

OECD Development Pathways

# Production Transformation Policy Review of Chile

REAPING THE BENEFITS OF NEW FRONTIERS

Assessment and recommendations

CHILE



## Assessment and recommendations

The Production Transformation Policy Review (PTPR) of Chile reviews the national agenda for growth and economic transformation and identifies game changers for future reforms. This overview summarises the PTPR's main results and recommendations. The PTPR highlights the progress made by the country in maintaining relatively stable and high growth during the last decades, its effective macroeconomic management and its openness to the global economy. It identifies the country's persistent structural weaknesses, including low productivity, limited knowledge base and persistent concentration of economic opportunities. It clarifies how the ongoing geopolitical and technological changes could open a window of opportunity for Chile to transform its economy and overcome its structural weaknesses. It assesses the current governance, policies and tools for economic transformation, including the strategic programmes that the country has put in place to reap the benefit of new technologies and global trends in solar energy, green mining and functional agro-food. The PTPR of Chile calls for an “update” of the Chilean model to continue succeeding. The PTPR process involved extensive consultations with multiple stakeholders. It benefited from peer review mechanisms through the participation of peers from Sweden, Emilia Romagna (Italy) and Germany and through a Peer Learning Group that steered the PTPR process in the framework of the OECD Initiative for Policy Dialogue on GVCs, Production Transformation and Development.

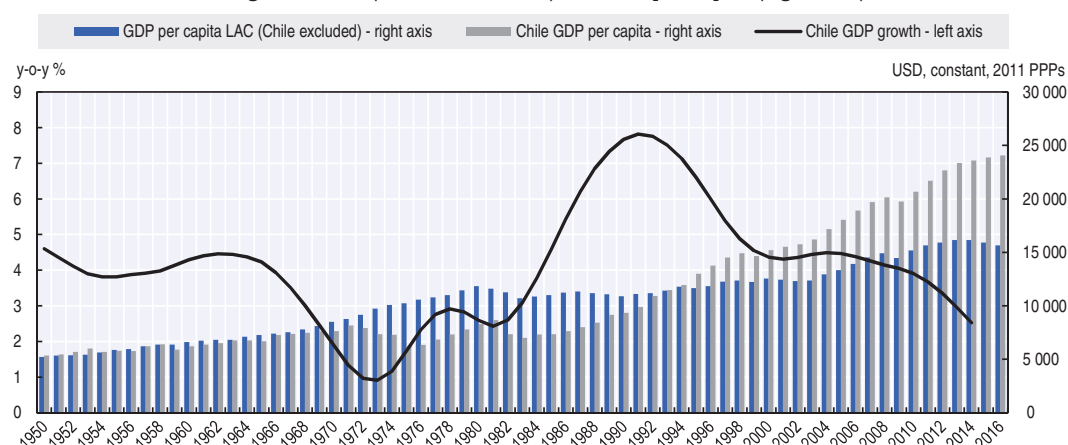
## Chile is a relatively stable, high growth and open economy.

The Chilean economy has been growing on average 4% annually since 2000 (the annual average GDP growth for Latin America in the same period has been 2.8%), (Figure 0.1). Sound macroeconomic management, coupled with effective penetration in global markets (trade equals 60% of GDP in Chile, while in Australia the same figure equals 40%) and Chinese appetite for raw materials explain this positive performance. Targeted policies to foster trade and investment have also been central: Chile has 21 free trade agreements in force, including with the European Union (2003), the United States (2004), the People's Republic of China (2006) and Japan (2007). Additionally, since the 1990s, the country has received a fair amount of FDI, especially in capital-intensive activities such as mining. In 2015, Chile's inward stock of FDI was among the highest in the OECD (around 80% of GDP, double the OECD average of 40%). Over the last decade, Chile has also seen some of its large companies grow and become regional leaders in forestry, retail and the airline business.

As a consequence, Chileans today are better off than in the past. They have higher incomes and they are progressively closing the gap with more advanced countries: the per-capita income of Chile was only 26% of the United States in the 1990s, while nowadays the average income of a Chilean equals 40% that of a US citizen.

Figure 0.1 Chile's GDP growth and GDP per capita

Annual GDP growth rate (HP filter, left axis) and GDP per capita (right axis), 1950-2016



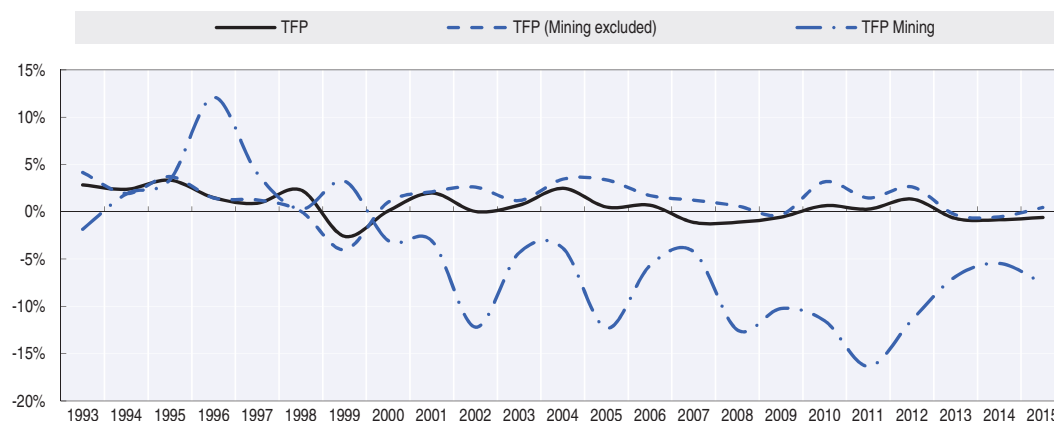
Note: GDP: gross domestic product; LAC: Latin American countries; y-o-y: year on year; PPP: purchasing power parity; HP: Hodrick Prescott Filter. The Lambda in the Hodrick Prescott filter has been chosen according to OECD (2016a), OECD Compendium of Productivity Indicators 2016, <http://dx.doi.org/10.1787/pdty-2016-en>.

Source: Authors' analysis based on the Conference Board (2017), Total Economy Database™ (Adjusted version), <https://www.conference-board.org/data/economydatabase/index.cfm?id=27762>.

## Low productivity holds back Chile's future growth.

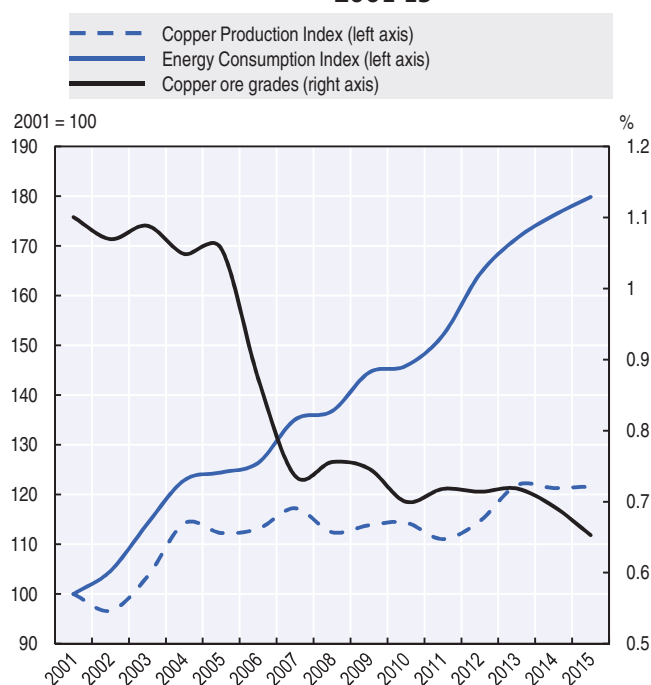
Despite the positive growth performance, weak productivity is holding back Chile's future growth potential. Total factor productivity (TFP) has remained stagnant since the beginning of the 1990s, mostly because of mining (TFP in mining has been declining at a yearly average of 4.7% since the early 1990s, Figure 0.2). The deterioration in copper ore grades has demanded a shift to underground mining and an increase in energy intensity resulting in lower productivity (Figure 0.3). In addition, most workers in Chile are employed in low productivity activities. Moreover, the number of workers per unit of output in mining is three times higher in Chile than in Sweden.

Figure 0.2 Total factor productivity growth in Chile, 1993-2015



Source: Authors' analysis based on data from UAI/CORFO (2017), "Boletín trimestral Evolución de la PTF en Chile" (Quarterly Evolution of the TFP in Chile).

Figure 0.3 Chilean ore grades are falling while energy consumption is rising, 2001-15



Note: Index is constructed for copper production by referring to thousands of tons extracted, and for energy consumption to terajoules necessary for extraction.

Source: Authors' analysis based on US Geological Survey and COCHILCO (2017), database, <https://www.cochilco.cl>.

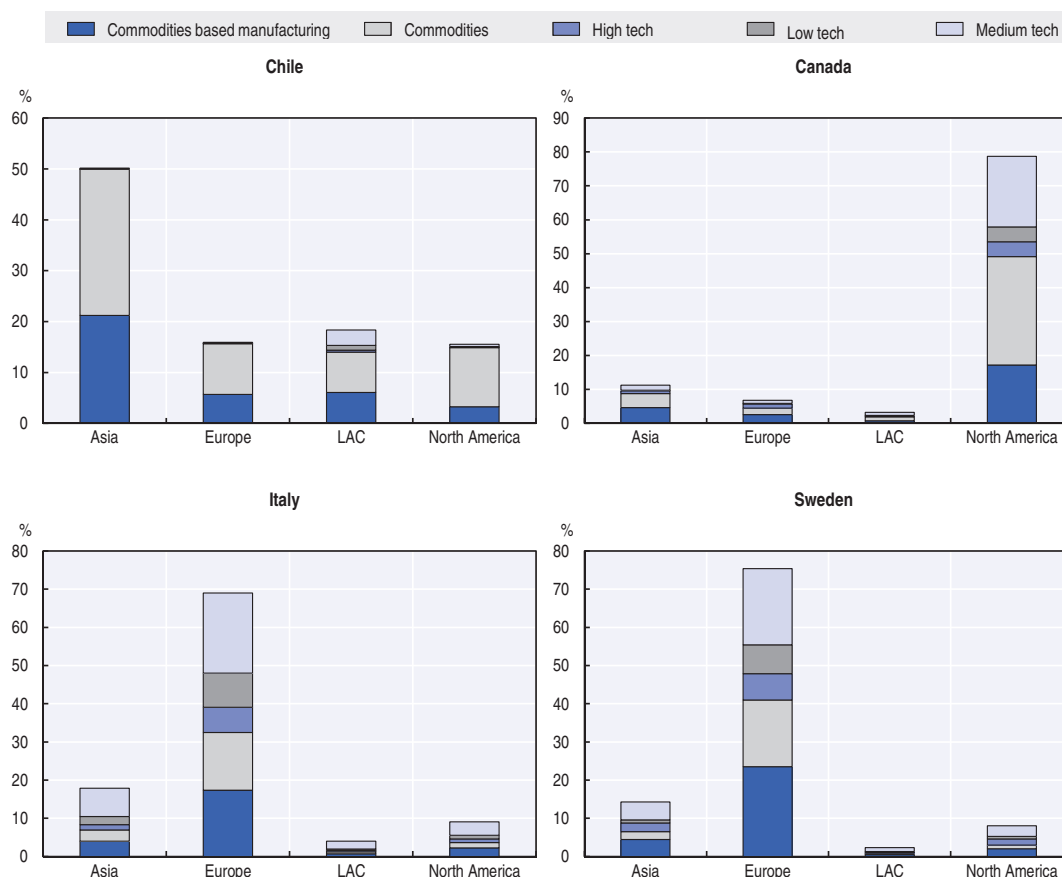
### The limited diversification of the economy, both in terms of activities and markets, leaves Chile vulnerable to external shocks.

Domestic economic growth is still highly reliant on natural resources. The Chilean economy remains only modestly diversified (Figure 0.4). Its exports are mostly concentrated in natural resource-based and primary products, characterised by relatively low levels of sophistication and poor linkages with the rest of the economy. Despite the effectiveness

of the stabilisation fund which guarantees macroeconomic stability, fluctuations in copper prices have major effects on businesses and citizens' perceptions. Pro-innovation, risky and long-term investments are limited when prices are on the upturn. Indeed, the boom in copper prices in the mid-2000s significantly increased the profitability of mining, sustaining economic growth but limiting the incentives to invest in other activities.

Figure 0.4 **Commodities make up a high share of Chile's exports**

Share of gross exports by technology content towards selected regions, Chile and selected countries, 2016



Notes: LAC: All Latin American and Caribbean countries.

The technological classification follows Lall, S. (2000) and Aboal et al (2015).

Source: Authors' analysis based on UN (2017), Comtrade Database, <https://comtrade.un.org>.

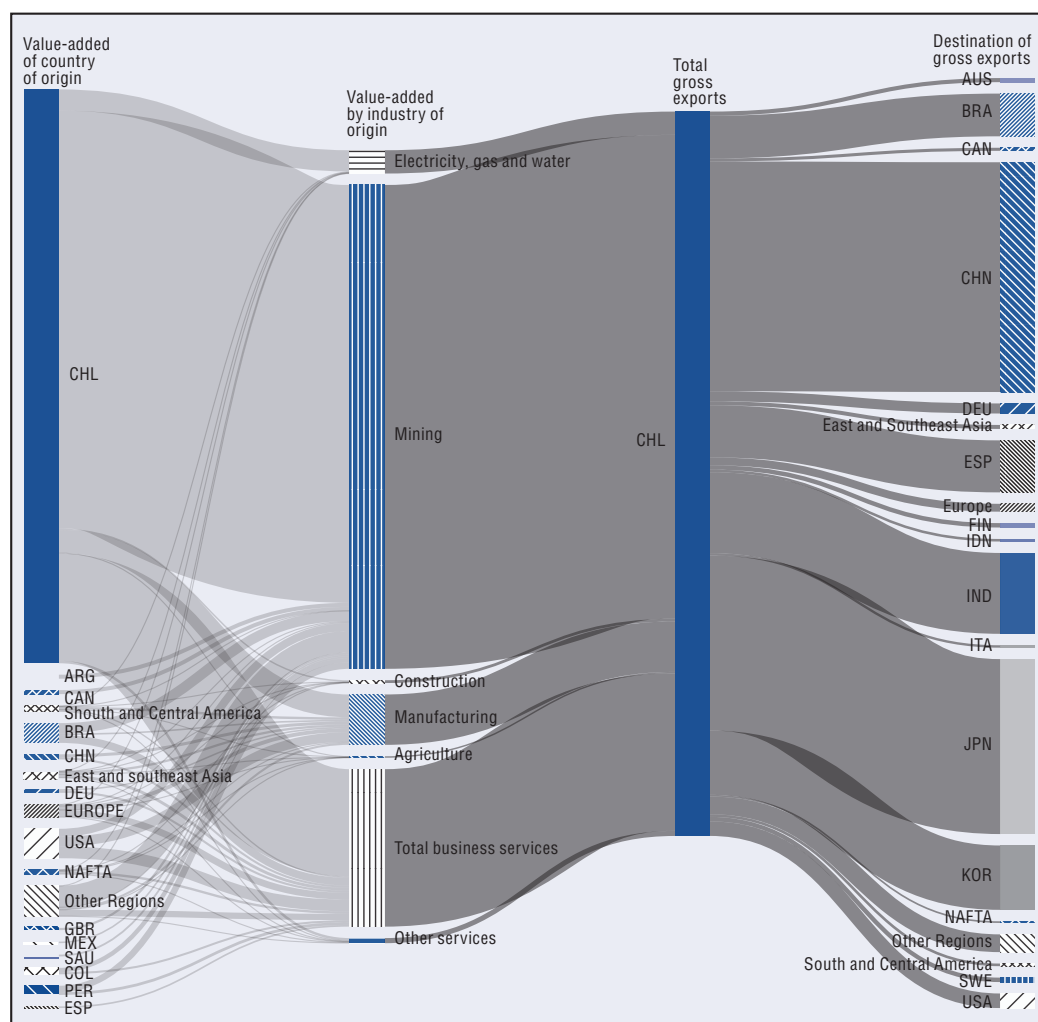
The country is the biggest producer of copper in the world, accounting for over one-third of global total reserves. It is also the world's leading producer of iodine, rhenium and lithium (Chile accounts for 63.2%, 50% and 39% of world production, respectively). Mining is the backbone of the Chilean economy. It employs around 220 000 workers and in the last decade, it accounted on average for 13% of GDP and for more than 55% of Chilean exports (50% of which are explained by copper alone).

Mining will continue to be a key driver of growth in the future, but it needs to shift up a gear. Mining in Chile is mostly linked to extraction and benefits less from foreign inputs than in other countries. Chile has, for example, a lower foreign value added content in

gross exports (20%) than Sweden (25%). Chilean mining exports also embed fewer inputs from other sectors than Swedish ones. In Sweden, business services and manufacturing contribute, respectively to 30% and 10% of the value added of mining exports, while in Chile these shares are down to 21% and 7%, respectively (Figures 0.5 and 0.6). In addition, the sector faces limits in terms of its future capacity to generate jobs given the move towards automated mining. Mining will also need to address its growing energy intensity: it accounted for 20% of total domestic energy consumption in Chile in 2015, 7 percentage points higher than in 2000.

Figure 0.5 **Decomposition of Chilean gross exports by origin and destination, mining, 2014**

Value added of gross exports by origin and destination (%)



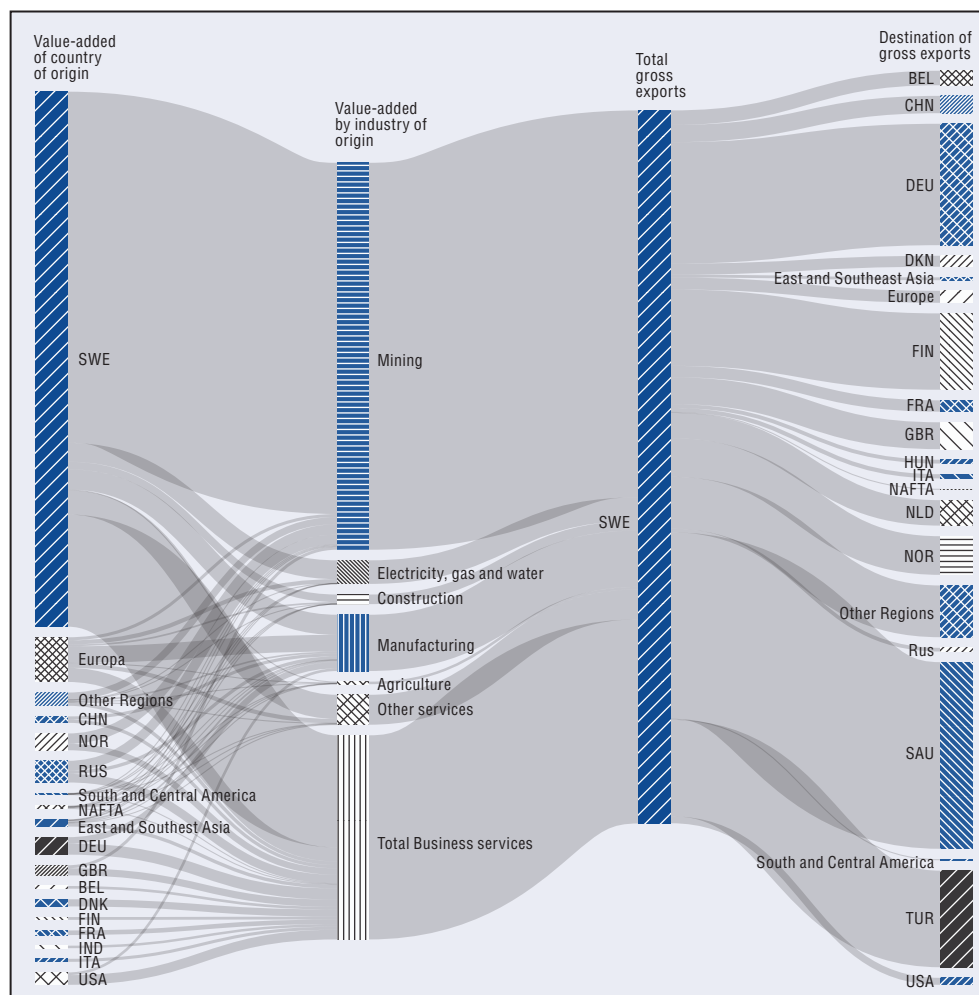
Note: Regional aggregates exclude member countries reported in the graph.

Source: OECD (2017b), TiVA Nowcast Database, [http://stats.oecd.org/Index.aspx?DataSetCode=TIVA\\_NOWCAST](http://stats.oecd.org/Index.aspx?DataSetCode=TIVA_NOWCAST); see also [www.oecd.org/std/its/tiva-nowcast-methodology.pdf](http://www.oecd.org/std/its/tiva-nowcast-methodology.pdf)



Figure 0.6 Decomposition of Swedish gross exports by origin and destination, mining, 2014

Value added of exports by origin and destination (%)



Source: OECD (2017b), TiVA Nowcast Database, [http://stats.oecd.org/Index.aspx?DataSetCode=TIVA\\_NOWCAST](http://stats.oecd.org/Index.aspx?DataSetCode=TIVA_NOWCAST); see also <http://www.oecd.org/std/its/tiva-nowcast-methodology.pdf>

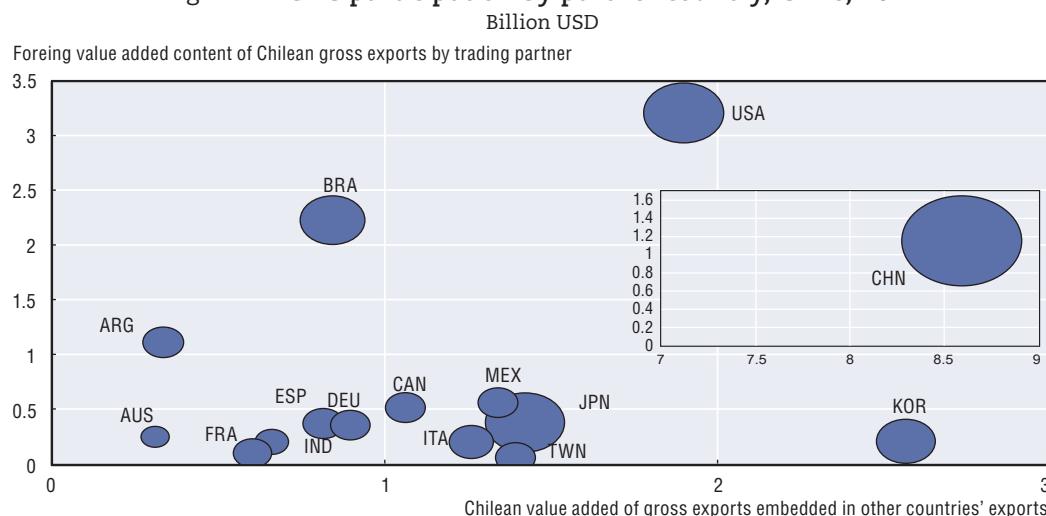
**Agriculture and the agro-food industry are also major drivers of export growth.** They account for 8% of Chile's GDP, contribute to more than 20% of domestic exports, and employ 17% of the national work force; the food and beverages industry only accounts for approximately 40% of domestic manufacturing value added. Chile mostly exports primary products for consumption, and its exports are less sophisticated and less diversified than other countries. Primary products account for 41% of Chile's domestic agro-food exports, compared to 15% and 11% in Italy and France respectively. In 2016, 49 products accounted for 90% of Chilean agro-food exports, while 112 products explain 90% of Italy's exports. Chile's top 10 destination markets (of which the US is by far the most important) account for 75% of total domestic agricultural exports and 70% of agro-food industry exports.

**Achieving successful diversification in Chile does not mean dismissing mining and traditional activities such as agriculture and agro-food.** But rather transforming them, making it more productive, and exploiting the synergies with emerging industries and technologies, including digital technologies and solar energy. Generating business opportunities in new areas will be essential to sustaining growth and creating jobs.



Chile has the potential to benefit more from its openness and improve its participation in global value chains (GVCs). Its businesses are integrated in GVCs, but mostly as commodity producers. In fact, most of the country's participation to GVCs is explained by the provision of un-refined copper to China, (Figure 0.7). Chile could improve its participation in GVCs by seeking opportunities beyond mining, including in services. In 2014, the services value-added content of Chile's total exports was 38.4%, below the OECD average of 55.5% (Figure 0.8). This could also contribute to increase SMEs' participation to GVCs, as in Chile only 10% of SMEs are involved in export activities, one of the lowest shares in OECD countries.

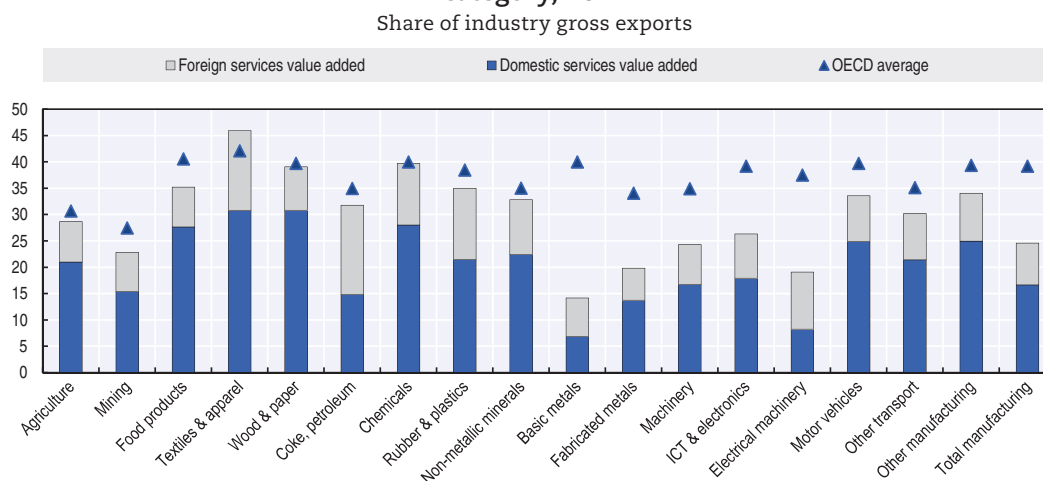
Figure 0.7 GVC participation by partner country, Chile, 2014



Note: Bubble size represents the share of Chilean exports to that country. Only countries that account for at least 2% of Chile's exports are displayed.

Source: Authors' analysis based on OECD-WTO (2017), Trade in Value Added database, <http://stats.oecd.org>.

Figure 0.8 Chile's services content of gross exports, by industry and service category, 2014



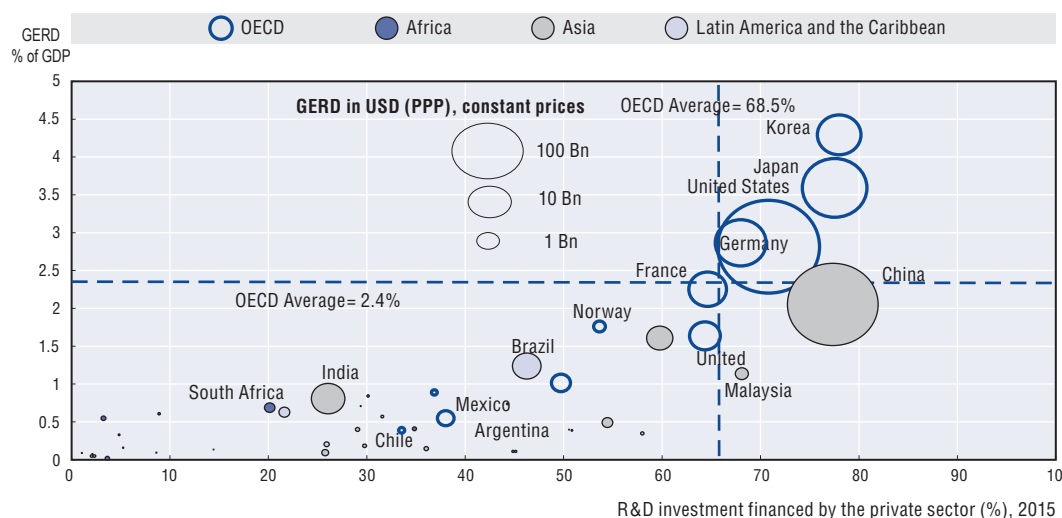
Source: Authors' analysis on OECD (2017d), TiVA Nowcast Database, [http://stats.oecd.org/Index.aspx?DataSetCode=TIVA\\_NOWCAST](http://stats.oecd.org/Index.aspx?DataSetCode=TIVA_NOWCAST).

## The persistent specialisation in low value added activities and the high concentration of economic opportunities in few activities, firms and regions hamper future progress and limit innovation.

Despite the progress of the last decade, Chile still has a limited knowledge base. A growing number of Chileans pursue graduate degrees, but few do so in relevant areas for future competitiveness: 3% of graduates are in information and communication technology (ICT), and only 1% in natural sciences, mathematics and statistics (the lowest share of all OECD countries). This skills gap hampers the capacity to be connected to global production systems, which will be increasingly dominated by digitalisation and new technologies and to innovate in strategic areas for the country, such as earth science and natural resources.

Chile has advanced in digital connectivity, but much progress still needs to be made. A high performing digital infrastructure is essential to fully reap the benefits of the digital era. More Chileans using internet, the number of fixed and wireless broadband subscriptions per 100 inhabitants is 16 in 2017 compared to only 9 in 2008, but the country still lags behind the frontier in connection speed. Chile's average broadband connection speed is 5 megabytes per second (Mb/s), four times slower than in Korea and only 2% of broadband connections in Chile operate faster than 15 Mb/s, while in Sweden and Korea the share is above 35%.

Figure 0.9 Public and private investment in R&D in Chile remain below average, 2015



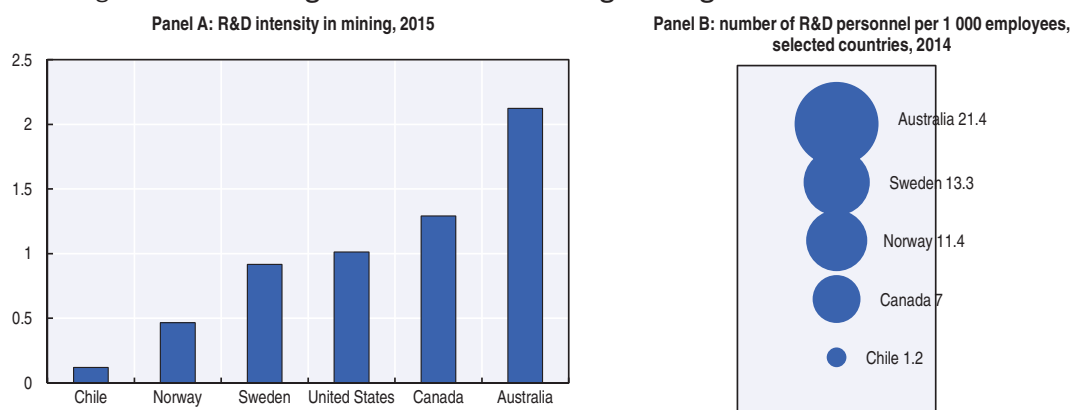
Note: GERD: Gross domestic expenditure on research and development.

Source: OECD (2016e), "Main science and technology indicators", <http://oe.cd/msti>; RICYT (2015), Red de Indicadores de Ciencia y Tecnología (database), [www.ricyt.org](http://www.ricyt.org); UNESCO (2016), Institute for Statistics Database, <http://data.uis.unesco.org>.

**Chilean businesses invest little in innovation.** With roughly USD 1.2 billion of gross domestic expenditure on research and development (GERD) (0.39% of GDP), Chile has one of the lowest R&D intensities of all OECD countries (Figure 0.9). Moreover, the private sector's contribution -at 33% of total R&D expenditure- is significantly below the OECD average of around 68%. In mining, the increasing specialisation in extractive activities and the high returns of the super cycle of commodity prices during the 2000s reduced the incentives to invest in innovation. Total business expenditures in R&D over total gross value added is 0.15% in Chile, versus 2% in Australia and 1% in Sweden (Figure 0.10). And,

while in Australia 21.4 out of 1 000 employees and in Sweden 13.3 are dedicated to R&D, the figure in Chile is 1.2. The lag in business investment in innovation is also large in manufacturing: Chilean firms invest only 0.4% of their gross value added in R&D, which compares poorly to the 5% invested by Australian manufacturing firms (Figure 0.11). In the food processing industry, the private sector commitment to innovation is also below that of international leaders. Fewer firms innovate and, among the innovators, Chilean firms tend to be less radical than the ones in other countries and they tend to focus on process, rather than on product innovations. In Chile, 40% of food processing companies declare being active in innovation, compared to 70% in Belgium and around 60% in France and Italy (Figure 0.12).

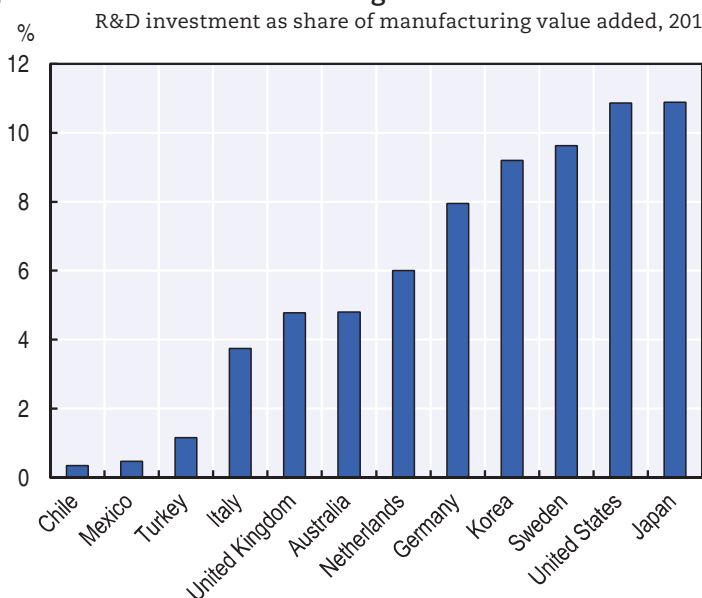
Figure 0.10 Chile lags behind world leading mining countries in innovation



Note: Panel a: R&D intensity in mining is the ratio of total business enterprises' expenditure on R&D over total gross value added in the mining sector (ISIC rev 3.1); Panel b figures refer to private sector employment, 2015: Chile, 2014: Norway, 2013, Australia and Canada, 2010: Sweden.

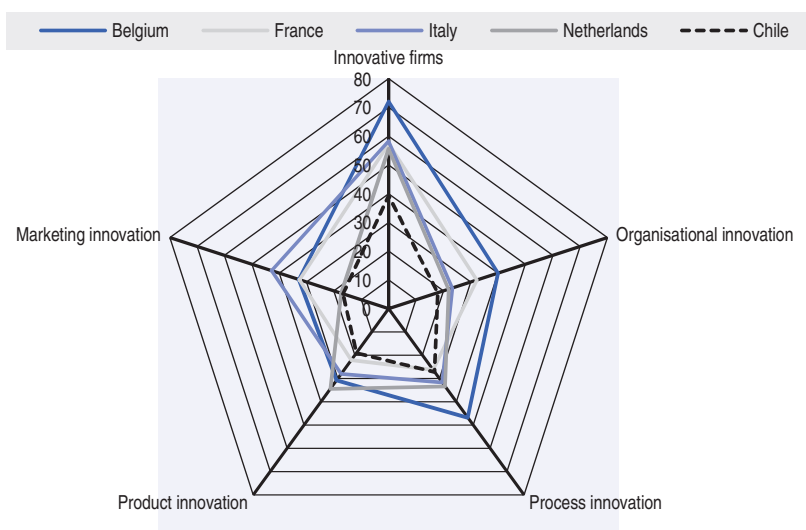
Source: Authors' analysis based on OECD STAND stats.oecd.org; ILO Statistics, [www.ilo.org/ilostat](http://www.ilo.org/ilostat); and Australian Department of Employment, <https://www.employment.gov.au> (databases), 2017.

Figure 0.11 Chile's manufacturing sector invests little in R&D



Source: Based on OECD (2017e), National Accounts Data, <http://stats.oecd.org/>; and OECD (2017i), Structural Analysis Statistics (TAN) Database, <http://stats.oecd.org>.

Figure 0.12 Share of food processing firms engaged in innovation activities by type of innovation, 2014



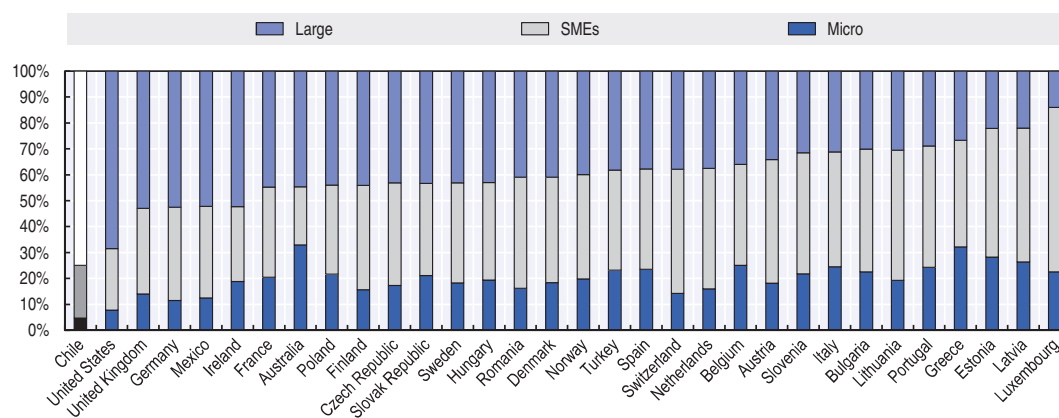
Note: For comparing different innovation surveys we adopted the scheme proposed by Crespi, G., Tacsir, E. and F. Vargas (2016), "Innovation dynamics and productivity: Evidence for Latin America", in: Firm Innovation and Productivity in Latin America and the Caribbean.

Source: Authors' analysis based on Eurostat (2014), "Community Innovation Survey", <http://ec.europa.eu/eurostat/web/microdata/community-innovation-survey>; and Chilean Innovation Survey 2013-14, 2017.

**Large firms play a dominant role in the economy, but they innovate less than their peers in advanced countries.** Large firms in Chile are responsible for 73% of business turnover and 57% of total business R&D, while in Germany such firms account for 53% of turnover and for 85% of R&D (Figures 0.13 and 0.14).

Figure 0.13 Large firms play a dominant role in Chile's economy

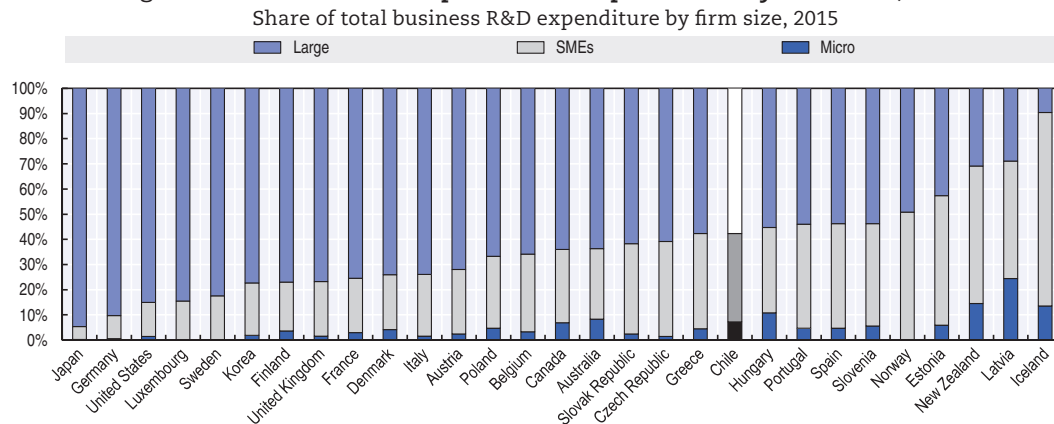
Share of total turnover in business activities by firm size, selected countries, 2015



Note: Business activities comprises ISIC 4.0 Div 5-90.

Source: Authors' analysis based on OECD (2017g), *Structural and Demographic Business Statistics database*, <http://stats.oecd.org>; and SII (2017), "SII statistics and studies", [www.sii.cl/estadisticas](http://www.sii.cl/estadisticas).

Figure 0.14 Business enterprise R&amp;D expenditure by firm size, 2015



Source: Authors' analysis based on OECD (2017h), *OECD Science, Technology and Patents Database*, <http://stats.oecd.org>.

In addition, economic opportunities are unequally distributed across the country. Chile is the most territorially unequal country in the OECD. Population, GDP growth and productivity are concentrated in the capital city. According to the latest census, 40% of Chileans live in the Santiago Metropolitan Region (RMS) and generate 48% of national GDP, higher than other countries in which the capital city plays an important role (Paris, for example, accounts for 18% of France's population and for 30% of national GDP). Chile's regional disparities in GDP per capita are the second highest of all OECD countries. Foreign direct investment concentrates in Santiago and the mining regions of Antofagasta and Atacama, while the creation of new firms is concentrated in Santiago. These trends hamper the possibilities to identify new sources of growth and to connect local ecosystems with emerging business opportunities.

### New technologies and the global call for inclusive and sustainable development open a window of opportunities to overcome the country's structural weaknesses.

Major scientific, technological and production changes are revolutionising the economy and society at an unprecedented speed. A high level of uncertainty characterises the global landscape at multiple levels – from the kind of technology that will dominate in a given domain, to the forms of social contracts that will be needed to regulate work in a platform-based economy, and the global race for leadership in the standards that will define competitive advantages in the future. These changes are coupled with stronger demands for shared prosperity and more sustainable and inclusive development, calling all countries – at different levels of development and wealth – to revise their strategies and to define new policy approaches.

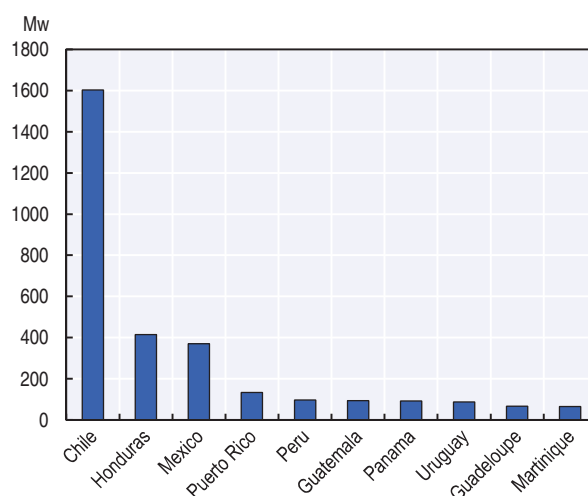
**New technologies are transforming businesses.** Most countries in the world, including Germany, Sweden and Italy, are increasingly aware of the potential disruptive impacts of ongoing technological changes and, in fact, are taking steps to shape their futures by defining long-term visions, scanning potential options and investing for the long term. For example, automation and artificial intelligence are driving productivity growth in mining, and are enhancing safety in the work place. In 2014, Sweden invested almost half a USD billion to set up the world's most automated mine which enabled a doubling in the extracted output and energy savings of 25%. In addition, the agro-food value chain is increasingly sophisticated and a growing number of scientific and technological areas will drive competitiveness in the future, including biotechnology, nanotechnology,

pharmaceuticals, and smart packaging. Data science will also benefit the sector through enhanced traceability and greater food safety.

The call for “green” products and services and new consumers’ preferences are also transforming the way to do business. This holds true in all activities, from mining to agro-food and solar energy. Greening mining is already a global business priority, due to high and growing energy costs and to a demand for greening value chains. New consumer preferences are also changing the global agriculture, food and beverage markets. While a decade ago the demand for sustainable, safe and healthy food was limited to a niche, today it has become more diffused and is expected to keep growing. Demand is shifting to “local” products (0-Km products), and to “authentic” and unique products, often coming from distant markets but with a recognised impact on health. These trends require new forms of traceability and standards and open new opportunities for business development.

Solar energy is becoming globally competitive thanks to falling prices. Chile’s natural endowments (the Atacama Desert has the highest solar incidence in the world and UV-B radiation 65% above the European average) together with falling renewable energy prices and ongoing technological changes are opening a window of opportunities. Chile is already the biggest solar energy producer in Latin America, accounting for almost half of total installed capacity in the region (Figure 0.15). Since 2015, Chile also has a national vision with a roadmap for energy towards 2050. All scenarios estimate that solar will be the leading energy source in Chile by 2045. Solar energy can help not only to green the energy matrix, but also to transform the economy and its growth model. Unlike fossil-fuel based energies, solar is not extracted through drilling or mining. It involves a manufacturing value chain and can be produced and used locally, opening new business opportunities in Chile.

Figure 0.15 Chile is Latin America’s biggest solar energy producer  
Installed capacity in solar energy, 2016



Source: Authors’ analysis based on IRENA (2017), IRENA Dashboard, <http://resourceirena.irena.org/gateway/dashboard/>

## Chile has taken steps to transform the economy and reap the benefits of new demands and technologies.

The Chilean approach to economic development shows relative continuity over time. Since 2014, the government has embarked on an ambitious programme that included an educational reform to respond to the demand for better and more inclusive



education, targeted efforts to promote environmental sustainability, reforms to increase decentralisation and autonomy in the regions, and reforms for enhancing productivity, innovation and growth. The pro-growth reforms had a budget of approximately 1 USD billion in 2017 (0.4% of GDP) of which 45% went to skills development. This budget has been increasing in the last decade, but it is still considerably below international trends. The growth agenda since 2014 can be summarised in four main areas:

1. **Modernising the state for greater impact.** The government has been active in reforming institutions to increase impact and deliver more effective results. The main actions have included: i) The creation of the National Productivity Commission (CNP), by decree in 2015, as a public-private consultative body to facilitate co-ordination and to better prioritise action; ii) The creation in 2016 of InvestChile as the national agency in charge of FDI attraction; iii) A proposal for creating a Ministry for Science and Technology, responsible for financing the training of advanced human capital and research, to which CONICYT would respond to as an implementing agency, and; iv) a renewed impetus to the decentralisation agenda. Recent reforms increased the decision-making and financial autonomy of regions. CORFO has also started pilot programmes in regions with the aim to decentralise 40% of its budget by 2021.
2. **Facilitating business development.** Chile has updated its policies for business development by reducing red tape and fostering start-up creation and expansion. The country has reformed the policy mix based on the results of its monitoring and evaluation, and now prioritises retaining more talent and businesses in the country and the creation of start-ups in the regions outside the capital city, Santiago. As a result the concentration of start-up creation in Santiago has decreased from 75% (during the first assessment of Start-up Chile) to around 50% in 2017. The government has modernised services to entrepreneurs through more flexible mechanisms tailored to the needs of start-ups, such as collaborative workspaces and mentoring networks; and it has simplified the regulations for starting and winding down a business. Private investment at the expansion stage and angel investors remain weak links in Chile's financing chain.
3. **Fostering human capital and innovation.** The government has continued to support human capital and innovation through several tools managed by CONICYT and CORFO. BecasChile has financed more than 2 300 PhDs in the last five years; however, the programme is not sufficiently articulated with emerging skills demand as more than 40% of the beneficiaries were trained in social sciences. CORFO manages multiple lines of financing to foster innovation in firms from precompetitive research to piloting and scale up. Some instruments specifically target SMEs. Since 2008, Chile has also put in place fiscal incentives for innovation; they have been reformed in 2011 to broaden the scope of the tax credit for R&D to include internal expenditures, increase the annual tax ceiling, simplify administrative requirements and encourage co-operation in R&D with domestic and international science and business partners. Between 2012 and 2016, CORFO certified more than USD 60 million in tax credits (50% of which went to mining, 35% to agriculture and forestry and 18% to agro-processing).
4. **Enabling public-private partnerships to address strategic challenges.** Starting from increasing awareness about the major technological changes that are transforming businesses and societies worldwide, and in line with global trends, the government has embarked in a new effort to facilitate public-private dialogue to identify future challenges and opportunities in its different industrial ecosystems. The Strategic Investments Fund (FIE) managed by the Ministry of Economy was set up in 2015 to finance high-impact strategic projects jointly selected by the government and the private sector. CORFO has introduced the strategic programmes. These represent a novelty in the Chilean policy approach: they build on previous



successful experiences of public-private dialogue, especially in mining, and scale it up to add a forward-looking dimension. Through a process of multi-stakeholder dialogue, CORFO acted as a coordination facilitator between businesses, academia, civil society and government to identify gaps and road-maps with a 10/15-year timeframe. This process has been conducive to identify future priorities, including the need to ensure resilient, reliable and safe Internet connection; to define standards for interoperability and digital trade and to modernise training at all levels – from vocational to post-graduate – to endow the next generation of workers and managers with the skills needed for the future. It has also contributed to identify competitiveness gaps that need public-private action, including for example: knowledge, technology, skills and infrastructure gaps.

**Table 0.1 Progress overview of Chile's strategic programmes, 2017**

<b>Governance dimensions</b>		
Anticipation capacity	✓	Having road-maps with a long-term horizon (to 2025-30) takes Chile a step forward in line with international good practices. Aligning financing with the time-line of the road map will be an additional step forward.
Adaptation capacity	≈	In the fast changing technological environment the time for design and validating road-maps could be shortened from the current 13 months, while adaptability could be increased by introducing periodical revision of road-maps.
Learning and upgrading potential	✓	The public-private consultations led to an effective identification of gaps in skills needed to compete in the future and of priority actions to bridge them. Growing cooperation between businesses, training centres and academia is a positive step. Overcoming barriers, including aligning educational accreditation processes with emerging needs, will be important to getting the right skills for tomorrow.
	≈	Setting up mechanisms to generate synergies between the different programmes and to enable learning and cross-fertilisation could align multiple-stakeholders to take actions and provide public goods which would act as competitiveness enhancers across all industries and firms, including digital infrastructure and skills. The creation of the Solar Research Institute, if endowed with a broader science base and mission could contribute to enhance learning opportunities in the whole economy.
Interconnectedness propensity	✓	<b>Within government.</b> The programme benefits from multi-agency co-ordination.
	≈	<b>Private sector.</b> Businesses participated in the road-map process, but enhanced participation of start-ups and SMEs would be needed as well as increased commitment by lead firms and investors would be needed in going forward.
	✓	<b>Academia.</b> The programme benefits from commitment and co-operation mechanisms with academia and international research centres.
	✓	<b>Civil society.</b> There is room to increase the participation of civil society in the process, and to identify new mechanisms to strengthen business-community relationship.
	x	<b>Regional.</b> Strengthening regional ties could help to scale up investments and reach the critical mass needed to compete effectively at the global level.
Embeddedness potential	✓	<b>International.</b> Scaling up on international cooperation could help closing knowledge and technology gaps.
	≈	There is a need to clarify procedures and standards to ensure environmental and social sustainability.
	x	There is a need to increase the role of regions & territories in planning, implementation and monitoring.
	≈	Open government and effective monitoring and evaluation are needed to track progress and performance and identify areas for reform.
<b>Future challenges</b>		
Ensuring the long-term commitment of the private sector. Mechanisms to avoid rent seeking and capture need to be in place to ensure that publicly-financed actions benefit all stakeholders and deliver public and club goods not available otherwise		
Aligning the budget with the strategy's objectives. Chile has an initial budget of USD160 million for three years (0.1% of 2016 GDP). In comparison, the Emilia Romagna region (Italy) has a USD 700 million budget for the period 2014-2020 in the context of the European Union Smart Specialisation Strategy		
Avoiding the overlap of programmes and actions and foster synergies among the different sectoral programmes. It is important to convey resources towards economic activities that have the greatest spill-over effects for the economy and society		
Ensuring high-level political ownership. The programmes are designed, implemented and revised within the Ministry of Economy through CORFO and with the financial support of FIE and FIC. In order to scale-up and foster production transformation it will be important seek higher political commitment		

Note: ✓: positive progress; ≈: margin for improvement; x: reform needed.

Through the strategic programmes, Chile seems to have found an effective policy approach by identifying enabling areas that are relevant for all industries (i.e logistics, solar energy, smart industries and advanced manufacturing) and by creating opportunities for the actors operating in different industries to share visions and challenges and define future specific needs in terms of skills, infrastructure, supply chain development, R&D and standards. This process is a step forward in consensus building and in fostering public private co-operation for economic development (Table 0.1). Examples of actions to close competitiveness gaps derived from the road-mapping process include: i) the proposal of the creation of the International Institute of Solar and Mining (IISM) to foster applied research in solar energy, mining and production of clean hydrogen and other energy-storage components that aims to fill the knowledge gap that hampers Chile to participate to natural resource-based value chains in a more sophisticated way; ii) the open platform, launched in 2017 and managed by Fundación Chile, to match demand and supply for developing innovative solutions to foster supply chain development in mining; and iii) the clarification of the need to develop standards for enabling the development of new food categories and high-value ingredients to enable upgrading in agro-food.

### To consolidate the progress made Chile will need to:

- **Mobilise public resources and scale up public investments to amounts that reflect global challenges.** Ensuring a high speed, resilient and reliable internet connection across the whole territory will require high investment. In addition, the competitiveness challenges posed by the ongoing technological and demand revolutions require high mobilisation of resources. For example, the Emilia Romagna region, with less than 5 million inhabitants, is mobilising USD 800 million between 2015 and 2020 for investments to improve the competitiveness of its agro-food system. Chile, according to current plans, is aiming to mobilise one-eighth of this amount (USD 100 million from 2014 to 2025). Considering Chile's future priorities to reduce public debt, actions involving regional and global partnerships could help the country overcome the funding gap.
- **Strengthen opportunities for learning and innovation.**
  - **Bridging the skills gap** to enable operating in global production systems, which will be increasingly dominated by digitalisation and new technologies and to innovate in strategic areas for the country, such as earth sciences and natural resources. Chile would benefit from consolidating and expanding current initiatives of greater involvement of private sector in technical, graduate and post-graduate levels, modernising vocational training, updating curricula at all levels to endow the next generation of workers and managers with the skills needed for the future and aligning educational accreditation processes with emerging needs. Increasing quality and access of the overall educational system is a precondition.
  - **Leverage on mining as a driver of change.** Chile could further leverage on the transition of mining towards industry 4.0 to address the competitiveness gaps that limit the country's potential to benefit from new technologies, including by improving internet connectivity and by creating opportunities for domestic universities, firms and research institutes to develop solutions for digital industrial systems.
  - **Enable partnerships and explore the potential of technological convergence.** The new industrial landscape will be characterized by growing interrelation between knowledge and technology fields; innovating will require cross-fertilization from different areas and disciplines. For example, it would be appropriate to enlarge the mission of the solar institute in Chile beyond

mining applications and to explore synergies with other renewable energies. World leading research centers in solar, including the German Aerospace Center (DLR), benefit from a wide science base and with networks with multiple technological and industrial fields. Europe, in its plan for renewable energies has also shifted from a technology-specific to an integrated approach that fosters complementarities between renewables and with other enabling technologies, such as ICT, advanced manufacturing, new materials, industrial biotechnology, nanotechnology, photonics and nano-electronics, among others.

- **Strengthen national, regional and international co-operation in research and supply-chain development.** Building capabilities in a rapidly changing technological environment takes time and requires benefiting from local and global research and production networks. Chile needs to increase private sector commitment to innovate and needs greater co-operation between science and businesses. Chile is on a good track as it is exploring opportunities to strengthen its learning and knowledge base through global partnership; the country could further build on its reputation as a reliable partner and scale up its efforts to co-operate within the region and globally. Pooling resources for research and exploiting synergies in Latin America could also help to scale up investments and reach the critical mass needed to compete effectively at the global level. International co-operation is also relevant. An interesting step in this direction is the South-South co-operation programme that Chile signed in 2017 with Morocco to foster learning and co-operation to strengthen capabilities in the solar value chain.
- **Getting the right stakeholders at the table.** Setting up effective public-private consultations is an important step in defining better policies. The effectiveness of these consultations depends, however, on the representativeness and inclusiveness of the participants. Over the last decade, Chile has strengthened the public-private dialogue with lead firms, especially in mining. Going forward it would be important to strengthen the participation of civil society, entrepreneurs along the entire value chain and local governments and communities. For example, the social acceptability of solar energy should not be taken for granted. The social license from which these energies currently benefit from will only be sustained in the long run if new agreements, negotiations and benefit sharing with the local communities are developed. New forms of dialogue and partnership with local communities will therefore be needed.
- **Being actively involved in international discussions on future standards and norms.** Especially in the ones that will be increasingly relevant in the value chains that matter to the country, such as mining, renewable energies and agro-food.
- **Monitor implementation and assess impact.** New technologies offer new opportunities to guarantee easier and real-time access to information linked to the implementation of public action. CORFO has good experience in project monitoring and evaluation. Going forward, it would be desirable to benefit from new technologies and set up a simple, easy-to-access mechanism for tracking implementation to increase accountability and enable adjusting actions when expected results are not achieved.

**The Chilean model requires an “update” to continue succeeding: a renewed pact between government, businesses, academia and society is needed to allow Chile to advance on its path to prosperity.**

Society’s aspirations change with progress, and the Chilean society – with its growing middle class – is no exception. Chileans are demanding more opportunities for their youth and access to new services. Matching the aspirations of an inclusive society requires an ‘update’ of the growth model to unleash new sources of growth and to broaden society’s participation to the economy to achieve shared prosperity.

Chile has the potential to be part of the next production revolution. The country, in addition to its natural endowments, has a sound reputation as a business partner and as a stable economy, and it counts on an extensive network of investors and trade partners. However, being a stable and open economy will not be enough to reap the benefits of new frontiers. Chile could build on its effective partnerships with lead firms in the value chain to participate in this transformation at an early stage. This will require a pro-innovation attitude from the business community, and targeted policies to foster learning and innovation. The speed of global change and the competition for lead positions mean that this window of opportunity will not remain open forever. Development is a moving target – successful countries are those that are able to seize opportunities at an early stage. Taking full advantage of global opportunities will require Chile to address its structural weaknesses, from ICT infrastructure and skills to strengthening the national production and innovation system. This can be achieved only through investment and renewed and effective partnerships among government at all levels, businesses, academia and society. To make Chile advance on its path towards prosperity and build the trust that is needed, three game changers are of particular importance in the near future:

1. **Advancing in modernizing the state to cope with a fast-changing, uncertain and complex landscape.** Chile’s governance needs an “update” to continue succeeding. Over the years, several institutional reforms have been implemented within and across organisations. In some cases the reforms have improved governance, in others successive changes created several institutional layers and a high level of complexity in the bureaucracy. In the future it would be important to preserve the state’s modernisation agenda and make it more agile, effective and capable of responding to future needs. Ensuring high-level leadership for the transformation agenda would help to achieve consensus and mobilise actions across ministries. Co-ordination at the ministerial level on innovation and economic transformation needs to be strengthened. The current negotiation process for annual budgeting between finance and each line ministry, coupled with weak co-ordination at the strategic level, weakens the capacity to prioritise actions in a more effective way. In going forward, it would also be desirable to reduce the multiplicity of co-ordination and advisory bodies and aim for a unique, but empowered and strengthened, body directly answering to the President. Enabling long-term financing for strategic investment is also important. The creation of the Strategic Investments Fund (FIE) is a positive step forward, even though its nature as a treasury fund limits the long-term orientation. To consolidate the fund and to simplify procedures it could be shifted to the responsibility of the implementation agency (CORFO), rather than being directly managed at the ministerial level. As the challenges of global, digital, inclusive and environmentally sustainable economies are multidimensional and complex, renewed co-ordination among the production, investment, trade and education agendas would also be desirable. The government has consolidated the dialogue with leading domestic and international firms. The next step would be to enlarge the consultation base and increase the capacity for dialogue with entrepreneurs, small businesses and civil society. In the new technological

paradigms, disruptive innovations could also come from start-ups and small firms – having a governance structure capable of interacting with them will increase the capacity to design better policies.

**2. Strengthening and institutionalising anticipation capacity at the highest strategic level.** The pace of change at the global level is so rapid and uncertain that it is almost impossible to do responsible policy making without preparing for a range of alternative possible futures. Since the Ministry of Planning has been transformed into the ministry in charge of social development, Chile lacks a formal process, or an institutionalised space for planning and scenarios building. There are some initiatives, including the 2050 energy policy and the strategic programmes for economic transformation with their road-maps to 2030, but there is no high level strategic function dedicated to scanning potential futures to inform the policy process. In going forward, stronger anticipatory capacities could increase the ability to identify needs, prioritise actions and generate consensus on what is needed in the short, medium and long term. A future-oriented space for strategy setting is essential to contribute to aligning different stakeholders on a modernisation path and avoid the risks of being captured by current established interests. It would be important to set up a mechanism to ensure that the results of the strategic foresight processes are embedded into the national strategy and that they trickle down to each policy area.

**3. Advancing towards a place-based approach to policy making.** At the global level, regions and cities are becoming key units for planning and implementing economic transformation strategies. Chile would benefit from continuing advancing in its regional agenda to identify new sources of growth and make it more inclusive. In this process, it is also important to identify mechanisms for cross-regional cooperation to take into account not only administrative regions, but also functional ones. Regional governments in Chile suffer from capability gaps with respect to the national administration, it is important to complement the decentralisation agenda with efforts to increase capabilities in regional and local governments as well as implementing effective mechanisms for resource transfers between the national and regional governments.

The world is moving fast, and for Chile to be part of the global wave of change, a renewed approach to policy making and government-business-society relationships is needed. The current strategy has marked some positive steps towards building consensus for change. From now on, going beyond ideological divides and finding a common ground to mobilise private and public actors is of critical importance to reap the benefits of international trends and avoid marginalisation in the evolving global context.



# Production Transformation Policy Review of Chile

## REAPING THE BENEFITS OF NEW FRONTIERS

The *OECD Development Pathways* series helps developing and emerging economies to identify innovative policy solutions to their specific development challenges. Higher levels of well-being and more equitable and sustainable growth cannot be achieved by merely reproducing the experience of industrialised countries. For each of the countries studied, the series proposes options for action in specific policy areas and at the broader strategic level. It identifies the binding constraints to development across all sectors and proposes whole-of-government solutions.

Chile is a relatively stable, well-connected, open economy. Over the last decade the country has managed to increase its participation in global value chains and to export new products. However, its knowledge base is limited, productivity is stagnating and economic opportunities are still concentrated in a few places and limited to a few activities and firms. Today's global production revolution offers a window of opportunity for Chile to "update" its growth model to become more inclusive and sustainable.

The *Production Transformation Policy Review of Chile* (PTPR) uses a forward-looking framework to assess the country readiness to embrace change, with perspectives on solar energy, mining and agro-food, and identifies priorities for future reforms. This review is the result of government-business dialogue and rigorous analysis. It benefitted from peer learning from Sweden, Germany and the Emilia Romagna Region in Italy through the OECD Initiative for Policy Dialogue on Global Value Chains, Production Transformation and Development.

Consult this publication on line at <http://dx.doi.org/10.1787/9789264288379-en>

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