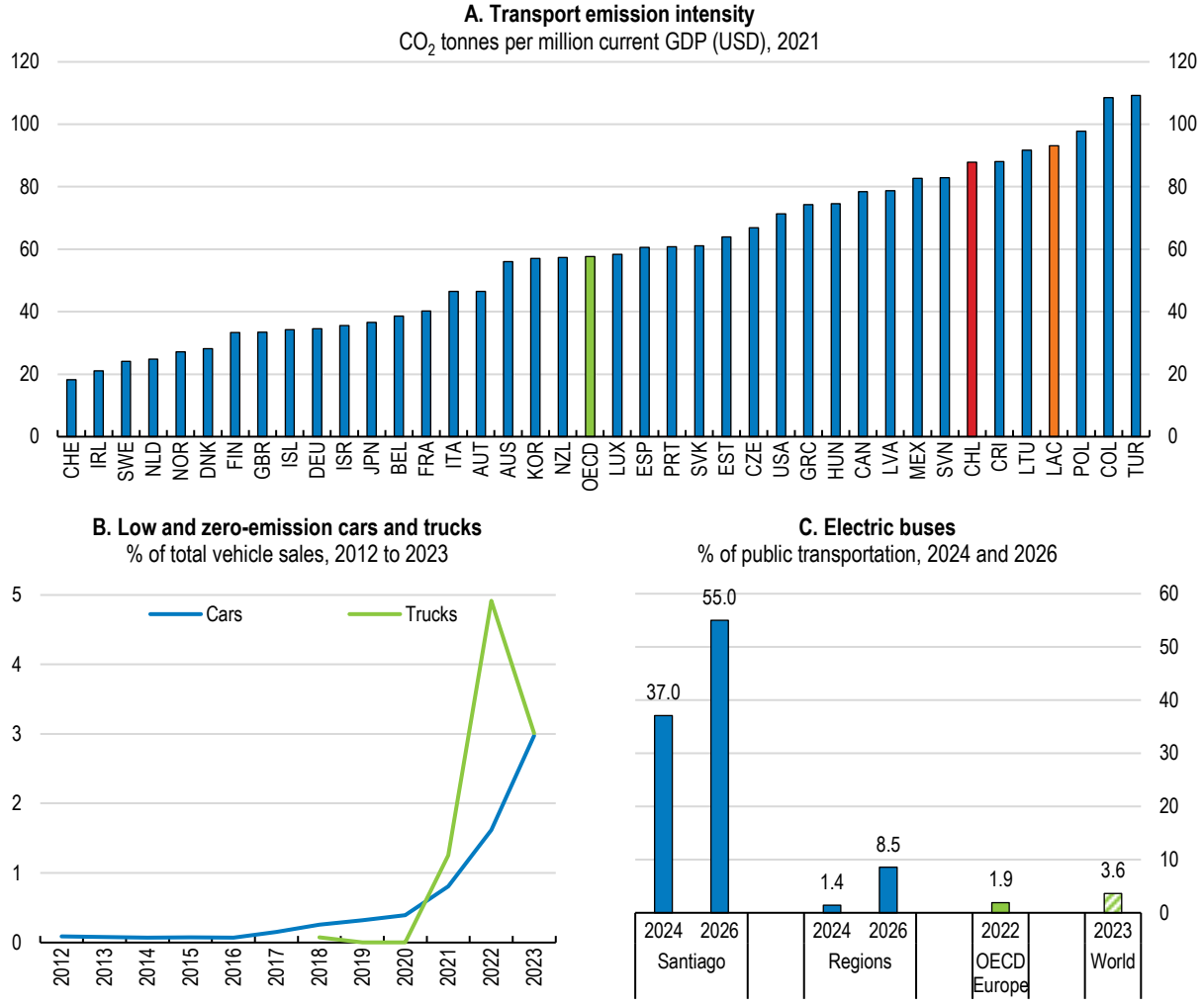
Chile will need to increase its electricity charging infrastructure. Growth in electric vehicles depends on the ability to match rising charging demand with accessible, reliable, and affordable infrastructure, either through private charging in homes or at work, or publicly accessible charging stations (IEA, 2023[63]). Chile has a reasonable amount of charging points for the size of the current electric vehicle stock, but 70% of public charging infrastructure is in the metropolitan area. The Ministry of Energy and the Energy Sustainability Agency are working on infrastructure plans at a national level and in the northern regions to identify suitable locations for the installation of more charging points, that should be no further than 100 km from intercity highways. This can contribute to increase the use of electric vehicles, and facilitate the electrification of long-haul freight, which currently lags that of urban freight. A functional interoperability platform for charging systems began operations in November 2024, which will allow users to find information on location, type of infrastructure and price of available charging stations, all of which should be fully compatible with any electric vehicle.

Decarbonisation of public transportation has made notable strides, but most of the advance is concentrated in the metropolitan region, where most of the population resides. As of early 2024, around 37% of public buses in Santiago were electric, well above the world and OECD-Europe shares, and that number is expected to rise to 55% by the end of 2026 (Figure 4.11, Panel C). The city has the largest fleet of electric buses outside of China, but the rest of the country only has electrified 1.4% of its fleet.

Developing a functional electric bus ecosystem outside Santiago should be a priority. A bill of law under discussion in Congress requires that at least 50% of resources from the Regional Support Fund are directed to public transportation. Other cities could benefit from the lessons learned from expanding

sustainable transport in Santiago. However, discussions and design of projects are very centralised, and the institutional framework for urban projects is atomised between ministries, regional governments, and municipalities, which can lead to lengthy processes to execute investment due to poor coordination. Achieving economies of scale in electrification of bus fleets in smaller urban centres can also be difficult, as regional companies are smaller and many lack capacity to invest in vehicles that usually become cheaper to operate than diesel alternatives only after seven years. Bridging skills gaps in project management between regional and central administrations, regulating regional companies' operation through contracts with the State, and providing economic incentives to small companies outside Santiago to buy electric buses can help accelerate the pace of electric infrastructure deployment in Chilean regions.

Figure 4.11. Decarbonisation of transport must scale up



Note: LAC is a simple average of Colombia, Costa Rica, and Mexico.
Source: A: ITF Transport Statistics database B: (ANAC, 2023[73]), Reports on sales of low-emission vehicles 2022 and 2023; (ANAC, 2023[74]). Automotive Market Reports 2021, 2022, 2023 C: Government of Chile projections, Eurostat, IEA Global EV Data Explorer.

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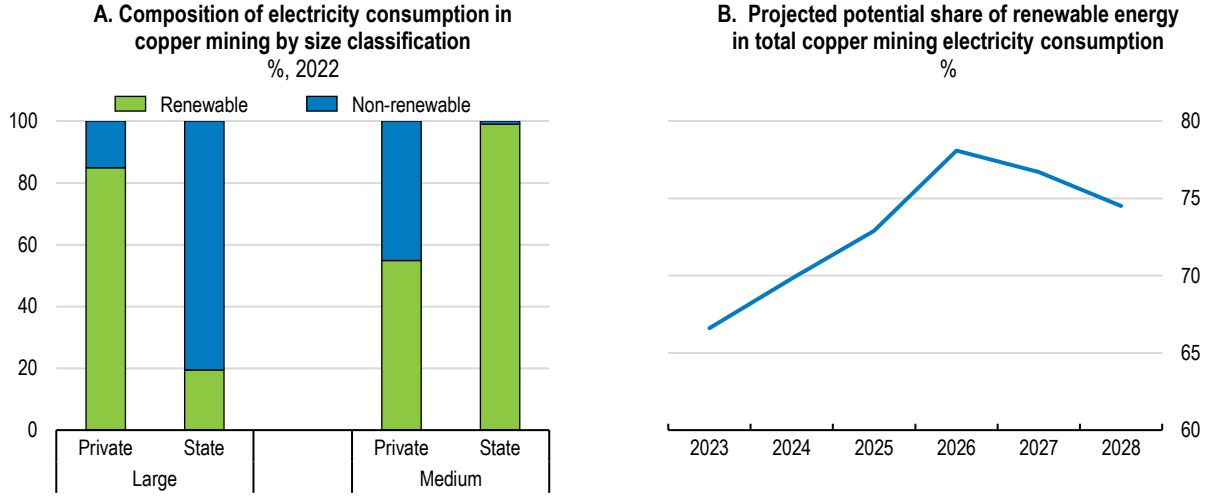
Emission standards for new vehicles can help reduce emissions from road transportation. Chile was the first country in Latin America to incorporate the EURO VI emissions standards for new light-duty vehicles, which is expected to reduce $PM_{2.5}$ and NO_x emissions by 51% and 55%, respectively, by 2030 (OECD, 2024[2]). However, this might lead to slower fleet renewal rates, particularly in the north, where average

vehicle age is higher and purchasing used cars is more common (De Vicente, 2022[64]). To reduce incentives to buy or sell old vehicles and boost renewal of the fleet, Chile could set higher registration fees for older and more polluting vehicles (OECD, 2024[2]).

Mining: decarbonising production processes

Identifying obstacles to green energy adoption in mining and enacting regulatory measures to overcome them will be key. Mining is one of the main users of energy in Chile and the National Mining Policy sets the goal of it being carbon neutral by 2040. As of 2022, 92% of copper operations were subjected to the Law of Energy Efficiency, and 72% already had energy management systems in place (COCHILCO, 2024[65]) . There is considerable demand for low-temperature heat in copper mining processes that can be supplied with renewable energy with appropriate design and integration. Renewable sources already account for nearly all electricity consumption in medium-scale state copper-mining operations, and 85% in large-scale private ones (Figure 4.12, Panel A), and it could surpass 70% for all the industry by 2027 (Figure 4.12, Panel B). However, large state-owned operations still have a wide gap to close on renewables use. In 2022 only a fifth of the electricity consumption by Codelco, the state company and largest copper producer in the world, was from renewable sources. Codelco has pledged to have a 100% renewable electric supply and to reduce emissions by 70%, compared to 2019 levels, by 2030; and to become carbon neutral by 2050. To fulfil those commitments, it has taken several steps in 2024, including awarding a large public tender for renewable energy. The Ministry of Mining sent for public consultation a plan to address emission mitigation challenges in the mining sector, including the decarbonisation of mining operations and the promotion of energy efficiency in the sector, as well as adaptation measures.

Figure 4.12. Copper mining can decarbonise its electricity consumption



Source: Panel A: (COCHILCO, 2023[66]). Informe de actualización del consumo energético de la minería del cobre al año 2022. Panel B: (COCHILCO, 2024[65]). Proyección del consumo de energía eléctrica en la minería del cobre 2023-2034.

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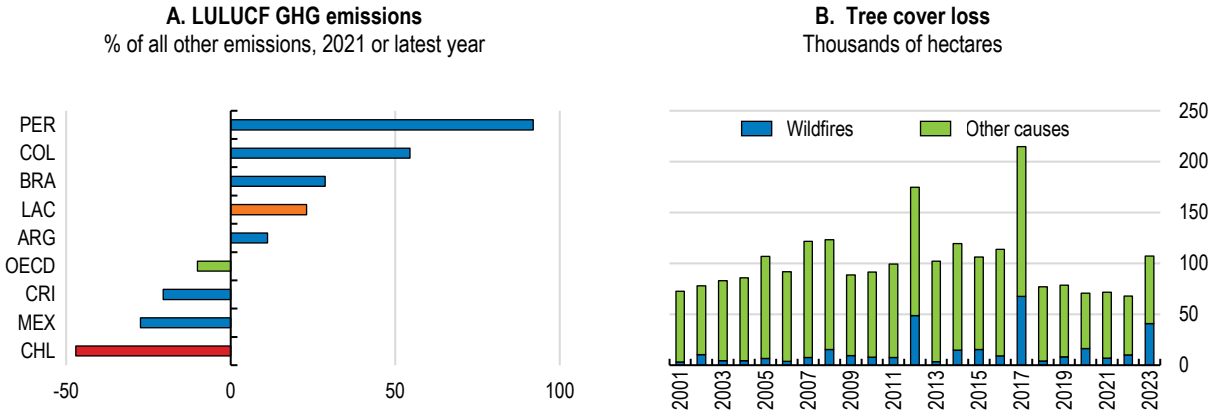
Substituting fossil fuel for electric alternatives in transport of personnel and equipment can also help to decarbonise mining. As of 2022, 86% of large-scale private mining operations, 75% of Codelco operations and 50% in medium-scale private mining operations had electromobility or low-emission plans. Green hydrogen can help abate fossil fuel use in transportation. The Ministry of Mining is identifying obstacles to the use of green hydrogen in mining trucks, and regulatory gaps in mining safety, as it can help to establish regulatory measures to aid green hydrogen adoption.

Initial costs of renewable energy deployment can be a significant obstacle to greening mining, especially for smaller operations, as thermal energy requires tailored solutions for each production process. Electromobility implies acquiring new vehicles and installing support infrastructure, and staff must be trained or hired to implement the new technologies. Also, if the renewable resource is far from the mine, it might be less competitive than traditional energy. Initiatives like the "PAMMA Small-Scale Sustainable Mining" scheme can help smaller firms bridge funding gaps to transition to cleaner energy.

Forestry: enhancing capacity to prevent forest fires

Reducing the incidence of wildfires is key to safeguard a sizable carbon sink in Chile (Figure 4.13, Panel A) that is essential to meet its decarbonisation goals (Figure 4.5). Carbon sequestration is very sensitive to wildfires, as shown by the widespread fires of 2017 that led to positive LULUCF contribution to emissions and to an all-time peak in net emissions. Since then, an additional 1.8% of forests, grassland and scrubland has burned, half of it in 2023 (CONAF, 2024[67]). Over the last decade wildfires in Chile have become larger and more widespread in comparison with the previous three decades, with longer fire seasons. The gradual increase in temperatures has contributed about 20% of the area burned in the last three decades, and it is estimated that by the end of this century, sustained temperature increases and reduced rainfall could lead to an average climate similar to that experienced during the 2016/2017 megafire season (González et al., 2020[68]).

Figure 4.13. Preventing wildfires will protect a valuable carbon sink



Note: LAC is a simple average of Colombia, Costa Rica, Mexico, Argentina, Brazil, and Peru.
Source: Panel A: OECD Environment Database. Panel B: Global Land Analysis & Discovery (GLAD) lab, University of Maryland, accessed through Global Forest Watch, database from (Tyukavina et al., 2022[69]).

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Land management practices compound climatic risks. Monoculture plantations of non-native, highly flammable evergreen species, which are common in Chile, can increase wildfire risk (Barquín et al., 2022[70]). Widespread conversion from native to foreign and monoculture plantations, and expansion of wildland-urban interface areas, including informal settlements in forest zones, were factors behind the rapid spread of the devastating 2024 fires (Kimutai et al., 2024[71]). In 2023, 52% of the area burned in Chile was plantations and only 15% were native forests (Gómez-González et al., 2024[72]). The 2017 fires affected non-native pine and eucalyptus more extensively and more severely than the native vegetation (Bowman et al., 2019[73]). Lack of water also has contributed to the browning of non-native trees, increasing their flammability.

Improving management of forest resources is key to preventing forest fires. Reducing the accumulation of combustible material in wooded areas, and strengthening land-use planning and building regulation, can

enhance wildfire prevention. For example, buffer zones in wildlife-urban interface areas can be set up, and development in fire-prone areas can be tightened through zoning regulations (OECD, 2023[74]). The government strategy to strengthen forest fire management includes a plan for reducing wildfire risk in urban-forest interface areas and geo-referencing critical infrastructure. Chile has increased its budget for firefighting in recent years, but ensuring stable public resources for wildfire prevention should also be a priority (OECD, 2023[74]).

Chile must improve its laws to manage forests and plantations resources, and to foster recovery of native forests. The scope for wildfire prevention in current laws is limited, as it only applies to certain types of forests and plantations; there is no legal basis for requiring fire prevention measures, and implementation has been patchy. Furthermore, the National Forestry Corporation (CONAF) has limited functions. A Law on Wildfires being discussed in Congress aims to strengthen prevention strategies and landscape management. The bill defines wildlife-urban interface areas in land-use planning instruments, strengthens existing forest management instruments, and establishes a new regime of penalties. CONAF has also increased the number of Analysis and Diagnostic Units to research wildfire causes, now covering 43% of fires, which contributes to design better prevention measures (CONAF, 2024[75]).

To achieve its carbon sequestration goal, Chile should also continue efforts to prevent degradation of its native forests. The country has increased its forest cover since 2000, and it is implementing the National Strategy of Climate Change and Vegetal Resources to enhance sustainable land management and foster the preservation of native forests. The Strategy aims to reduce degradation of at least 264 000 hectares of vegetal resources between 2017 and 2025, and to reach a reduction of 20% in GHG emissions from deforestation and forest degradation by 2025, compared to the 2001-2013 baseline. As part of the Strategy, by 2025 CONAF plans to establish the results-based payment schemes for environmental services.

An ETS can also be leveraged to ensure carbon capture by land-use change and forestry. In New Zealand, where LULUCF is included in the ETS, the sector increased their carbon stock by the equivalent to reducing gross national emissions by 30% in 2018 (OECD, 2022[76]). Some forests can be voluntarily registered into the ETS and can earn emissions units that represent the carbon captured but are also liable to repay units if the carbon stock falls. Most landowners with exotic forest land face deforestation liabilities under the New Zealand ETS (OECD, 2022[76]). However, a feature unique to the New Zealand ETS is that there are no limits on forestry units, and ETS pricing does not reflect the durations of carbon storage of native compared to exotic forests, and risks such as fires. Including LULUCF in an ETS should be done in a way that gives clarity to the market on the costs and benefits of exotic and native forests and their potential to offset gross emissions (OECD, 2024[77]).

Agriculture: continue reducing emissions and controlling water pollution

Agriculture emissions have continuously fallen and further progress is welcome. This is the only sector that has reduced its GHG emission over the last decade, by around 14% over 2010-2020, and the GHG emissions intensity of agricultural output of Chile is one of the lowest in the OECD. The Ministry of Agriculture has implemented mitigation initiatives like the efficient use of fertilisers and sustainability standards with mitigation actions for dairy, poultry and pork production which also includes soil management practices (OECD, 2024[2]). Chile does not have agriculture-specific mitigation targets that can be used to gauge reduction in agricultural emissions, but it can take additional actions to make the sector more sustainable, productive, and resilient. For example, Chile could scale up and target investments in extension services, and innovations on sustainable productivity and climate-smart agriculture, particularly those that reduce emissions of methane, a greenhouse gas far more potent than CO_2, to fulfil its commitment under the Methane Pledge (OECD, 2023[78]). To ensure an efficient use of public resources, improved co-ordination across ministries and agencies that support the agricultural sector is key, as well as better co-ordination, communication, and accountability between regional and national governments to avoid overlapping efforts (OECD, 2023[78]).

Agriculture and aquaculture are also important sources of water pollution. Chile should broaden the coverage of wastewater regulation by developing specific emissions standards for agriculture and aquaculture. Agriculture also generates pollution in surface water, where high levels of nitrates and pesticides have been observed, warranting stricter monitoring and the possibility to introduce economic instruments for water management, like taxes on water effluents, pesticides and fertilisers (OECD, 2024[2]).

Residential buildings: improving energy efficiency

Lack of proper thermal insulation causes heat losses that increase energy consumption. Estimates suggest that around two thirds of homes in Chile have low energy efficiency and lack appropriate insulation, and that nearly 90% of public and corporate buildings do not meet minimum energy efficiency standards (Calvo et al., 2019[79]; Universidad de Talca, 2019[80]).

Plans for energy efficiency requirements in residential buildings should be more ambitious. The 2021 Law of Energy Efficiency is expected to contribute 7% of cumulative reductions in GHG emission by 2050. The National Energy Policy requires that all new buildings have zero net energy consumption by 2050, which could be brought forward to 2030, as it is the case for public new buildings that must be net zero by then. Regarding residential buildings, 35% of existing homes need to comply with new regulation on thermal standards for buildings. Moreover, regulation mandates that only 10% of existing homes comply with a net-zero thermal regulation standard by 2050, which is far too low and should be increased (OECD, 2024[2]). Chile should tighten energy efficiency requirements in residential buildings, while ensuring access to poorer households to affordable and sustainable energy-efficiency upgrades.

Waste management: reducing landfilling and fostering recycling

Chile's waste management system has made progress but remains inefficient and must be modernised. Chile has high waste collection coverage, but it landfills a higher percentage of its municipal solid waste (92%) than any other OECD country. Organic material in landfills produces carbon dioxide and methane at equal parts. Chile has an ambitious waste management goal of 66% organic waste recovery rate by 2040. To meet that target, Chile must modernise landfill facilities with stricter environmental standards and review sanitation tariff schemes while ensuring affordability (OECD, 2024[2]). Approving the bill for the valorisation of organic waste would be a significant step forward, as it would strengthen differentiated waste management practices at the territorial level, and discourage harmful waste management practices (OECD, 2024[2]). The introduction of a landfill tax is also welcome.

Chile must significantly scale up its recycling efforts. The country aims at achieving a 40% recycling rate by 2030, but today that rate is less than 1%, well below the 25% for the OECD. The implementation of extended producer responsibility (EPR) schemes should help to promote recycling of major waste sources, but to further encourage waste reduction and recycling initiatives, Chile should tailor environmental awareness campaigns to specific community needs, and develop a long-term investment strategy for waste separation and treatment infrastructure (OECD, 2024[2]).

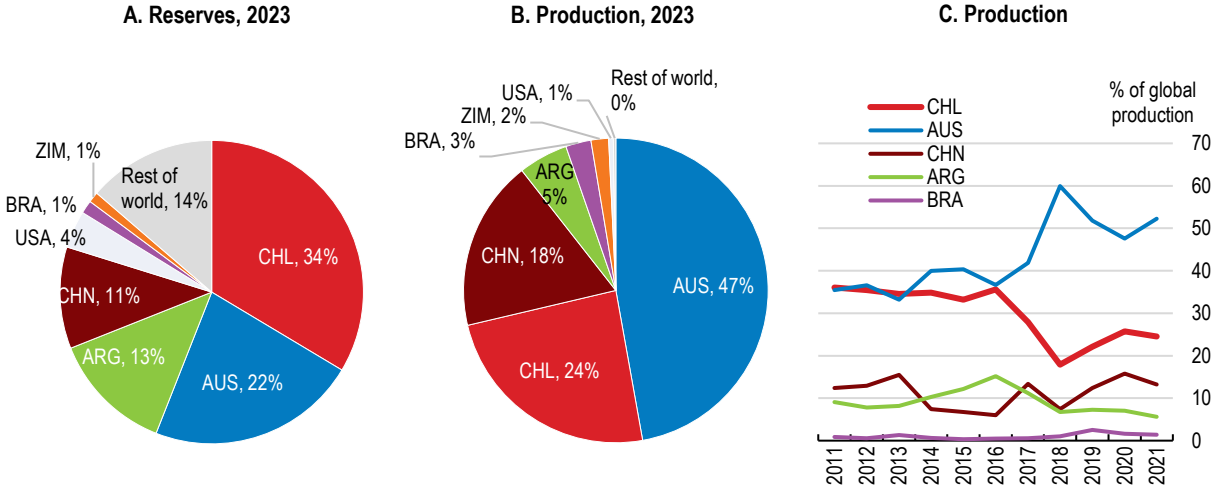
4.3. Developing the lithium industry in a sustainable manner

Lithium production has become increasingly important for Chile. Exports of lithium have grown from 0.9% of total exports of goods in 2020 to 7.1% in 2023, and lithium production now accounts for 1% of fiscal revenue (see Chapter 1). Under the current legal framework lithium can be exploited directly by the State, by its companies or institutions, or by private companies through administrative concessions or special operation contracts. Currently, only two companies exploit lithium in Chile, both private and operating with contracts with the public agency, Corfo.

Chile is well positioned to benefit from increased world demand for lithium, as it has the largest share of known lithium reserves and produces around a quarter of world lithium (Figure 4.14). Global demand for lithium is expected to grow more than fifteen times between 2020 and 2040, especially due to growth in demand for electric vehicles and storage (IEA, 2022[81]). Although increasing Chile's lithium industry will not directly contribute to lower emissions and reach national decarbonisation targets, it can significantly contribute to sustain the worldwide drive towards cleaner energy, while increasing jobs and investment, and presenting opportunities to move up in the lithium value chain and boost growth in Chile. Developing lithium-related activity beyond extraction to bring more value added to the economy could also trigger growth that translates into additional tax revenues.

Chile's large reserves are located in the Atacama salt flat (10.5 million tonnes) and the Maricunga salt flat (0.4 million tonnes) in the north of the country, with 3.3 million tonnes in 9 Andean and pre-Andean salt-flats, and data on lithium presence in other 13 salt flats and 36 areas not yet studied (Cabello, 2022[82]). As a reference, the worldwide production of lithium was 106 thousand tonnes in 2021. Chile's production costs are estimated to be the lowest among producing countries (Figure 4.15), given its high concentration of lithium and low magnesium content (Choe et al., 2024[83]). Despite these advantages, Chile's share of world lithium production has fallen over the last decade (Figure 4.14, Panel C), as Australia's development of its industry has outpaced Chile's, helped by a more straightforward legal framework.

Figure 4.14. Chile holds most world reserves of lithium, but its share of production has fallen



Source: UN Comtrade; US Geological Survey, January 2024.

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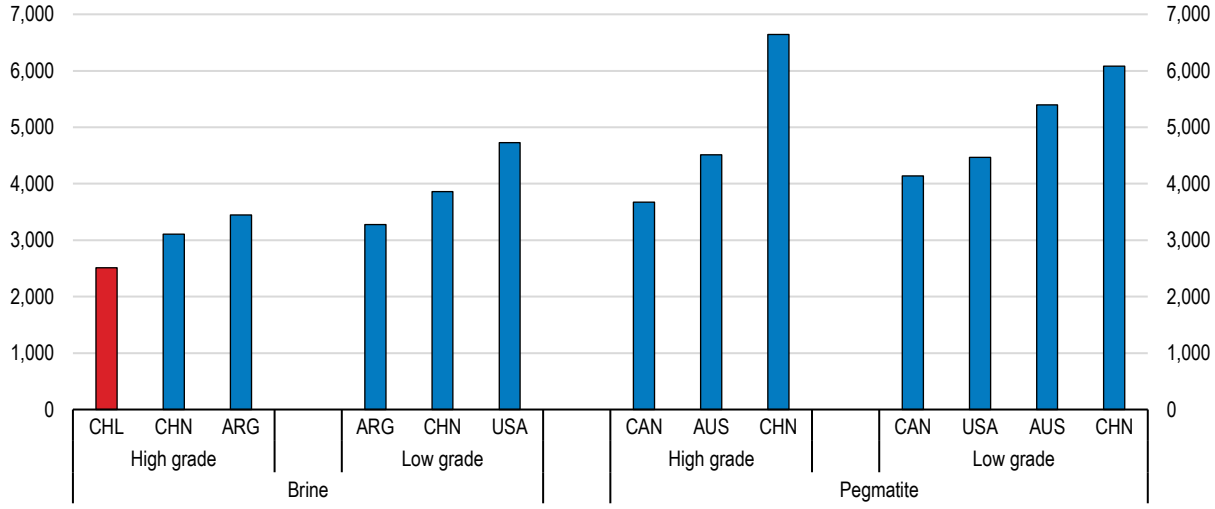
Increased recycling of lithium will shrink the industry of lithium production going forward. The end-of-life recycling rates for lithium are 0.5% today, compared with 45.5% for copper (IEA, 2022[81]), but it is projected that lithium recycling from batteries will begin in earnest by 2030 (Figure 4.16), and that it will grow more than three-fold in the following decade, so that by 2045 the share of recycling will become substantial (McKinsey & Company, 2023[84]). Chile's position in the cost curve could protect its lithium mining industry, but nonetheless Chile should move swiftly to ensure an adequately prepared workforce, develop technical capabilities, improve licensing processes, and make environmental assessments less susceptible to political influence, to profit from its notable advantages in lithium production.

Figure 4.15. Chile's lithium production costs are the lowest worldwide regardless of the extraction technology

Lithium production cost by type of deposit and grade, USD / tonne of lithium carbonate equivalent



Source: (Ambrose and Kendall, 2020[85]) Understanding the future of lithium: Part 1, resource model.

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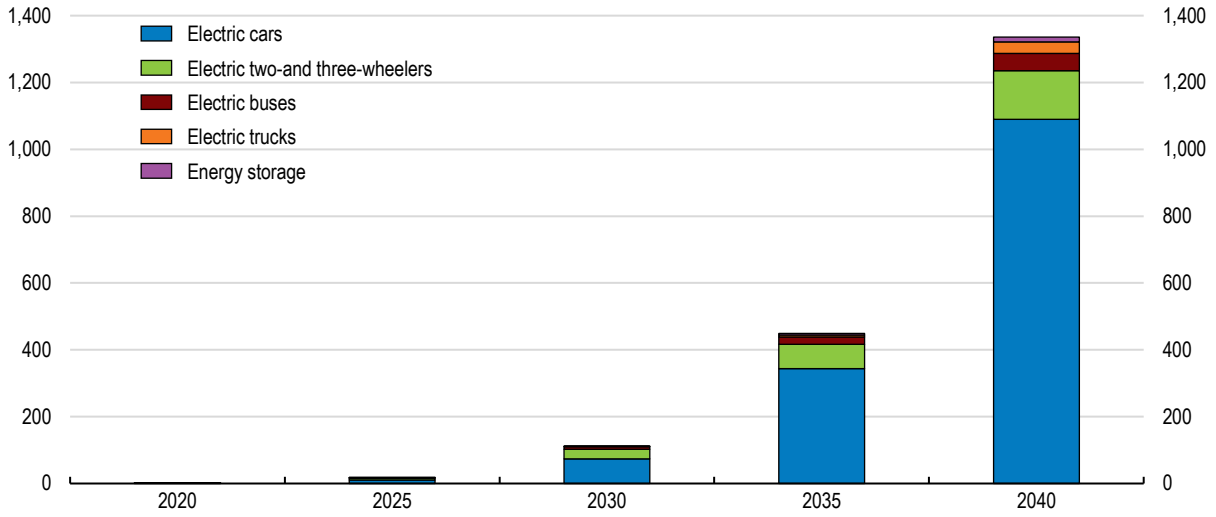
To boost the development of the lithium industry, the government published the National Lithium Strategy (Box 4.4) in 2023, which foresees significant state involvement, and different business models for public-private partnerships. The strategy aims to sustainably increase lithium production in several salt flats, while promoting production linkages upstream and downstream, and using revenues to finance further expansion. Some progress in implementing the strategy has been achieved over 2023-2024, as the Strategic Committee for Lithium and Salt Flats was established in 2023, and a review of the institutional and regulatory framework is underway. A public research institute on lithium was created in 2024 and is currently under implementation.

The State will participate in lithium production through Codelco and Enami, the national mining companies (Box 4.4). The government declared the Atacama and Maricunga salt flats as strategic, so that the State will have a majority stake (50%+1) in operations there through Codelco. In May 2024 Codelco signed an agreement with the largest lithium producer in Atacama to partner in lithium production from 2025 until 2060. The state mining companies have created subsidiaries to handle partnerships with private firms in other salt flats. Since April 2024, 36 firms have expressed interest in lithium projects in salt flats open for exploration or exploitation, through special contracts of operation.

A key challenge is the national mining company Codelco financial strains and lack of expertise in lithium production. Codelco's debt has increased considerably, and its copper output fallen significantly (Figure 4.17). This is despite efforts since 2010 to boost copper output through strategic investments, that have led to significant cost overruns and technical setbacks that yielded less copper than expected (CESCO, 2023[86]; Cambero and Villegas, 2024[87]). In early 2024, S&P Global Ratings, Fitch and Moody's Investor Service have all downgraded Codelco's credit rating. Improving Codelco's financial position and strengthening its corporate governance by enhancing the executive board's technical expertise and independence can improve the company's ability to be an effective partner in lithium production.

Figure 4.16. Lithium available for recycling will increase substantially

Amount of spent lithium-ion batteries from electric vehicles and storage in the Sustainable Development Scenario, GWh



Source: (IEA, 2022[81]). The Role of Critical Minerals in Clean Energy Transitions.

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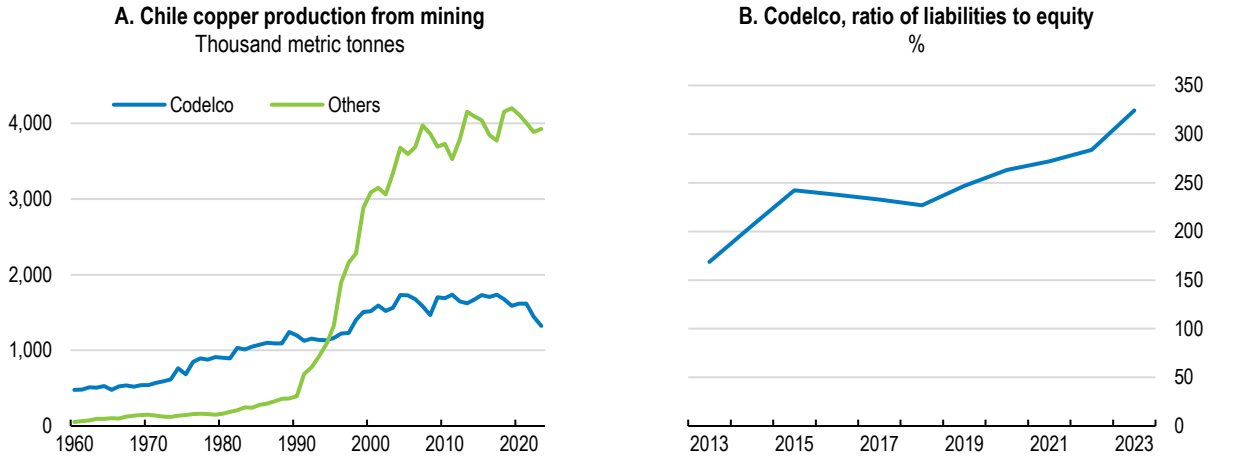
The government risks spreading itself too thinly in its efforts to develop the lithium industry by committing to several high-profile initiatives. Chile should prioritise and concentrate its public resources in some key activities, such as improving the state mining companies' lithium knowledge and expertise, setting up the planned National Lithium and Salt Flats Technological and Research Institute, and monitoring the environmental impact of lithium extraction. Partnerships with private companies should help to transfer knowledge to state mining companies lacking expertise in lithium. Additionally, the national research institute would help state companies to acquire knowledge on characteristics and geologic processes in salt flats, to develop extraction technologies to be used there, and to create new products. The government should better assess the benefits and drawbacks of setting up a national lithium company.

Lithium production is vulnerable to water stress, and contributes to exacerbate it, given its high water requirements. Chile's reserves of lithium are found in water deposits with a high concentration of salt (brines), and lithium is extracted through several stages of solar evaporation, and then processed in chemical plants to obtain lithium compounds. Producing one tonne of lithium carbonate in the Atacama salt flat requires extracting 600 000 litres of brine from the ground (SQM, 2021[88]). Although this is considerably less than the water used by other methods in other countries, the Atacama region is one of the driest environments in the world.

Lithium production could contribute to exacerbate already high water stress and decrease water availability for the unique flora and fauna in Chile. There is no scientific consensus that brine extraction from the salt flats does not affect the adjacent wetlands and aquifers. The extraction can cause fresh or brackish water to flow into the spaces left by the extracted brine, which could contribute to decrease water availability for the unique flora and fauna of the region, and for irrigation or human consumption (Blair et al., 2022[89]). Ideally, the government would monitor and assess the impacts of lithium extraction, however, lithium-rich brines are classified as a mineral under Chilean laws, which makes it difficult for the government to gather data and assess the environmental impact of lithium extraction.

Figure 4.17. Codelco's leverage has increased while its production has fallen



Source: Panel A: COCHILCO, mining production statistics; Panel B: Codelco financial statements 2013-2023.

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The Lithium Strategy mandates the creation of a network of protected Andean salt flats because the wetlands in Chilean Andes, which contribute to fragile salt flat ecosystems and provide a carbon sink, could be affected by increased lithium production (OECD, 2024[2]). In March 2024 the Council of Ministers for Sustainability and Climate Change published the list of salt flats and lagoons that will be under a protected status, which will take the protected area from the current 8% to 33%, in line with the target set by the Convention on Biological Diversity. The strategy also mandates that biodiversity and hydrogeological baselines are developed to assess the impact of lithium production. The development of public baselines is ongoing and in November 2024 the government launched work for the lithium industry baseline for the Antofagasta region, to be carried out by a local university.

Given the potential effects of lithium extraction on water stress and the environment, the Lithium Strategy expects using new and more environmentally friendly extraction and processing technologies. Currently, the main new technology is direct lithium extraction with brine reinjection (DLE/R). However, this technology requires reinjecting brine into the ground, and its use must be carefully designed and executed to avoid harming the environment, or mixing spent brines with fresh, lithium-rich ones, or with aquifers for human consumption. This method has advantages (shorter production times, lower space requirements, no weather dependence), but it is not yet widely used in production, its implementation must be tailored to the hydrogeological characteristics of each salt flat, and extraction equipment can be expensive (Nicolaci et al., 2023[90]). Moreover, the additional costs and technical uncertainties associated with this technology might discourage firms, delay investments, or make Chilean lithium lose competitiveness. When establishing new partnerships with private companies for lithium extraction, the government should not push for specific technologies to be implemented, but rather prioritise technologies that use water efficiently and that have the least environmental impact.

The government should strengthen its regulatory and technical capacity to monitor water use and to assess the potential environmental impact of lithium extraction. In Chile water governance is fragmented, as there is no integrated national authority in charge of decisions for the water sector based on professional and technical recommendations, and efforts must be increased to align and co-ordinate all agents intervening in water management. (OECD, 2024[2]). Knowledge gaps in hydrogeology could be bridged by leveraging knowledge and local relationships developed by the private sector. The government hopes that the new National Lithium and Salt Flats Technological and Research Institute will help close those knowledge gaps over the medium term. The institute is expected to establish association agreements with universities, and to study new methods of lithium extraction, their impact on the salt flats, and processes associated with

the lithium value chain, among other intended lines of research. Providing stable funding and ensuring that the institute's agenda remains aligned with the government and national mining companies' capacity needs is crucial for its long-term success.

Box 4.4. The National Lithium Strategy

Chile launched a National Lithium Strategy in April 2023 to boost the development of the lithium industry through public-private collaboration.

Goals

- Sustainably increasing production in the Atacama salt flat, and in other salt flats within 6-8 years.
- Developing a new institutional framework to update regulations on salt flats and lithium, with special attention to water and renewable energy use. Biodiversity and hydrogeological baselines will be developed before the start of projects to ensure proper assessment of impacts.
- Promoting production linkages upstream (prospecting, extraction) and downstream (refining, new materials development).
- Using revenues from the public-private model to finance growth-enhancing investments.
- Increasing the number of companies operating in Chile's salt flats.
- Further integrating Chile in the value chain beyond mining and refining.

Strategic actions

- Creation of a Public Technical Research Institute for Lithium and Salt Flats.
- Development of public-private collaboration.
  - In the Atacama salt flat Corfo grants lease contracts (two in operation: SQM and Albemarle), while in Pedernales salt flat Codelco can establish subsidiaries or set up public-private partnerships to start production.
  - In other salt flats special contracts of lithium operation (CEOL) will be necessary. The State has tasked Codelco to look for a solution to start production in the Maricunga salt flat, and Enami has requested a CEOL for the "Altos Andinos" project.
- Modernisation of the institutional framework.
- Community involvement in the development of the strategy, especially indigenous communities.

Source: (Government of Chile, 2023[91]). National Lithium Strategy.

4.4. Mobilising green finance for mitigation and adaptation

The financial sector has a central role to play in the green transition by channelling resources to build or retrofit infrastructure and carry out research and development, among other needs. Mobilising green finance is particularly important for Chile, which aims not only to decarbonise its economy while making it more resilient to climate risks, but to develop a new industry, green hydrogen, and scale up lithium extraction. Chile has made progress in greening its financial system and attracting resources for decarbonisation. Additional progress is needed in ensuring that the financial system identifies and incorporates climate-related risks and opportunities in their business models, increasing financing for adaptation, and providing enough training in sustainable finances to support sustainable growth.

4.4.1. Greening the financial system

Chile's Financial Strategy for Climate Change is structured around three pillars: greening the financial system, promoting financing of green initiatives, and strengthening competitiveness of the "greened"

financial system (Ministry of Finance, 2022[92]). A Public-Private Roundtable on Green Finance led by the Ministry of Finance has helped to establish an agreement to incorporate risks and opportunities stemming from climate change in private sector decisions and setting up a roadmap for a green finance taxonomy (Box 4.5). The Ministry of Finance created the Office for Sustainable Finance in 2022 to direct public and private financial flows to activities aligned with Chile's decarbonisation agenda, promote domestic financial innovation, and advise the Ministry on sustainable development and climate finance. Chile's regulators have also incorporated new disclosure requirements to include sustainability issues in reporting and investment decisions (see Chapter 1).

Despite progress in raising awareness of the need to incorporate environmental, social or governance (ESG) issues into the financial system's decisions, financial sector participants point to significant gaps in knowledge about ESG matters that hinder further advancement. Other lagging areas are in the incorporation of ESG factors in lending decisions and risk models, and data gaps about customers' preferences regarding sustainable investment. Specific training programs are needed to increase understanding and integration of ESG aspects into strategic decision-making, as financial sector participants agree that there are knowledge gaps among boards and senior management of organisations. This results in companies providing information that is very heterogeneous and difficult to analyse, increasing the risk of greenwashing (Ministry of Finance, 2024[93]). To address this, a taxonomy of environmentally sustainable economic activities is being developed. There is also little explicit standardisation in reporting metrics, which hampers integration of information into investment decisions. Fully adhering to ISSB standards, for instance, would facilitate information comparison and integration into the global financial markets, which could foster foreign investment.

Box 4.5. Initiatives to green the financial system

The Green Agreement of the Chilean financial system

The Green Agreement (*Acuerdo Verde*) was established in 2019 by the financial sector, the government, and financial regulators as a voluntary, long-term commitment to incorporate risks and opportunities stemming from climate change in the business decisions of the signatories. The goals of the Agreement are to contribute to financial stability, support Chile's climate commitments, and turn Chile into a regional hub for green finance. The Agreement was renewed in 2024 for five years.

As of 2023, over 70% of the commitments made by participants were completed or very advanced, and in the case of the public sector, almost 100% were fulfilled. Although there are advances in raising awareness of the need to incorporate ESG issues into the financial system's decisions, participants noted that significant gaps persist in knowledge about ESG matters that hinder further progress. Other lagging areas are in the incorporation of ESG factors in lending decisions and risk models and gathering data about customers' preferences regarding sustainable investment.

A taxonomy of environmentally sustainable economic activities for Chile

The Green Agreement set a roadmap for the development of a Taxonomy of Environmentally Sustainable Economic Activities. Chile, as other Latin American countries such as Colombia and Mexico, is developing its taxonomy based on the EU taxonomy and will cover nine sectors. The Ministry of Finance is leading and overviewing its development.

Source: Ministry of Finance.

4.4.2. Channelling financing towards green projects

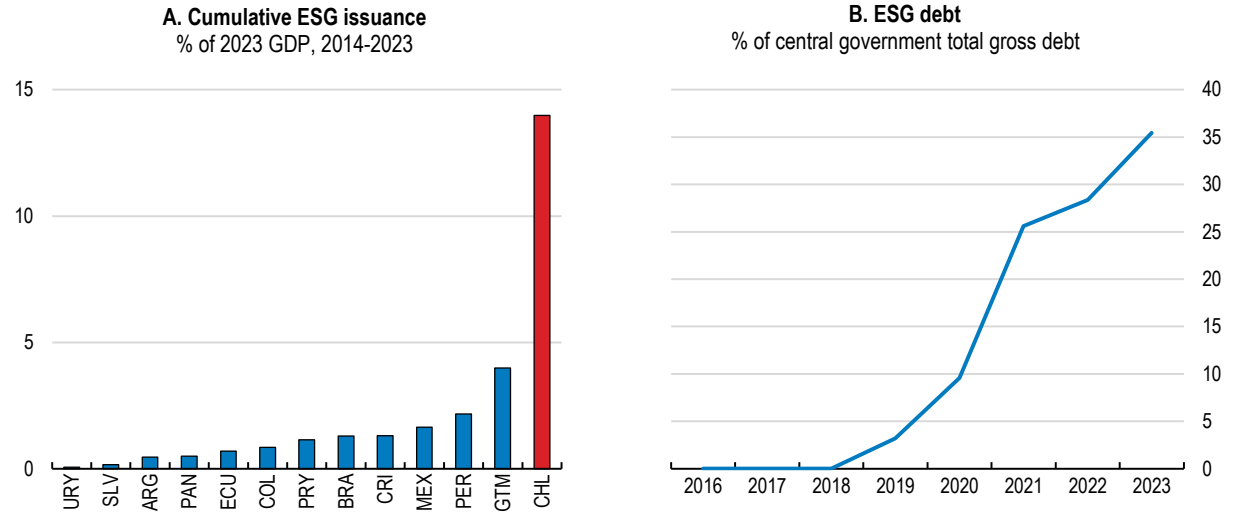
Achieving Chile's transition goals will require substantial resources, for which traditional financing might be insufficient. The cost of implementing Chile's Long-Term Climate Strategy is estimated to be around 18.6% of GDP through 2050 (Ministry of Finance, 2024[94]). Market actors expect that debt-related instruments

like loans and bonds will be the most deployed in transition finance-related transactions, far surpassing equity (OECD, 2022[95]). Chile has advanced in issuing thematic debt instruments, including issuing green bonds, sustainable bonds, sustainability-linked bonds, and social bonds. Chile is the largest issuer of sovereign green bonds in Latin America and the first Latin American country that issued green bonds back in 2019, accounting for 14% GDP over 2014-2023 (Figure 4.18, Panel A). Between 2018 and 2023 the share of ESG debt on total gross debt of the central government went from zero to 36% of the total (Figure 4.18, Panel B). Demand for Chile's sustainable bonds is several times the allocated amount, and the *greenium* for its sovereign emissions is estimated at 8 basis points (Ando et al., 2023[96]). Proceeds finance mostly clean transportation projects. The country has also received funds as part of blended finance initiatives.

The planned taxonomy of environmentally sustainable activities will help channel financing towards green projects (Box 4.5). Providing appropriate capacity building for participants to ensure its proper implementation as well as establishing a permanent structure for regularly updating it as planned can help improve ESG labelling and reduce the risk of greenwashing. Involving the private sector in the development, as Chile is doing, is also key to ensure legitimacy and building acceptance of the taxonomy.

Ongoing work on the taxonomy includes defining the technical criteria to select activities, particularly during the transition. This work should avoid creating carbon-intensive *lock-in,* that is, promoting high-emission investments despite availability of low-emission alternatives. That could happen if the taxonomy ends up including technologies with marginal improvements but that remain emission-intensive (OECD, 2022[95]). To prevent carbon lock-in when defining transition economic activities, the taxonomy should include sunset clauses, whereby an activity counts as a transition activity until a set date and must meet stricter requirements thereafter. Carbon assets should be future-proofed so that new or retrofitted carbon infrastructure is enabled for the use of low emission technologies, like green hydrogen (OECD, 2023[97]). The taxonomy can also help to assess the additionality of green projects, that is, whether they would not have been funded through conventional finance.

Figure 4.18. Chile has become a regional leader in sustainable finance



Note: ESG stands for environmental, social or governance.
Source: Panel A: Climate Bonds Initiative, Interactive data platform; and IMF International Financial Statistics; Panel B: Ministry of Finance.

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Chile has several bond frameworks aligned with international standards, including for Green Bonds and Sustainable Bonds. Chile also published and updated its Sustainability-Linked Bond (SLB) Framework and issued the first-ever sovereign SLB in 2022, amounting to USD 2 billion, but there is scope to further

develop the domestic market for thematic bonds and ESG bonds. To that end, the Santiago Stock Exchange established a Thematic Bonds segment in 2018, updated in 2023, gives courses on ESG topics and produced a “Guide for Responsible Investment and Reporting”. In 2022 it also started collaborating with the Climate Bonds Initiative to promote and develop standards for sustainable bonds. Several sovereign emissions of ESG bonds in Chilean pesos are meant to provide the market with benchmarks. Raising awareness among investors of the availability of green bonds as an investment option can also help foster its development.

Blended finance is another opportunity to expand green investment. To position itself as a prime destination for blended finance, Chile will have to compete with regions with high potential like Africa or the Pacific Island nations. Chile can boost its attractiveness for blended finance by seeking improvements in several areas, in line with the recommendations from the Network for Greening the Financial System. Granting enough resources to bodies tasked with fostering good investor relations and improving governance can help attract private financing. Training public sector officials can reduce knowledge gaps compared to private stakeholders. Reducing unnecessary regulations can lower investor uncertainty on timing and profitability of projects. Finally, making carbon pricing more stringent can complement advances in reporting standards and transition taxonomies, to strengthen prerequisites for climate investing.

Chile should devote more resources to adaptation. A recent survey among municipalities shows that only 10% of ongoing projects relate to adaptation needs (CDP, 2023[98]). None of the seven projects financed in Chile by the Green Climate Fund concern adaptation initiatives, unlike other Latin American peers like Mexico, Colombia, or Costa Rica, where multiple adaptation or cross-cutting projects are financed (Green Climate Fund, n.d.[99]). Increasing green finance on adaptation can strengthen preparedness for climate change risks. Chile’s green bond portfolio is concentrated in mitigation projects, with little going to adaptation initiatives. Around 95% of funds from green bonds during 2019-2022 went to clean transportation, including the electrification of the Santiago transport system and sustainable mobility projects, while only 0.1% went to water management projects. State-contingent debt instruments could also help Chile to manage public debt when faced with natural disasters. These instruments can be linked to the occurrence of natural disasters, so that they trigger an automatic reduction in the sovereign’s debt service burden, preserving policy space to undertake relief measures (IMF, 2017[100]).

4.5. Improving the social protection system to support the green transition

Decarbonising the economy will reduce output and employment in carbon-intensive sectors and increase the costs of some goods and services, which will have distributional effects that must be addressed to ensure support for climate policies and contain effects on well-being. Over 2015-2019 about 6% of OECD employment was in occupations that are especially concentrated in high-emission industries, where employment is expected to contract at an average annual rate of more than 2% over the next decade due to ambitious emission reduction targets (OECD, 2024[101]). Displaced workers in high-emission industries face a decline in earnings that is 24% higher than those in low-emission industries (OECD, 2024[101]). Ensuring a coordinated, targeted, and well-funded policy response to assist the population affected by decarbonisation is the best way to garner support for climate policies.

4.5.1. Preparing workers for a greener economy

Chile’s green transition will impact employment in several sectors, by growing the share of employment in wind, solar and transmission sectors and shrinking the share of employment in coal plants and hydropower (Box 4.6). A comprehensive policy response is needed that includes public training programmes or incentives for employers to reduce skills shortages, boosting training and skills development programs, updating the offer and content of vocational education and training programmes, and increasing spending in active labour market programmes to facilitate the reallocation of workers. Incentives for jobseekers and

workers could include providing information, advice, and guidance (OECD, 2023[102]). Policies should lower barriers to job mobility through more flexible labour and housing markets, and assistance to laid-off workers should be provided before or right after dismissal (OECD, 2023[103]). Several OECD countries provide examples of relevant initiatives (Box 4.7).

Developing a green hydrogen industry requires sufficiently skilled workers to set up, operate, and improve equipment based on novel technologies, some of them still in development. Chile's Action Plan for Green Hydrogen Development includes several measures to better prepare the labour market. First, a labour demand study will be carried out by several ministries in 2024 to identify gaps in professional profiles that will be required throughout the value chain. Then, for 2024-2025 programmes to train technicians in high-school vocational institutions in regions primed for green hydrogen development are planned, and the ministries of energy and education are developing a secondment programme abroad for industry workers. Furthermore, the ministries of education, energy, and economic affairs are designing a programme to set up laboratories with electrolyser equipment in technical high schools and state technical education institutions, starting in the Magallanes region. The Action Plan also includes a line of work focusing on sustained incorporation of women to the hydrogen industry. Monitoring and evaluation of these programmes are key to ensure cost-effectiveness, and for their eventual deployment in other regions of the country. Higher education institutions should adjust their curricula to prepare professionals to work in the hydrogen industry both in technical careers, as the Catholic University of Chile has done with its Diploma on Hydrogen Technologies, and in non-technical careers by proposing case studies, activities and elective modules on hydrogen (The Green Skills Consortium, 2023[104]).

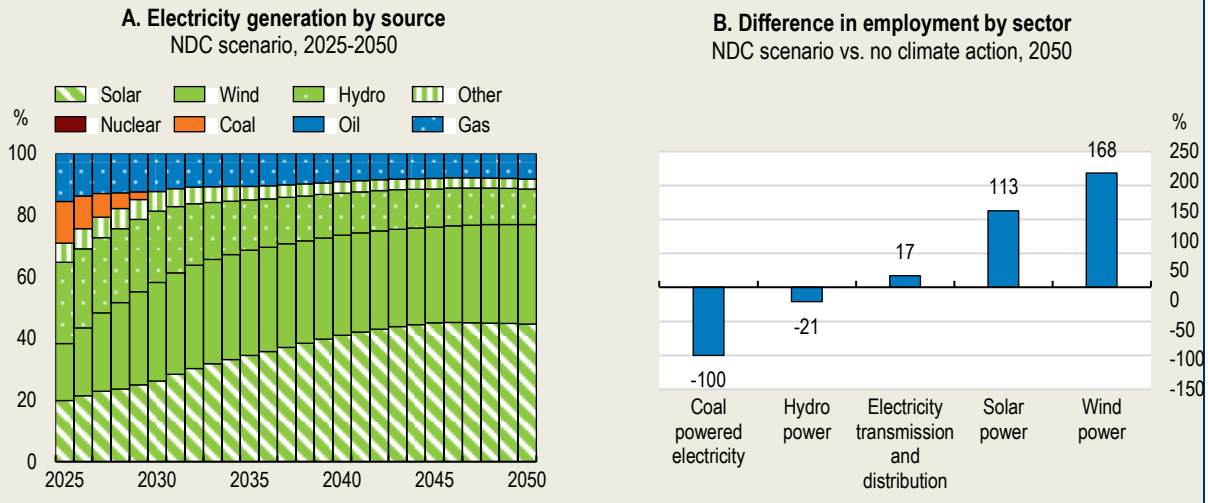
Ensuring a well-prepared workforce will be critical to fulfil Chile's ambition to boost its lithium industry. Labour demand in large-scale mining for 2023-2032 is projected at 34 000 people, while the offer of human capital for that period is estimated at around 20 000 people, including higher education and high-school technical graduates (CCM - Eleva, 2023[105]). Gaps are wider in occupations related to equipment maintenance and operation, while there is a projected surplus of graduates in geology and mine extraction, but a shortage in the maintenance and operator specialties (CCM - Eleva, 2023[105]). Reinforcing work-education initiatives can help better align educational offer with demand, for example by strengthening the Ser Minería talent attraction programme, and by increasing and promoting internships and apprenticeships. The Council for Mining Competencies (CCM) has recommended adding Industrial Chemistry as a technical high-school specialisation to help prepare the workforce for increasing lithium production, as well as reinforcing digital competences across all degrees (CCM - Eleva, 2023[105]). Universities should keep strengthening their hydrogeology curricula, as the University of Chile has done.

Box 4.6. Labour market effects of transitioning to renewable electricity

As the share of renewables in electricity generation grows over the coming decades, employment in renewable energy sectors will increase significantly. The OECD ENV-Linkages model (Château, Dellink and Lanzi, 2014[106]) was used to assess these impacts.

Under current decarbonisation plans, wind and solar power will grow from 38% of total electricity generation in 2025 to 77% in 2050, while hydro electricity's share will halve over that period and coal-fired plants will close over the next decade (Figure 4.19, Panel A). In 2050, total employment in the economy would be 0.95% lower under current decarbonisation plans compared to what they would be if no climate action is undertaken, but employment in wind and solar power would be 1.7 and 1.1 times higher, while in hydro power it would be 21% lower (Figure 4.19, Panel B). Taken together, employment in these renewable sectors would be 43% higher under the decarbonisation scenario compared to implementing no decarbonisation policies, or around 16 thousand workers.

Figure 4.19. Employment in renewable energy sectors will surge



Note: The OECD ENV-Linkages model was calibrated to match the IEA-Stated Policies Scenario (STEPS), which includes Nationally Determined Contribution under the Paris Agreement, as well as a scenario where Chile does not enforce any climate policy action.
Source: OECD ENV-Linkages model.

StatLink https://stat.link/nx3jis

Box 4.7. Policies in OECD countries for a fair transition towards a greener economy

Labour market policies

- *Canada.* The sustainable jobs bill approved in 2024 aims to prepare workers for new jobs during the transition to a lower-carbon economy, by creating an advisory partnership council, the publication of an action plan every five years, and the creation of a sustainable jobs secretariat to ensure policy coherence across federal departments.
- *Australia.* The JobTrainer fund from 2020-22, endowed with AUD 1 billion, offered free or low-fee training in priority certifications and allocated AUD 105 million to the New Energy Apprenticeships and New Energy Skills programs to deliver 10 000 energy apprentices and tailor skills training to the specific needs of new energy industries (OECD, 2023[107]). Jobs and Skills Australia also conducted a capacity study on the workforce needs for the transition to help train workers a clean energy economy.
- *European Union*. The Social Climate Fund was set up to mitigate the social impacts of a new emissions trading system for buildings and road transport, which is expected to start in 2026 and amounts to 4.3% of the 2021-27 EU budget. The European Social Fund+ will allocate 4.9% of the 2021-2027 EU budget to support employment and skills.
- *Chile*. Pillar III of the "Pacto Fiscal", aims at boosting development of sectors with potential to diversify the economy, plans to strengthen skill building and training by expanding the "Talento Digital" programme to reach 50 000 additional students.

Redistributing revenues from carbon taxes

- *Austria*. The EUR 32.50 per tonne carbon tax measure enacted in 2022 recycles all revenue as cash payments, using location-based targeting, whereby residents in regions with greater dependence on carbon-heavy receive more support.

- *New Zealand*. In 2022 a Climate Emergency Response Fund was set up based on proceeds from its emissions trading system to fund initiatives that reduce vulnerability or exposure to climate change or that address distributional effects of climate change and mitigation policies.
- *Canada*. British Columbia has a Climate Action Tax Credit, which is a quarterly payment that aims to offset the impact of the carbon taxes paid by individuals and families. Other eight Canadian provinces redistribute carbon tax revenues back to households through the Canada Carbon Rebate.
- *Switzerland*. A carbon tax of CHF 12 per tonne was introduced in 2008 and raised in steps to CHF 120 per tonne in 2022. Currently raises annual revenues of about CHF 1.2 billion, with two-thirds distributed as a lump-sum transfer, in the form of reduced health insurance rate.
- *Ireland*. A EUR 48.50 per tonne carbon tax was established in 2010, with a "soft" type of earmarking, meaning political commitment to use a share of revenues for raising social assistance benefits for households with children, and to provide retraining for workers in carbon-intensive sectors.

Source: OECD Employment Outlook 2024: The Net-Zero Transition and the Labour Market.

4.5.2. Supporting populations affected by the green transition

To mitigate the employment and social impacts of the green transition in Chile it will be key to improve income protection for dismissed workers and to increase the coverage and adequacy of cash transfer programmes, as recommended in 2022 OECD Economic Survey (OECD, 2022[35]), and to ensure that workers are well equipped to re-enter the labour market. Early interventions targeted at workers at risk of dismissal can limit the incidence and consequences of job displacement (OECD, 2024[101]).

Strengthening the carbon tax should be done gradually, and targeted assistance to poorer households and energy-intensive or trade-exposed sectors should be provided. Several OECD countries use revenue from the carbon tax to assist vulnerable populations ("revenue recycling", Box 4.7), which has been shown to improve well-being (OECD, 2024[101]). Communicating how revenues from the tax will be used can increase support, like in Canada, where British Columbia significantly increased the carbon tax in 2024, but will reallocate revenues through tax credits for low and middle-income families.

Programmes targeted at communities where employment losses are expected to occur can increase acceptance of decarbonisation plans, like areas in Chile where coal-fired plants have closed or are scheduled to close. These programmes should entail coordination between environmental and labour market policies and municipalities, include measures to develop a comprehensive adult learning strategy, use timely labour market data, and capitalise on the public employment service (OECD, 2023[103]; OECD, 2023[108]). Chile has a Strategy for a Just Transition in the Energy Sector to foster changes in the labour market, develop new technologies, and diversify production in municipalities where coal-fired plants will close. Enough funding, monitoring, and coordination between institutions involved will be needed to ensure that gains from these plans are not short-lived. Chile can draw from the experience of other OECD countries to refine its strategy, in particular from programmes supporting populations affected by phasing out coal. For example, Germany pledged 1.2% of GDP between 2019 and 2038 to support regions affected by coal mines closing, focusing on infrastructure, innovation, and job markets (D'Arcangelo et al., 2022[4]). The US will close half of its coal capacity by 2026, and the Inflation Reduction Act gives a bonus credit for clean energy production in communities where coal mines or coal-fired electric generating units have closed. To achieve productive reconversion in transition zones it will be key to channel investment in non-polluting industries that help maintain levels of development and local employment in those areas, as Pillar III of the Fiscal Pact intends (Box 4.7).

Table 4.2. Policy recommendations from this chapter (Key recommendations in bold)

MAIN FINDINGS	CHAPTER 4 RECOMMENDATIONS
Adapting to climate change	
Chile is highly exposed to climate-related hazards. Sectoral adaptation plans are being designed, but limited knowledge on resources needed and financial resources hinder implementation. Home insurance is less prevalent among lower-education households.	**Strengthen co-ordination across administrations, build capacity at sub-national level, and encourage public-private collaboration in adaptation.** Ensure sufficient and stable funding for adaptation, including by regularly planning and budgeting for adaptation spending. Raise awareness about climate risks and insurance benefits, and support access to home insurance for vulnerable households. Consider extending mandatory home insurance to other climate-related risks like floods and landslides while ensuring affordability for the most vulnerable.
Over the last decade wildfires in Chile have become larger and more widespread. A sizable carbon sink, which is very sensitive to wildfires, is essential to meet decarbonisation goals.	Ensure stable public resources for wildfire prevention, scale up preventive clean-up of material that could fuel fires in wooded areas, and strengthen land-use planning and building regulation.
Meeting decarbonisation targets	
The tax on carbon emissions from stationary sources is low by international standards (USD 5 per tonne of CO_2), and significantly lower than the social cost of carbon, estimated by the government at USD 63.4 per tonne of CO_2, undermining efforts to reduce emissions. The carbon tax does not count towards the determination of the wholesale market price of electricity, treating equally polluting and non-polluting electricity plants.	**Increase the carbon tax, expand its base, and implement an emissions trading system, while compensating vulnerable households.** Redesign the electricity price-setting mechanism to reflect the carbon tax.
Fuel excise taxes have many exemptions and several tax refunds. The tax rate for diesel is much lower than for gasoline. There is still considerable fiscal support for fossil fuels, like a rebate scheme for the diesel excise tax.	**Phase out sectoral exemptions for fuel excise taxes, gradually align excise taxes for gasoline and diesel, and phase out tax expenditures that support fossil fuels.**
Chile aims to reach 80% of electricity from renewable sources by 2030. However, lack of transmission lines from renewable generation zones to demand zones wastes energy and creates regional electricity price disparities. Short-duration energy storage is growing, but long-duration storage solutions are also needed.	**Facilitate the expansion of electricity transmission lines to integrate renewables into the electric grid.** Encourage the development of long-duration energy storage facilities.
Chile has a national strategy to develop a local hydrogen industry, but its development is slowed down by a complex and long sectoral permitting process, lack of qualified workers, poor port infrastructure, and incipient technologies in need of further development. Environmental risks must be weighed against potential gains.	Streamline sectoral and environmental permitting processes and eliminate political interference from environmental assessment processes. Ensure that support for green hydrogen development remains cost-effective. Strengthen regulations for the extraction and desalination of seawater, and foster R&D in the hydrogen industry to reduce environmental impacts.
Transport is the second most important source of GHG emissions, and its emissions have been rising. The share of electric cars in sales is rising but is still very low. Decarbonisation of public transportation has made notable strides, but regions outside Santiago lag considerably.	Set more stringent GHG emission targets for the transportation sector. Expand investment in sustainable public transportation and improve its accessibility, efficiency, and coverage outside Santiago. Target tax incentives to remove the most polluting vehicles and provide support for smaller firms to buy electric buses and heavy vehicles following cost-benefit analysis.
Many mining operations lack electromobility or low-emission plans.	Identify obstacles to green energy adoption in mining and enact regulatory measures to overcome them.
Around two thirds of homes in Chile have low energy efficiency and lack appropriate insulation, and 90% of public and corporate buildings do not meet minimum energy efficiency standards.	Tighten energy efficiency requirements in residential buildings while ensuring housing affordability for vulnerable populations.
Developing the lithium industry in a sustainable manner	
Chile aims to develop the lithium industry through partnerships between national mining companies and private companies. The weak financial position and lack of expertise in lithium production of the national copper company, Codelco, poses challenges. Lithium production contributes to exacerbate water stress and increasing it risks harming the wetlands in the Chilean Andes.	**Enhance Codelco's executive board technical expertise and independence.** Prioritise the use of public resources for improving the state mining companies' lithium knowledge and monitoring the environmental impact of lithium extraction. Accelerate development of baselines to assess effects of lithium production on salt flats and strengthen state capacity to monitor water use. Establish a central governmental authority to regulate, plan, develop, and protect water resources and manage water and wastewater. Prioritise lithium extraction technologies that use water efficiently and that have the least environmental impact.
Mobilizing green finance for adaptation and mitigation	
Chile is a regional leader in sustainable finance, but knowledge gaps remain among financial market participants and there is not enough financing for adaptation.	Provide capacity development on green finance in the public sector. Consider the use of state-dependent debt instruments and include more adaptation projects in the green bond portfolio.
Improving the social protection system to enhance the green transition	
Achieving decarbonisation goals will lead to reallocation of workers between industries and to job losses in some sectors.	Provide targeted support for workers displaced by decarbonisation of industries, including allocating a portion of revenue from carbon taxes for vulnerable populations or to fund green projects of infrastructure or mobility.

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Macroeconomic imbalances built during the pandemic have largely resolved. The Chilean economy has returned to its trend growth and inflation has fallen thanks to adequate macroeconomic policies. Ensuring fiscal sustainability should remain a priority to maintain public debt below the debt ceiling and address growing spending needs associated with the green and digital transitions, and an ageing population. Chile's potential growth has weakened and increasing it will depend on its ability to remove structural barriers to lift productivity. Expanding access to high-quality childcare and elderly care and reducing education gender gaps can help unlock Chile's full labour force potential and improve equality. Facilitating the adoption of digital tools by SMEs and boosting innovation through easier access to public R&D support are fundamental steps for the digital transformation. To meet its climate goals and take advantage of its abundant reserves of lithium and copper and high renewable energy potential, Chile should strengthen environmental policies, improve infrastructure, simplify business regulation, and prepare its workforce, while protecting water, biodiversity, and vulnerable populations.

SPECIAL FEATURES: ENABLING WIDER WOMEN'S PARTICIPATION IN THE LABOUR MARKET; ACCELERATING PRODUCTIVITY THROUGH DIGITALISATION AND INNOVATION; ACHIEVING A GREEN TRANSITION FOR A MORE PROSPEROUS CHILE

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