

# Diagnostic of Chile's Engagement in Global Value Chains



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One year ago, when reflecting on trade policies that can address productivity challenges of Chile and help the country progress towards a higher level of economic development, we decided to approach the Organisation for Economic Co-operation and Development (OECD) requesting an evaluation of Chile's integration into Global Value Chains (GVCs). Upon an extensive data analysis exercise and consultations with major stakeholders, the OECD issued the report that is presented here. Several agencies were involved in the process from the side of the Chilean government: the National Statistics Institute (INE), the Chilean Economic Development Agency (CORFO), the Ministry of Finance, the Foreign Investment Committee (CIE), the National Council of Innovation for Development (CNID), the Internal Revenue Service (SII), the Mining Ministry, and the Manufacturer's Association (SOFOFA).

The results of the study show that Chile is indeed highly engaged in GVCs, but primarily as a producer of inputs that other economies use in their production, which is mainly attributable to the high importance of copper and other natural resources in Chile's exports. In addition, the role of research and development (R&D) and innovation more broadly is limited in the economy, and the country continues to specialize in the basic commodities and relatively unsophisticated mining-related products. The study's conclusions, therefore, point to the policy challenge that underpins the trade policy strategy of DIRECON that aims to increase Chile's export diversification. The study's results also leave us with a vital challenge of promoting public policies that help firms innovate and add value to products and services in which the country cherishes a comparative advantage through increasing the efficiency of programmes that support the development of science, technology and innovation. If our efforts are successful, Chile could participate in GVCs in a more sophisticated manner not only as a producer of natural resources, but also as supplier of higher value-added activities, both in manufacturing and services, in which a more extensive application of specialised know-how and knowledge is required. Building on our extensive expertise in the mining, engineering, agricultural and chemical sectors can provide a basis for such a strategy. In this regard, the recent negotiated Transpacific Partnership Agreement (TPP) constitutes a great opportunity to overcome the challenges we face today.

Today, we are convinced that requesting this study from the OECD has not only helped us identify important challenges to the GVC participation and economic development of our own country, but also has made an important public contribution to the wider international community interested in the dynamics and policy challenges associated with GVCs.



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Santiago, January 2016

## **DIAGNOSTIC OF CHILE'S ENGAGEMENT IN GLOBAL VALUE CHAINS**

### **FOREWORD**

The global value chain (GVC) revolution that began in the early 1990s has been characterised by unprecedented geographical separation of tasks and business functions employed to produce complex products. Through GVCs, firms have increasingly drawn on the international, instead of national, knowledge, resources and production factor base which allowed further specialisation and realisation of greater economies of scale. GVCs have also opened opportunities to participate in the global markets without having to develop a complete product or value chain and to draw on foreign knowledge and learn by doing. However, GVCs also tend to be very competitive, versatile and are characterised by powerful governance relationships which means that the capacity of workers and firms to participate in beneficial ways is not to be taken for granted.

The current OECD report, commissioned by the Dirección General de Relaciones Económicas Internacionales (DIRECON) of the Chilean Ministry of Foreign Affairs, aims to lay an empirical foundation for structuring economic policies to facilitate Chile's GVC participation and maximise the benefits associated with it for national firms and workers. It builds on recent data and methodological advancements by the OECD, compiles key indicators of Chile's engagement in GVCs and puts them in the context of recent and considered policy reforms. The thematic breakdown proposed aims at providing a holistic diagnostic of Chile's position in international production networks by investigating its trade, investment and innovation dimensions.

The report was prepared jointly by the OECD's Trade and Agriculture Directorate, Directorate for Financial and Enterprise Affairs and Directorate for Science, Technology and Innovation. It was drafted by Przemyslaw Kowalski (Chapter 1), Sebastian Benz (Chapter 2), Monika Sztajerowska (Chapter 3) and Koen de Backer (Chapter 4), under guidance from Trudy Witbreuk and Ana Novik. The report has benefitted from valuable comments by colleagues in the Banco Central de Chile, Corporación de Fomento de la Producción (CORFO), Comité de Inversiones Extranjeras (CIE) and Dirección General de Relaciones Económicas Internacionales (DIRECON), and meetings with these and other relevant institutions in Santiago de Chile in June 2015. Statistical assistance from Clarisse Legendre and Charles Cadestin, and editorial assistance from Jacqueline Maher, is gratefully acknowledged.

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## CHAPTER 1. OVERVIEW

### 1.1. Introduction

The remarkable economic performance of Chile between 1990 and 2014, when its economy grew on average by more than 5% annually, can be in no small part traced back to the country's ambitious trade and investment liberalization and integration with international markets.<sup>1</sup> High degrees of specialisation building on Chile's natural resource endowments—most notably copper—are the best testimony to the role international trade played in this period of strong growth. However, heavy reliance on natural resources has also exposed the Chilean economy to external shocks, has held back development of innovation-intensive activities—and thus demand for skills—and has come at a cost for the environment.

After being hit by the repercussions of the 2008-2009 financial and economic crisis, when the international prices of copper more than halved and the Chilean economy contracted in real terms, Chile's gross domestic product (GDP) growth started slowing again in 2012. This slowdown is continuing and has been attributed to the end of the commodity supercycle (OECD, 2015d) and, more recently, to the slowdown in China. The collapse in the price of copper, which is currently more than 40% lower than at its peak in 2010, has hurt business confidence and investment particularly hard. These developments have triggered a re-thinking of Chile's medium-term growth prospects, including the role of global value chains (GVCs), and a search for appropriate trade, investment and innovation policy responses.

Driven predominantly by large efficiency-seeking multi-national enterprises (MNEs) and foreign direct investment (FDI) in the context of falling communication and co-ordination costs, the “GVC revolution” which unfolded in the early 1990s<sup>2</sup> has brought about geographical separation of tasks and business functions employed to produce complex products. Through GVCs, firms draw on the international, instead of national, knowledge, resources and production factor base which allows further specialisation and realisation of greater economies of scale. This has made economic activity more specialised, interconnected and sensitive to trade, doing business and co-ordination costs, and has blurred the divisions between the different economic policy areas. GVCs have also opened opportunities to participate in the global markets without having to develop a complete product or value chain<sup>3</sup> as well as to draw on foreign knowledge and learn by doing.<sup>4</sup>

GVCs thus offer both opportunities for deeper specialisation as well as for broadening of export and production portfolios. Chile's strong specialisation in natural resources and the associated economic growth may have not occurred without proliferation of GVCs. At the same time, the GVC revolution opened up to Chilean firms the possibility of exporting tasks and functions they would not be able to export otherwise. For example, particular skills and technologies acquired from specialisation in mining (e.g. mining-related engineering services) have been used to supply related services in foreign markets, loosening the link between copper prices and Chile's export performance. Having strong position in upstream segments of copper chains created opportunities to add to raw copper products other activities (e.g. further chemical or manufacturing processing) and thereby to increase sophistication and diversification of the exported product bundle. Finally, through GVC trade Chilean firms can draw on

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<sup>1</sup> Blyde and Iberti (2012), for example, show how a reduction of barriers to trade influenced productivity and GDP growth in Chile.

<sup>2</sup> E.g. Baldwin (2012).

<sup>3</sup> Stamm (2004), Baldwin (2012), Escaith (2014) and OECD (2013a).

<sup>4</sup> Hausmann (2014).

global markets for intermediate inputs and can increase their competitiveness in copper and non-copper sectors.

Particularly in resource-intensive economies like Chile, “upgrading” in global or regional value chains may be a promising way of avoiding the “resource curse” whereby intensive exports of natural resources have a detrimental impact on other sectors of the economy due to the crowding out of productive resources and the appreciation of the exchange rate.

However, value chains also tend to be very competitive, versatile and are characterised by powerful governance relationships. In this context, the capacity of workers and firms to participate in beneficial ways is not to be taken for granted.<sup>5</sup> The rise of GVCs has thus seen the re-emergence of discussions about the role that governments can play, whether through trade and investment policy, industrial policy, or broader policies such as innovation to promote more beneficial outcomes.

The current report lays an empirical foundation for improving the effects of Chile’s GVC engagement by building on recent data and methodological advancements by the OECD, compiling key indicators of the country’s engagement in GVCs and putting them in the context of recent and considered policy reforms. The thematic breakdown proposed aims at providing a holistic diagnostic of Chile’s position in international production networks by investigating its trade (Chapter 2), investment (Chapter 3) and innovation (Chapter 4) dimensions. This overview chapter summarises the main findings from the three thematic chapters.

In a nutshell, with its recent ambitious trade and investment liberalisation, Chile is no longer facing the challenge of putting in place basic pre-conditions for integration into GVCs. It can reflect on how to extend and consolidate its trade agreements and fine-tune its inward FDI policy so as to support the objectives of diversification and upgrading. Yet, behind-the-border policies are likely to be relatively more important. Improving infrastructure and logistics, reducing trade costs, improving the availability of capital, protection of intellectual property rights; and policies scaling up the quality of institutions and innovation climate have all been identified as important factors in enabling integration into GVCs.<sup>6</sup>

In particular, upgrading and diversification are driven by the innovation of firms in pursuit of new sources of profits and thus upgrading policies are very similar to policies that stimulate innovation and enhance productivity. As innovation is a broad concept, policies for innovation cross government portfolios and affect a wide range of stakeholders. Examples of such broad innovation policies include: providing conditions for product market competition and encouraging market and firm entry; investing in education, skills, knowledge-based assets and infrastructure; and providing the framework conditions that support business investments in such areas.

## **1.2. Chile’s engagement in GVCs—empirical findings**

### ***1.2.1. Overview of Chile’s engagement in GVCs***

On aggregate, Chile is well integrated into GVCs and its position in GVCs is relatively upstream. Compared to other countries included in the OECD Trade in Value Added (TiVA) database<sup>7</sup>, Chile’s

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<sup>5</sup> E.g. UNCTAD (2013b); Primo Braga (2013); Bamber et al. (2014).

<sup>6</sup> OECD (2013a), Bamber et al. (2014) and OECD (2015).

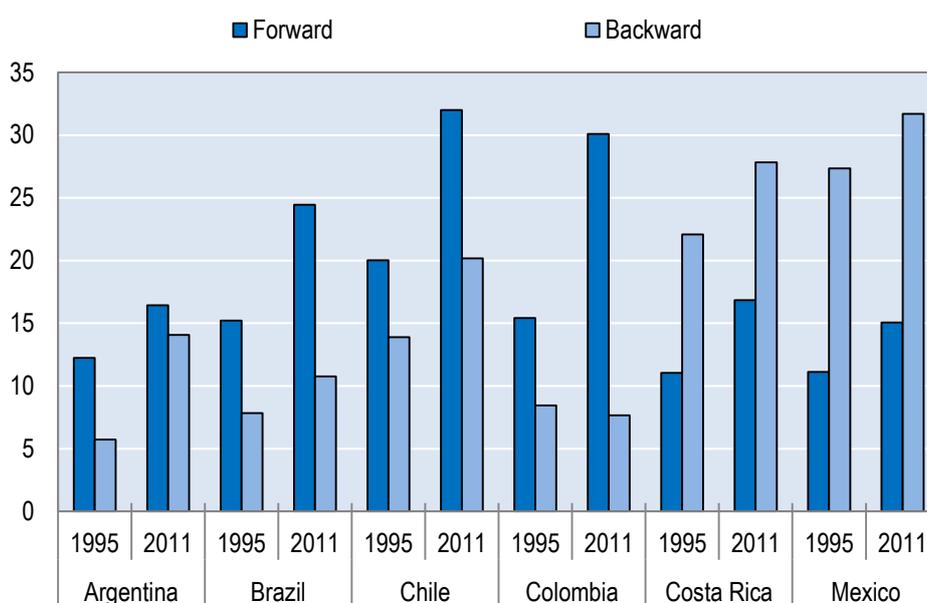
<sup>7</sup> Currently, OECD TiVA covers 61 individual countries, including 34 OECD members and 27 emerging and developing countries in Asia, Africa, Europe and Latin America. Six countries from Latin America are currently covered: Argentina, Brazil, Chile, Colombia, Costa Rica and Mexico. OECD (2016) uses the OECD

participation in terms of providing inputs for further processing—the forward GVC participation—accounts for 32% of its total gross exports and is relatively high. Sourcing of foreign inputs—the backward GVC participation—is relatively low (20% of total gross exports).

Chile’s forward linkage, in particular, is higher than in most countries covered by the OECD TiVA database and lower only than in a handful of other important natural resource producers such as Norway, Russia or Saudi Arabia. Chile’s relatively low backward participation is clearly due to the fact that its exports are concentrated in primary and intermediate products and production of these tends to use relatively few imported inputs.

Overall, Chile records some of the highest levels of GVC integration among the South American economies represented in the OECD TiVA database (Figure 1.1). In principle, this can reflect Chile’s more favourable stance in policy areas which matter for GVC integration (e.g. trade and investment policies, regulation and doing business climate, infrastructure, quality of institutions), but it can also reflect the different sizes of these economies, geographical conditions and other factors that are not easily influenced by policy in short to medium term.

**Figure 1.1. Forward and backward participation over time**



Source: Authors’ calculations based on OECD-WTO TiVA database. See also Chapter 2.

Analysis presented in this report shows that even though Chile’s backward participation in GVCs is relatively low it is broadly consistent with what would be expected given factors such as the size of the economy and distance from the main manufacturing hubs, etc.<sup>8</sup> Chile’s favourable trade and investment openness partly compensate for some of these factors. Low import tariffs, both at home and in export markets, and engagement in preferential trading agreements (PTAs) position Chile in the top performers in Central and South America.

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TiVA database as well as detailed trade data to characterise GVC integration in the Latin America in more detail. For more on the OECD Trade in Value Added Database see:

<http://www.oecd.org/sti/ind/measuringtradeinvalue-addedanoecd-wtojointinitiative.htm>

<sup>8</sup> See Chapter 2 and OECD (2015e).

However, measures of concentration of Chile's exports show high and growing levels of concentration both in terms of the small number of countries to which Chilean firms export as well as in terms of the limited variety of exported products (Chapter 2). The latter is due to the high share of copper products in Chile's exports and Chile records three times higher levels of export concentration than Argentina and Brazil, which are also higher than on average in other smaller and more resource-intensive countries in Latin America.

Interestingly, Chile's exports to other Latin American countries and in particular some of its closest neighbours are much more diversified in terms of the exported variety of products than its exports to some of its Asian or European partners (Chapter 2). There might thus be potential to diversify the exported product portfolio by facilitating trade with Latin American neighbours although the scale remains a problem. Chilean exports to high-income countries in North America, Europe and South East Asia tend to be less diversified but on-going OECD work suggests that in Latin America as a whole trade with these regions is relatively well diversified and has become more intensive (OECD, 2016). All this suggests that the potential for further diversification lies both in intra and extra-regional integration efforts.

Calculation of the so-called survival rates, which are shares of products which are continually exported to the same partner country after a specified period of time since the beginning of the export relationship, show that Chile's export relationships are less stable than in other Latin American countries. Yet, it is not the country's main exports—copper and copper-related products<sup>9</sup>—which do not survive long—these are in fact some of Chile's more stable trade relationships. Rather, the low survival rates in Chile may be an indication of commodity prices-linked exchange rate fluctuations which may be creating unstable conditions for exporters of other products.

As much as one third of Chile's backward GVC linkage can be attributed to FDI openness which is among the highest ratios in the region. This reflects Chile's high share of inward FDI stock to GDP, which stood at 70% in 2014 (Figure 1.2). This is higher than in several OECD countries with a similar market size such as, for example, the Czech Republic or Slovakia, or other resource-rich OECD countries like New Zealand or Australia (Chapter 3).

In addition, both inward and outward FDI flows have been growing at a fast rate in Chile, outpacing many Latin American economies. Chilean firms also increasingly acquire other firms abroad and in the case of Latin America, a new class of home-grown MNEs (so-called *Translatinas*) has been emerging that increasingly compete in global markets, including Chile's *Falabella* (retail), *LATAM* (air transport) or *Compañía Sudeamericana de Vapores* (shipping services).

The Chilean manufacturing survey (ENIA) which is explored in Chapter 3 suggests relatively high levels of productivity of foreign firms. These firms are also clearly more engaged in GVCs than domestic firms, having exported on average 26% of their sales and imported 18% of their intermediate inputs in 2008-2012, as compared to 6% and 5% of purely domestic firms. Still, a comparison of these numbers to those reported in other OECD economies,<sup>10</sup> shows that while the share of foreign firms among all manufacturing firms in Chile was similar to other OECD economies, generally the contribution of foreign firms to exports and imports was lower.

Foreign manufacturing firms were larger, more capital-intensive and more productive than domestic ones: they employed on average three times more workers and generated five times more value-added per worker than purely domestic firms. On average, they also paid more than three times higher wages, with the wage premium being higher for skilled workers. Separating out the effects of firm size and sector and

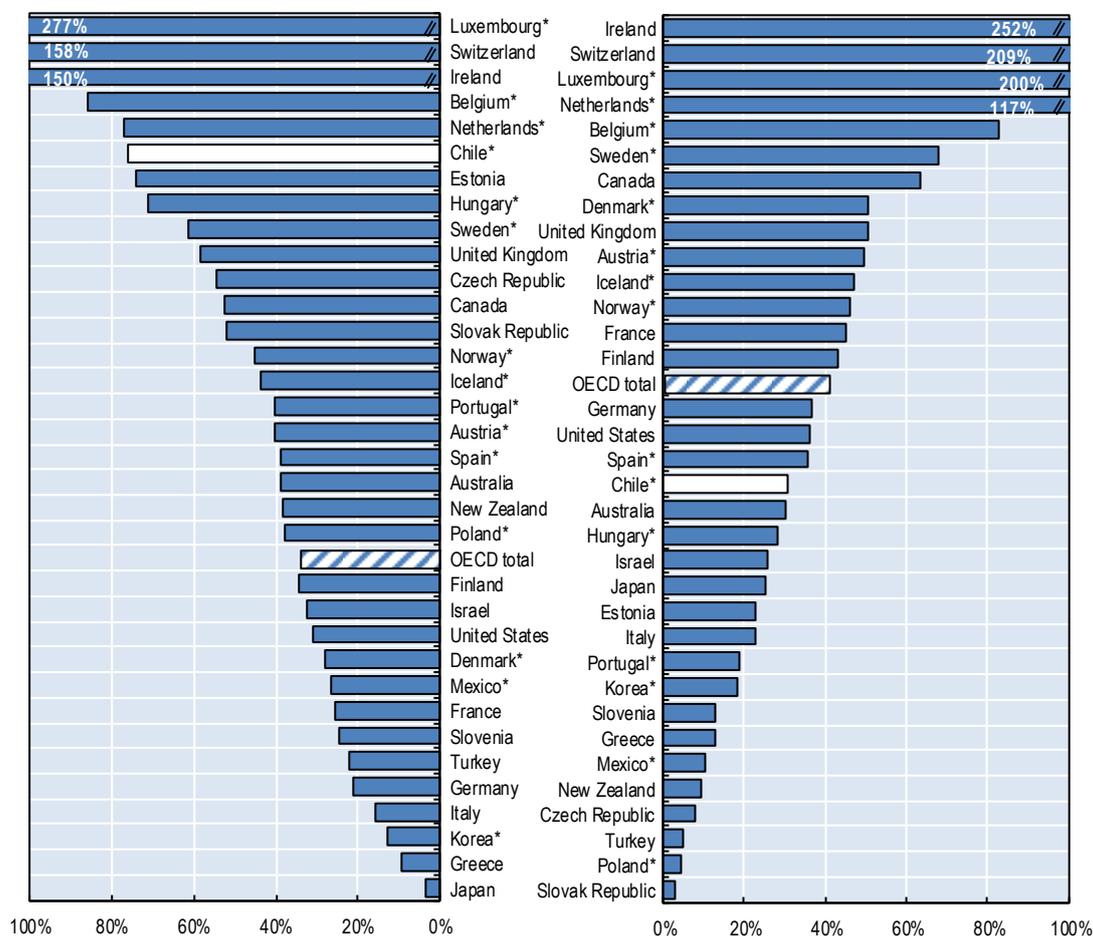
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<sup>9</sup> Approximately 50% of Chile's exports are accounted for by two HS6 copper products.

<sup>10</sup> See Chapter 3 for details and caveats of this comparison.

other effects common to all firms, showed that foreign ownership in Chile was associated with higher exports, wages, skilled labour share and labour productivity (Chapter 3).

Figure 1.2. FDI positions, at-end 2014 or latest available year



Note: \* FDI data exclude resident Special Purpose Entities (SPEs). Inward and outward FDI positions as a share of GDP are calculated using GDP at current prices and current exchange rates.

Source: OECD International Direct Investment statistics and OECD National Accounts database. See also Chapter 3.

However, foreign firms were not characterised by higher shares of skilled employment. This may be in part related to the sectoral concentration of foreign firms in Chile but might also suggest that Chile’s labour force is not competitive enough to attract global players to locate their skilled-labour intensive activities in the country. The latter would be consistent with the finding that US affiliates investing in Chile spent relatively low shares of their costs on R&D as compared to their investments in other countries, including in other South American countries (Chapter 3).

It is also consistent with the innovation performance of Chile which is well below the OECD median on many indicators (Figure 1.3 and Chapter 4). This is to an extent related to the fact that resource-rich countries like Chile have overall a smaller manufacturing industry as their stronger currency—due to large

exports of natural resources—makes manufacturing exports on international markets more expensive and manufacturing typically is a major source of innovation.<sup>11</sup>

The results of innovation surveys indicate that most firms in Chile have both a low propensity to innovate and an insufficient level of innovativeness. Just like in other countries, larger firms innovate more than smaller firms, but for Chile the lack of innovation in the majority of SMEs is more remarkable: only 20% of Chilean SMEs report to have undertaken innovation activities. This percentage is significantly lower than in other resource-intensive OECD countries and also—albeit less significantly—lower than in countries at a similar level of development.

Chile's spending on R&D, at 0.39% of GDP in 2013, was one of the lowest amongst OECD countries; lower than other resource-intensive economies such as Canada or Norway, but also economies like Turkey or Mexico. Nevertheless, there has been a slight increase in gross R&D expenditure in recent years reflecting the government's policy in this area (Chapter 4). The business sector played a rather limited role in R&D, accounting for less than 40% of total R&D investments (the OECD average is two-thirds), which clearly distinguished Chile's innovation system from those of more advanced economies, but also from more similar countries.<sup>12</sup>

Among large innovative firms, collaboration rates were at less than one-third in Chile as compared to 70% in several OECD countries. The majority of Chilean firms did not perceive the value of co-operation in innovation; while some innovative clusters had formed, e.g. in the food and beverage industries, many others were latent. Collaboration showed a strong national character, with around 80% of innovation collaboration happening between Chilean entities. Again, size appeared to be a strong determinant of foreign collaboration: large firms had a much higher propensity to collaborate internationally than SMEs.<sup>13</sup> Given the role it plays in domestic and international value chains, the mining industry could be a platform for development of a broader set of diversified interrelated services and manufacturing activities.

The very low numbers of R&D personnel and researchers in Chile show that human capital is a significant bottleneck for R&D and innovation. Chile lacks sufficient advanced human capital in key science, technology and engineering management fields.<sup>14</sup> One way to examine future depth of a country's talent pool for innovation is to measure the proportion of top performing students (age 15) on science, reading and mathematical proficiency tests. OECD PISA results from 2012 showed that Chile had some of the lowest proportions of top performers in all three subjects (Chapter 4).

A recent OECD comparison of various barriers to entrepreneurship showed that administrative burdens for start-ups continued to be a problem.<sup>15</sup> As of 2014, Chile also had one of the lowest fixed broadband penetration levels with just 13.7 subscriptions per 100 inhabitants while the OECD average was at 27. The penetration rate of wireless broadband in Chile of 42.9 per 100 subscribers was also lower than most other OECD countries. Prices of broadband services were also relatively high.

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<sup>11</sup> For example, manufacturing accounts for more than three quarters of R&D investments in most OECD economies.

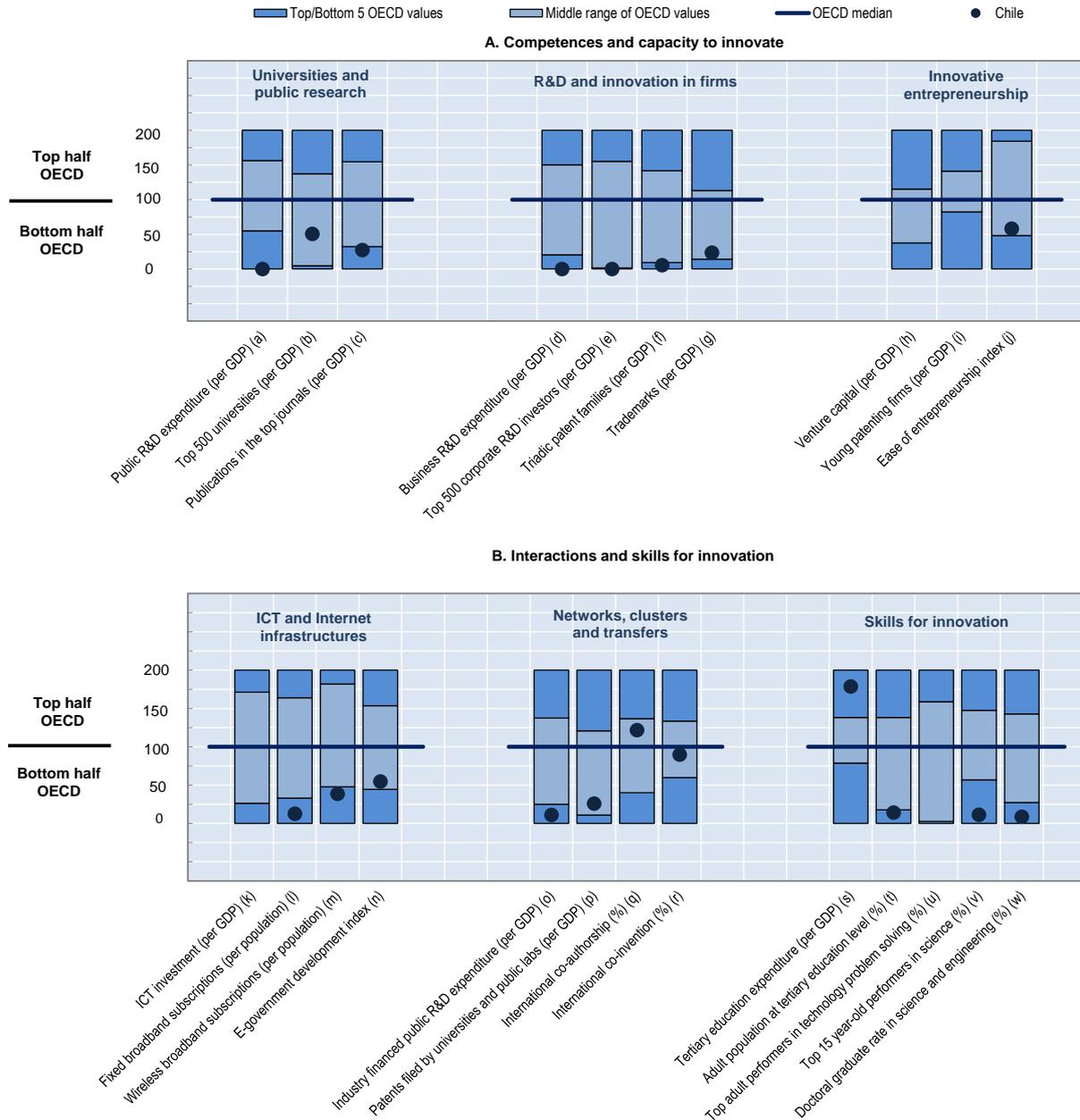
<sup>12</sup> OECD (2007) and Chapter 4.

<sup>13</sup> OECD (2013a).

<sup>14</sup> OECD (2013g).

<sup>15</sup> OECD Product Market Regulations.

**Figure 1.3. Chile's innovation performance**



Source: OECD (2014), STI Outlook. See also Chapter 4.

### 1.2.2. Specialisation in copper value chains

Unsurprisingly, measures of “revealed comparative advantage” or “competitiveness” in GVCs point in Chile to the mining and metals sectors which are the two sectors capturing copper products at different levels of processing (Chapter 2). In 2011, these copper-related sectors accounted together for 63% of Chile’s forward GVC linkages, up from 40% in 1995.<sup>16</sup> The mining and metals sector have also emerged

<sup>16</sup> Other sectors contributing more significantly to the forward linkage in 2011 included business services (3%), wholesale and retail trade services (2.6%), and transport and telecommunication services (1.7%) (see Chapter 2).

as cornerstones of Chile's backward GVC integration with the foreign value added embodied in these sectors' exports increasing from 45% of Chile's total backward participation in 1995 to more than 50% in 2011. This was, in contrast to other Latin American countries where manufacturing sectors played a more important role in backward linkages.

Mining and quarrying attracted also the highest share of inward FDI, accounting for 35% of inward FDI stock at end-2013 and 50% of inflows in 2009-2013 (Chapter 3).<sup>17</sup> 43% of sales of the largest foreign MNEs operating in Chile were in mining in 2012, and most of cross-border M&A deals took place in mining and metals sector.

While high degrees of integration into copper supply chains do carry risks, they also imply that Chile could further use this strong position to develop the range of products it supplies so that the economic benefits stemming from its natural endowments are increased.<sup>18</sup> In general the country tends to export higher volumes of less sophisticated copper products such as copper ores and concentrates and copper cathodes and low volumes of relatively more sophisticated copper products such as copper coppers and cotter pins or copper nails, tacks, drawing pins (Chapter 2). Their co-existence, however, suggests that there might be potential for encouraging relatively more activity in the processing activities.

A further indication that this might be possible stems from a comparison with other Latin American countries which compete with Chile in exports of the more sophisticated copper products. From the policy point of view the pertinent questions are what policies and market imperfections (including insufficient levels of innovation) may be impeding such a transformation toward more processed copper products. If some of these impediments could be fixed, Chile would possibly be able to capture more value and create more employment around this key sector.

Importantly, Chile's mining and metal industries rely heavily on links with other domestic sectors, most notably services. For example, 15% of exports of the copper-related sector are inputs from the services sector, most notably business services. However, this is still lower than in most other natural resource-rich countries where services contribute on average 20% of exports (Chapter 2), suggesting a potential for improvement. Imported services, most notably wholesale, retail trade and hotel services but also business and transport and telecommunication services, also play an important role in Chile, although not as important as in some high income natural resource producers such as Australia and Canada. Future developments in the copper-related sectors will thus depend crucially on both competitiveness of domestic services sectors and access to global services markets.

### ***1.2.3. Value chain links beyond the copper sector***

Comparative advantage in GVCs is also revealed for Chile in agriculture, the wood and paper industry, and other manufacturing products such as for example transport machinery. Interestingly, wholesale, transport, telecommunication services and, albeit to a lesser extent business services, also show signs of comparative advantage (Figure 1.4 and Chapter 2).

Some of Chile's exporting manufacturing sectors already make relatively intensive use of foreign inputs. In the chemicals and non-metallic minerals sector, for example, foreign value added accounts for 35% of exports and in the textile sector it accounts for 32% (Chapter 2). In general, foreign value added

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<sup>17</sup> The actual share of FDI in mining (and in other sectors) in Chile is likely to be higher than reported in the official statistics, given that a large share of FDI remains unallocated to any given sector (see Chapter 3).

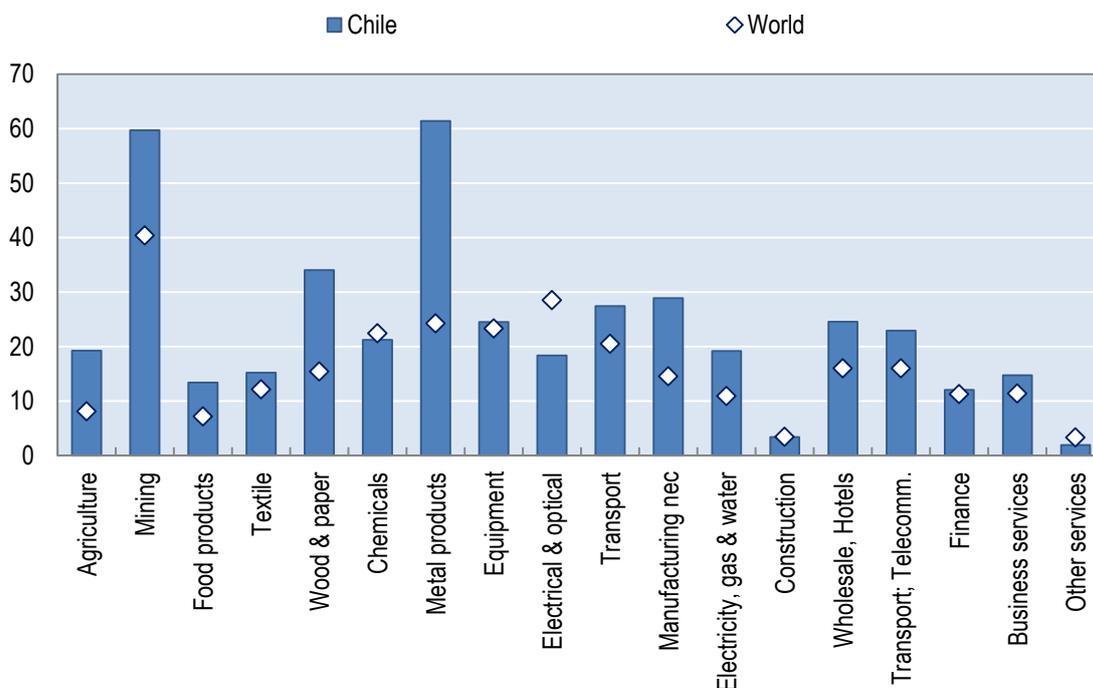
<sup>18</sup> Indeed, recent evidence suggests that economic growth of countries is correlated with the sophistication of products they export. This is a nutshell measured as a weighted average of the GDP per capita of all countries exporting these particular products. See Hausmann et al. (2007).

has become more important between 1995 and 2011 in most sectors but there are three important exceptions: machinery and other equipment; electrical and optical equipment; and transport equipment.

The use of foreign intermediate inputs has been shown to be generally positively correlated with export performance (OECD, 2015e) and this seems to have been also the case in Chile. Namely, sectors which have expanded their backward linkages experienced larger increases in domestic value added exports and the three sectors that have actually reduced their backward linkages recorded poorer export performance (Chapter 2). This suggests that Chile’s competitiveness in global markets can be increased by facilitating the use of foreign intermediate inputs.

Likely related to the observed GVC disengagement in a number of manufacturing sectors is the relative absence of FDI in manufacturing in Chile accounting for less than 5% of the inward FDI stock (Chapter 3). This contrasts with the experience of other small economies that have integrated intensely into GVCs. To the extent that manufacturing supports innovation and job creation, there may be scope for facilitating and attracting more investment in that sector in Chile, especially if such attraction can build on Chile’s existing vast engineering know-how related to the extractive industry.

**Figure 1.4. Comparative advantage in GVCs: exported value added relative to domestic value added**



Source: Authors’ calculations based on OECD-WTO TiVA database. See also Chapter 2.

#### **1.2.4. The relative importance of regional and global value chains**

China and to a lesser extent Korea, Canada, Mexico and India have become increasingly important in Chile’s forward GVC linkages, while the previously significant European economies have been losing importance. Accounting for 30% of the country’s forward GVC linkage, China is the most important Chile’s partner and this is an entirely new phenomenon as compared to the mid-1990s.

Intra-regional forward GVC linkages of Chile involving South American countries remain generally limited.<sup>19</sup> For example, Brazil—the biggest South American economy—contributes less to Chile’s forward linkage than much smaller and more distant economies, such as Korea and Taiwan. However, in terms of backward linkages, Chile does tend to source more from its neighbours as compared to other Latin American countries (Chapter 2; OECD, 2016).

These patterns are also reflected in FDI flows where only a small share of inward FDI in Chile comes from Latin America (4% in 2013) while neighbouring countries account for the lion’s share of Chile’s outward FDI stock (42%) and remain top destinations for Chilean outward investments.

Overall, the low levels of intra-regional GVC participation in Latin America are mostly due to specialisation in natural resources, outward orientation of some of the downstream GVC participants in the region (e.g. Mexico and Costa Rica) as well as the still relatively low levels of openness in the region (OECD, 2016). This suggests that there is a certain potential for Chile to benefit from further trade opening of its regional neighbours.

### **1.3. Diversification and upgrading in value chains: selected policy implications**

#### ***1.3.1. General considerations***

As far as diversification of Chile’s GVC participation is concerned, the country should potentially be able to export a variety of more processed copper-related and other products after adequate investment in capital, skills and innovation. As far as copper products are concerned, most of Chile’s copper ores are used in other countries’ exports of chemicals and most of the more processed copper products are used in foreign exports of metal products and electrical, optical equipment as well as machinery, transport and other equipment (Chapter 2). The general difference between the less and more sophisticated copper products is the degree of mechanical or chemical processing and the input of required business services.<sup>20</sup>

Some obstacles to further diversification of the copper export basket are related to limitations in other natural resources which are required for the processing of copper. For example, even though water is abundantly available in most parts of Chile, water scarcity is a problem in the Northern regions where the largest copper deposits are located. However, water is crucial to physically separate copper ore from gangue via froth flotation. Moreover, Chile is also struggling with ensuring low and stable energy costs which currently already account for 14% of total production cost in Chile’s copper industry.<sup>21</sup> While Southern Chile recently has started to make use of hydropower energy, no sufficient high-capacity grid is available in order to transport electrical energy to the North.

To some extent Chile’s concentration on less sophisticated copper products is also related to the institutional setup of copper mining in Chile. The largest copper company in Chile is the state-owned enterprise CODELCO. It accounts for more than 30% of Chile’s copper production and is charged with extraction and commercialization of copper so as to maximize profits which go directly into the national budget. While this source of income is crucial to finance Chile’s public policies, it is unclear whether a focus on transfers into the national budget is the most beneficial way of using these resources in the long-term. An analysis of the benefits from copper production should not only be based on current productivity

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<sup>19</sup> European and South East Asian countries trade approximately three times more with their neighbours as compared to countries in South America, see OECD (2016).

<sup>20</sup> For example while copper cathodes of which Chile is exporting large volumes, are a very pure forms of copper that are used in making wiring, including copper cotters, nails and tacks of which Chile is exporting relatively little (see Chapter 2).

<sup>21</sup> CSIRO Futures (2014).

levels, cost structure, and market prices, but should also take into account the effects of investment in technology and innovation. Moreover, it is pivotal to carefully consider the social and environmental effects in areas such as water consumption, emissions, biodiversity and waste disposal.

Functional upgrading in extraction activities involves increasing domestic value added by adding additional activities to existing activities.<sup>22</sup> In recent decades, Chile has already been successful in functional upgrading as demonstrated by the increasing importance of domestic inputs into the industry. The share of domestic intermediate inputs used in Chile's mining sector grew from 25% in the 1950s to around 60% at the end of the 20<sup>th</sup> century (Chapter 2). The technological upgrading and learning involved in this process has not been limited to supplying inputs for the domestic mining sector but has also been accompanied by increasing exports of mining inputs and associated engineering services.<sup>23</sup>

While exports of engineering services do already take place, their scale is small relative to the scale of copper production and only a very small proportion of the 6000 mining companies in Chile export their services. The World Class Suppliers Programme (Programa de Proveedores de Clase Mundial) aims to increase the number of mining services exporters to 250 by 2035. The main aspect of the program is collaboration between mining companies, public research centres and universities with the target to overcome particular technological challenges. Importantly, these challenges are defined by mining companies that contract specialized services from external suppliers. The success of this programme and the efficient allocation of public resources depend crucially on the ability of these mining companies to correctly identify challenges which constitute profitable investment opportunities, which in turn depends on their appropriate motivation. In this respect, measures could be considered to guarantee that co-funding from public resources in universities or research centres does not substitute for, but complements, private investment.

Functional upgrading has also occurred in other sectors. For example, Chile is one of the world's largest exporters of fruit and vegetables. However, the sector's growth was relatively slow, gradually adding more steps to the domestic part of the value added chain. Exporting began with fresh fruit and vegetables around 1980. The first packing and cold storage units were installed around 1985 and exports of processed fruit and vegetables increased from less than USD 100 million in 1990 to more than USD 15.2 billion in 2013.<sup>24</sup> Due to increasing demand for food products in Asian countries, especially in China, this sector provides high potential for further export diversification in Chile.

Starting to export is however still difficult for producers in large parts of Chile. Even though Chile's road infrastructure is relatively robust, internal transport costs constitute an obstacle for exporters of products other than copper. This is also due to the fact that only a small share of exports is shipped from ports in the North or South of Chile. Instead, a significant proportion of exports from these regions is first transported to the middle of the country. This is because some ports in the North of Chile specialise in exports of mining products. In order to increase competitiveness in global markets for all Chilean export products, an efficient transport infrastructure and logistics system will be crucial.

Substantial efforts to broaden the export basket are being undertaken in the context of strategic programs of the Production Development Corporation (CORFO). These programs aim to resolve coordination failures originating from transaction costs, asymmetric information, or economies of scale in order to benefit from underlying comparative advantages. Very often, these coordination failures crystallise as a lack of technological infrastructure, a lack of human capital or a lack of scientific know-

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<sup>22</sup> Kaplinsky and Morris (2003).

<sup>23</sup> Korinek (2013).

<sup>24</sup> Fernandez-Stark et al. (2011) and ProChile (2015).

how, which can be ameliorated by public contributions to research centres and public technological institutes.

In addition, the so called ‘activating platforms’ (plataformas habilitantes) aim to increase output and productivity across several sectors. These activating platforms have been identified as logistics, energy and water, intelligent industries, and advanced manufacturing. At a national level, these activating platforms are especially relevant for seven key sectors of the Chilean economy. Even though mining is one of these sectors, a balanced programme from which all sectors can benefit equally should increase diversification of Chilean exports. The other six sectors, which have been identified as especially promising for Chile by CORFO, are sustainable tourism, agriculture and food industry, construction, creative economy (e.g. design industry), sustainable fisheries and aquaculture, and advanced manufacturing (e.g. metallurgy).

Efforts to support diversification into other activities should be continued and in a longer term would benefit from a development of a set of clear criteria for qualifying different economic activities for government diversification programmes. These could include: presence of comparative advantage, for example in sectors such as agriculture or tourism; contribution to productive knowledge in the country (e.g. services around mining); potential for technology adoption, including through inward FDI; match between skill intensity and their availability in the local workforce (or possibility of their development); the expected market growth; potential for increasing returns to scale; and potential for learning by doing effects.

### ***1.3.2. The role of future trade, foreign investment and innovation policies***

#### *Trade and investment*

Chile’s current trade and investment policies are not major obstacles to diversification and upgrading. The vast majority of import tariffs were fixed at a most-favoured nation (MFN) level of 6% and Chile has 24 bilateral or regional agreements with 63 partners covering 94% of its exports and has just concluded extensive negotiations on the Trans-Pacific Partnership agreement with twelve other countries in the Americas and Asia-Pacific. While negotiation of additional trade agreements may seem less pertinent in this context, further liberalisation should be seen in light of currently high and growing concentration of exports in terms of destination markets and the fact that some of the destinations to which Chile exports offer relatively few diversification opportunities. There is thus a certain scope for supporting export diversification through extension, deepening and harmonisation of trade agreements.<sup>25</sup>

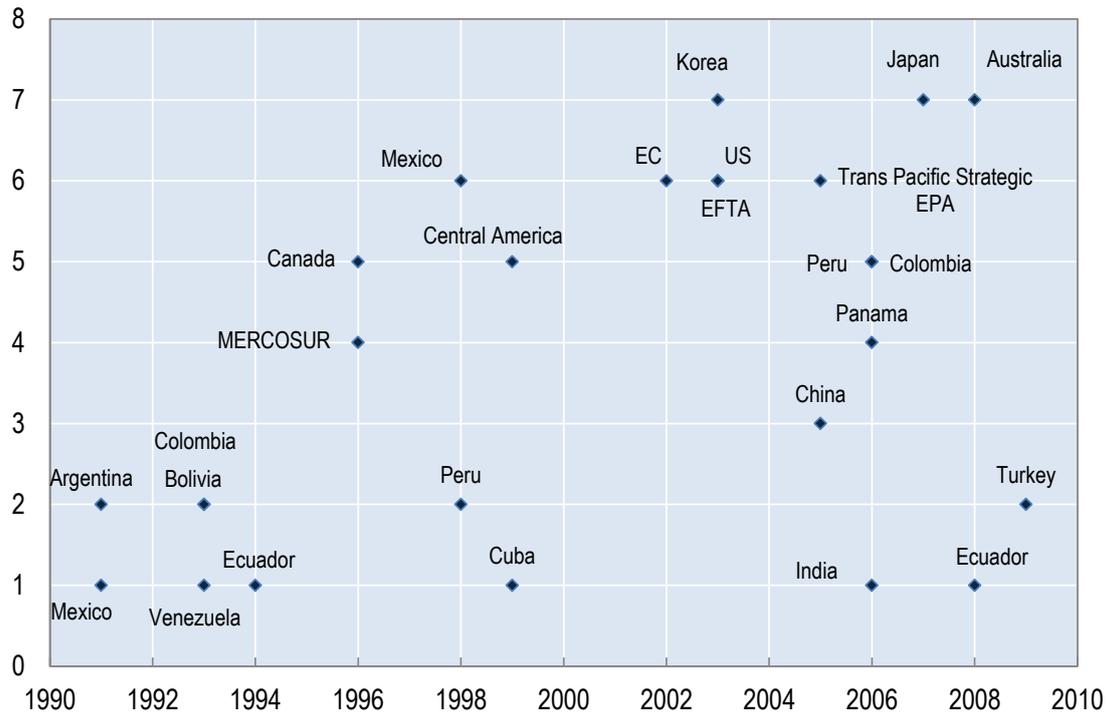
Chile’s agreements with developed countries are usually characterized by more breadth and depth than its agreements with Latin American neighbours, notwithstanding that there are higher levels of export diversification with these countries. Chile’s Agreements with Latin American neighbours are not as ambitious since they do not necessarily aim to ensure the free movement of goods, services, and capital in a free-trade zone.<sup>26</sup> Instead, the agreements often only aim to promote and regulate trade among its member countries and to implement economic cooperation activities in order to expand markets without the ultimate goal of free trade (Figure 1.5).

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<sup>25</sup> OECD (2016) looks into the issues of harmonisation of approaches to rules of origin and non-tariff measures in existing Latin American trade agreements.

<sup>26</sup> WTO (2015).

**Figure 1.5. Depth of Chile's trade agreements**



*Note:* The values indicates whether the agreement contains substantive provisions in one or more of the seven key areas: services trade, investment protection, technical barriers to trade (TBT) and/or sanitary and phytosanitary (SPS) measures, public procurement, competition, and intellectual property rights (the value of 1 if only one area covered, 7 of all areas covered).

*Source:* DESTA database (Dür et al., 2014). See also Chapter 2.

This suggests that efforts for regional trade integration could have a favourable impact on Chile. Currently, attempts at deeper regional integration manifest themselves in negotiations to broaden the coverage of the Pacific Alliance treaty, which aims to achieve free movement of goods, services, capital, and people in the participating countries. Moreover, it will contain provisions on a wide range of trade-related issues, such as rules of origin, market access, technical barriers to trade and sanitary and phytosanitary measures, trade facilitation and customs cooperation, as well as government procurement and dispute settlement.

Similarly to trade policy, Chile has, overall, an open foreign investment regime (Chapter 3). It does not impose any specific restrictions on market entry in manufacturing, which suggests that statutory FDI barriers cannot be the reason behind the relatively low FDI share in manufacturing. However, according to the OECD Services Trade Restrictiveness Index (STRI)<sup>27</sup>, barriers to the trade of maritime transport services in Chile are higher than in any other OECD country and around 75% of these are due to restriction on foreign entry. Barriers in Chile's rail transport sector are also slightly above OECD average, mostly due to barriers to competition.<sup>28</sup> Given Chile's long coastline and high reliance on exports of copper by sea from different national ports, the Government could consider removing some of these remaining restrictions (Chapter 3).

<sup>27</sup> For more on the OECD services Trade Restrictiveness Index see: <http://www.oecd.org/tad/services-trade/services-trade-restrictiveness-index.htm>

<sup>28</sup> See: [http://www.oecd.org/tad/services-trade/STRI\\_CHL.pdf](http://www.oecd.org/tad/services-trade/STRI_CHL.pdf)

Overall, bearing in mind the country's remote location and the ambition to further connect to GVCs, Chile should aim to mobilise all the resources it can, both domestic and foreign, to ensure competitiveness of its key backbone services. For example, logistics account for about one fifth of total product value in the manufacturing sector in Chile, which is over two times higher than the OECD average (OECD, 2013a). As a result, a reduction in transport costs is estimated to have a much larger impact on the total manufacturing output in Chile than further reductions in tariffs, for example.<sup>29</sup> The availability and affordability of energy, water and transport services are also key considerations for the future growth of the mining sector in Chile.<sup>30</sup>

More generally, as Chile removed most of the statutory restrictions on FDI in its various sectors, other behind-the-border barriers and ensuring *de facto* high level of competition have become more important. For example, Chile's scores on the OECD STRI show that regulations relating to competition are a relatively more important barrier to trade and investment in its certain key backbone services sectors, such as courier services, telecommunications, air transport or rail. This could explain the high market concentration and mark-ups in the country.<sup>31</sup> There is also scope for further strengthening of competition policy, notably in the area of monitoring of mergers and acquisitions (Chapter 3).

Analysis of Chilean FDI and firm survey data suggests that foreign investors locate primarily in the mining, retail and financial services sectors as well as basic metals within the manufacturing industry. They do not appear to engage intensely in R&D in Chile nor employ particularly high shares of skilled labour locally. To the extent that investment-related policies influence market entry conditions of different firms in different sectors, they can be an important factor influencing the distribution and characteristics of FDI in the host economy, with implications for the GVC participation and upgrading opportunities for local firms.<sup>32</sup>

Recognising this factor, as part of the National Agenda for Productivity, Innovation and Growth, the Government implemented a Foreign Investment Law in 2015, introducing a new framework for investment promotion in Chile. This reform marks a qualitative change in the Government's approach to international investment, which has hitherto relied primarily on FDI and trade liberalisation and ensuring a stable macroeconomic framework to attract investors, without a pro-active investment attraction policy in place. The creation of Chile's Investment Promotion Agency has been undertaken in conjunction with OECD's best practices enshrined in the OECD Policy Framework For Investment (OECD, 2015h) and a special report delivered to the Government with guidelines on an adequate institutional arrangement for an IPA (OECD, 2015j). Currently, the Government is developing a national investment promotion strategy, which can provide a helpful opportunity to further develop a unifying vision and communicate clearly the intended policy goals and means.

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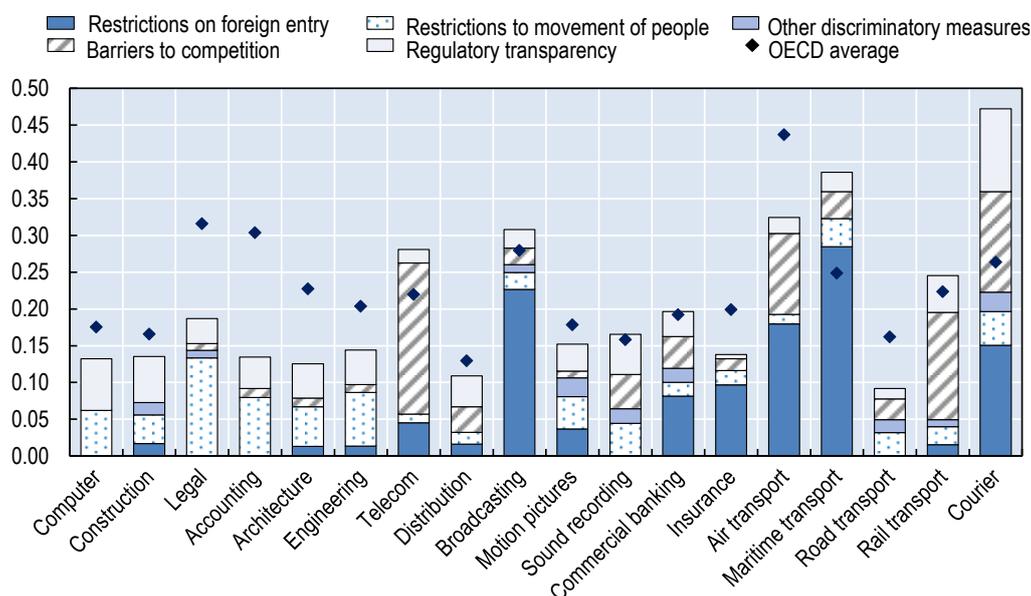
<sup>29</sup> IADB (2010).

<sup>30</sup> CSIRO (2014).

<sup>31</sup> Except for mining, price-cost margins are higher in Chile than in Australia, Canada and New Zealand in all sectors, and the largest differences are found in transport and telecommunications.

<sup>32</sup> Firms' international investment location decisions are influenced by a number of factors, some of which lie outside of the scope of national policies (see OECD, 2008a; OECD, 2008b; Faeth, 2009 for an overview).

**Figure 1.6. Chile's scores on the OECD Services Trade Restrictiveness Index, by sector, 2014**



Source: OECD Services Trade Restrictiveness Index. See also Chapters 2 and 3.

With the adoption of the principle of selectivity in the Government's investment promotion efforts, other best practices become particularly important—notably the need to adopt a whole-of-government approach and ensure policy coherence facilitated through strategic agenda-setting, greater transparency and more rigorous evaluations of various support programmes, and finally the use of clear performance indicators and regular market monitoring. In particular as the IPA is brand new, and the Government is still establishing the most useful means to support investment, foreign and domestic, it should allocate due time to dialogue with existing and potential investors and internal consultations and coordination to build on past experiences and adopt a coherent approach going forward.

### *Innovation*

The policy environment in Chile has become more conducive to innovation and thus to GVC upgrading during the past years, to a large extent based on the observations in the OECD Innovation Review of 2007. Chile has several well-designed innovation promotion programmes (offered by CORFO, CONICYT, ProChile and others) but programme scale and take-up have not been large enough yet to make a substantial impact. As a result, the significant changes in innovation policy are not yet reflected in a better policy performance of Chile.

While, as elaborated in more detail in Chapter 4, business R&D grew by 10% in 2009-2012, R&D activities in Chile lag these of other countries as reflected in the low figure of business R&D expenditures relative to GDP (Figure 1.7). In addition, cooperation between the business and the public sectors is not well developed and innovation is limited to only a small share of companies. Collaboration among Chilean companies on innovation is comparatively low.

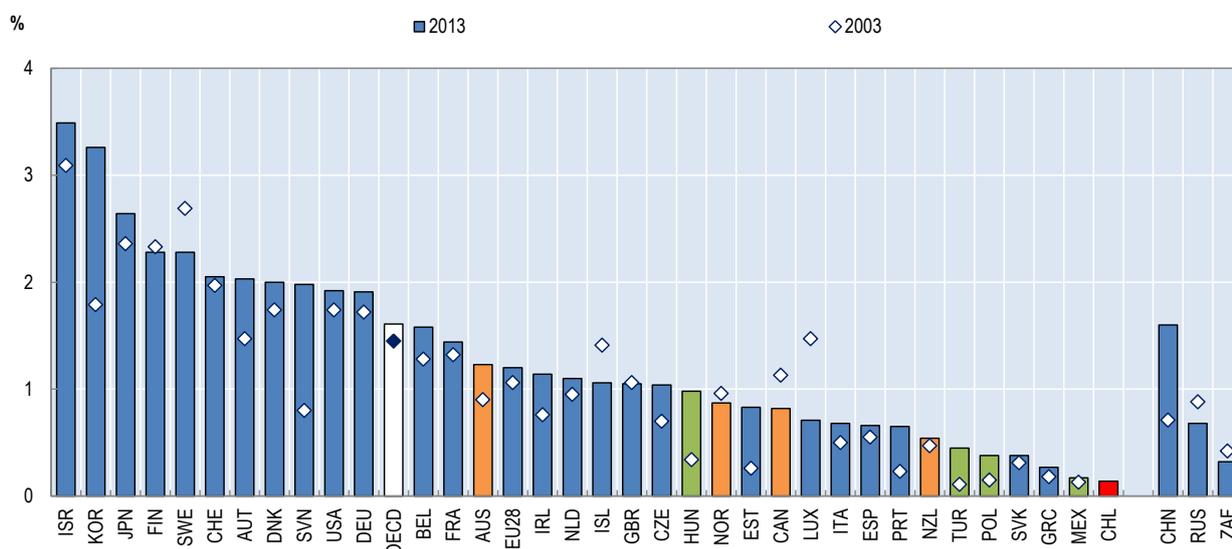
Despite the fact that the share of the Chilean population having benefitted from tertiary education is comparable with other OECD countries, the clear shortage of human capital including science, technology and mathematics inhibits the transition to an innovation economy. Connectivity and use of the Internet continue to be a challenge for Chile with fixed and wireless broadband penetration lower than in other (OECD and other similar) countries.

In order to guarantee the efficiency and effectiveness of the different measures to encourage and support innovation, a number of issues could be taken into account. Adding further policies to the existing mix, rather than replacing existing policies with new ones, can lead to duplication, lack of critical mass and also to a complex environment for businesses. A regular review of innovation programmes—on effectiveness, efficiency and relevance—is necessary in order to stop or adjust inefficient ones, and expand those that are proven to work.

While it may still be too early to carry out a full evaluation since policy measures have been implemented only recently, evaluation of the implemented measures will be desirable and needed at some point in time. Some early evaluations have been undertaken (e.g. of the modified R&D tax credit system and the Incubator programme) but more systematic evaluations should be planned later. To boost take-up and ensure the cost-effectiveness of programmes in Chile, the authorities should design these so that they can be adequately evaluated.

**Figure 1.7. Business enterprise expenditure on R&D, 2001 and 2013**

As a percentage of GDP



Source: OECD, Main Science, Technology and Innovation database. See also Chapter 4.

The OECD Innovation Review for Chile (2007) pointed already to important problems in the governance of the innovation system, in particular the existence of different programmes run by different governments departments and agencies without a lot of coordination and a common, long-term vision for science, technology and innovation policy. It called for strengthening the institutional and policy coherence of innovation in Chile, which has become only more important over the last years. Also the ongoing OECD review of Chilean public research centres programmes referred to major governance problems, in particular related to the different funding mechanisms for these centres.

The government’s Agenda for Productivity, Innovation and Growth goes a long way to addressing the fragmented institutional set-up for innovation. It includes 47 different measures, focused around promoting the diversification of production, boosting sectors with high growth potential, the expansion of programmes and resources available for early-stage start-ups, increasing productivity and competitiveness of businesses and generating a new impetus to exporting. Among the most notable of these endeavours is the creation of a Productivity Commission that will help to ensure that productivity is the focus of policymaking across the government, and help to identify policies.

## CHAPTER 2. TRADE AND PRODUCTION

### 2.1. Introduction

At least to some extent, Chile's remarkable economic performance in recent years can be traced back to its strategy of trade liberalisation and integration into international markets. Several studies suggest that a reduction of barriers to trade implies rising productivity and substantial gains in terms of GDP (see Blyde and Iberti, 2012, for evidence on Chile and Costinot and Rodríguez-Clare, 2014, for an overview). Especially for a highly specialised country such as Chile, these gains from trade can be expected to be large. However, Chile's capability to secure economic growth from further trade integration is challenged by several factors which have to be addressed to sustain growth and prosperity.

Technological developments have led to increased vertical specialisation along the value chain, meaning that increasingly narrow components of final products are produced in GVCs all around the world (Gereffi et al., 2001; Baldwin, 2012; OECD, 2013a). GVCs offer the opportunity of selling a particular activity in international markets, without being competitive in the production of entire products. Hence, the phenomenon has also been labelled as trade in tasks (Grossman and Rossi-Hansberg, 2006, 2008). However, participation in GVCs may pose particular challenges to firms and institutions (UNCTAD, 2013b; Primo Braga, 2013; Bamber et al., 2014; OECD, 2013a).

The commodities boom of the recent years has allowed Chile a remarkable growth of revenue from exports of copper. Copper prices skyrocketed during the first years of the 21st century until mid-2008. A sharp decline was followed by a steady recovery and a new peak in early 2011. Since then, prices are on a downturn with copper having lost almost half of its previous value. A high dependence on natural resources may turn out to be unfavourable in such a situation of falling prices and options to diversify economic output need to be evaluated. Empirical evidence suggests that in developing countries export diversification is positively correlated with economic growth in the process of catching-up to technologically advanced economies (de Ferranti et al., 2002; Imbs and Wacziarg, 2003; Cadot et al., 2011).

Participation in GVCs offers new opportunities for countries to broaden their export portfolio. Particular skills and technologies acquired from specialisation in mining can be used to supply related tasks to the world market, dismantling the link between copper prices and Chile's export performance. Likewise, a reduction of trade barriers can help other Chilean industries to overcome their lack of competitiveness on the global market and contribute to a reduction of Chile's export specialisation.

This type of analysis was made possible by recent OECD efforts to structurally collect data on Inter-Country Input-Output (ICIO) flows. Matrices constructed to represent these flows do not only record bilateral international trade on a sectoral level, but also provide information on the processing of domestic and foreign intermediate inputs. Thereby, it is possible to track output in particular sectors and countries being traded and processed along the value chain. Hence, these data constitute a representation of modern economies' interconnectedness via international TiVA. Each trade flow between two countries can be decomposed by the actual sources of value added. The availability of such data is crucial for a well-founded analysis of international trade and its implications on economic outcomes (De Backer and Miroudot, 2013; OECD, 2013a). TiVA data from the OECD is available for the years 1995, 2000, 2005, and 2008-2011 and a total of 61 countries (all OECD countries and other important economies) plus an aggregate that represents the rest of the world.

The availability of such data for large parts of the world is a relatively recent phenomenon. TiVA provides a sectoral disaggregation of output, exports, and imports which makes it possible to draw

conclusions on a country's specialisation pattern on a broad sectoral level. TiVA also indicates the importance of foreign value added in exports and the supply of domestic value added for other countries' exports, allowing calculating measures of backward and forward participation on a sectoral or aggregate level. Finally, these indicators on forward and backward participation can be furthermore disaggregated into flows of value added to/from particular sectors and/or countries.

Nevertheless, there are some limits to what can be learned from TiVA data. TiVA requires to interpret each sector as homogeneous step in a GVCs; It is impossible to infer information on production steps within TiVA sectors, or on any finer level of disaggregation, such as firms; In particular, TiVA does not provide information on 'high value' or 'low value' activities within sectors. Nor does TiVA provide direct normative implications; participation in global value chains cannot be a policy objective in and of itself. TiVA describes a current (or past) pattern of trade flows - it does not provide information on potential benefits from changes to this pattern. Thus, where necessary the analysis based on TiVA is complemented by other available data to answer these questions.

In order to assess the scope for potential policy interventions in Chile and their impact on the country's benefits from participation in global value chains, a thorough understanding of Chile's trade policy landscape is crucial. Most remarkable is the unilateral market opening, by which the vast majority of tariff lines were fixed at a most-favoured nation (MFN) level of 6%, as well as the strong effort towards bilateral liberalisation, reaching a number of 24 agreements with 63 partners that cover 94% of Chile's exports in March 2015. Many of these agreements are cover a relatively wide range of topics and implement deep liberalisation. However, Chile's agreements with countries within Latin America tend to be economic complementarity agreements, according to the framework set by the Latin American Integration Association (Asociación Latinoamericana de Integración, ALADI). In general, these agreements are not as ambitious as FTAs since they do not necessarily aim to ensure the free movement of goods, services, and capital in a free-trade zone (WTO, 2015). Instead, the agreements often only aim to promote and regulate trade among its member countries and to implement economic cooperation activities in order to expand markets without the goal of free trade.

Currently, attempts at deeper regional integration manifest themselves in negotiations to broaden the coverage of the Pacific Alliance treaty, which aims to achieve free movement of goods, services, capital, and people in the participating countries. Moreover, it will contain provisions on a wide range of trade-related issues, such as rules of origin, market access, technical barriers to trade and sanitary and phytosanitary measures, trade facilitation and customs cooperation, as well as government procurement and dispute settlement.

Chile also participates in the negotiations on a Trans-Pacific Partnership Agreement (TPP), together with 11 other countries. Negotiations are based on a previous agreement between Chile, Brunei Darussalam, New Zealand and Singapore on a Trans-Pacific Strategic Economic Partnership. Given the high dynamics of growth and trade flows in the Pacific region, this agreement which could imply a harmonisation of trade rules between a relatively high number of countries seems especially important.

Despite these ambitious liberalisation programs, there are concerns in Chile that it is not sufficiently integrated in GVCs, due to the high degree of specialisation in its exports (Rebolledo, 2014). Chile is the world's most important copper exporter and mining is the single most important sector in the Chilean economy, providing more than 50% of Chile's exports and more than 15% of GDP (Korinek, 2013). The sector is characterised by a high ratio of exports to output and a low ratio of imports to output. This implies that Chile is mostly connected to GVCs via forward linkages, delivering intermediate inputs for other countries' exports.

Several domestic initiatives address this problem, aiming to diversify Chile's export basket to reduce dependency from exogenous shocks to commodity prices, while at the same time boost sectors with high growth potential. These include the World Class Mining Suppliers Programme which aims to increase exports of knowledge-intensive services and technologies related to mining. The availability of natural resources in Chile (especially copper) provides a unique comparative advantage which can be extended along the mining value chain. Hence, this strategy can be described as 'upgrading in global value chains'.

Functional upgrading from extraction activities implies an increase value added by adding additional activities to an existing activity (Kaplinsky and Morris, 2003). In recent decades, Chile has already been successful in function upgrading towards more upstream activities, measured by the increasing importance of domestic inputs into the industry. The share of domestic intermediate inputs used in Chile's mining sector grew from 25% in the 1950s to 60% already at the end of the 20<sup>th</sup> century. The technological upgrading and learning involved in this process has not been limited to supplying inputs for the domestic mining sector. It has also allowed Chile's mining suppliers to raise their level of exports from almost USD 0 to USD 300 million in 2011, while exports of engineering services grew from around USD 10 million in 2000 to USD 200 million in 2011 (Korinek, 2013). Hence, the substitution of domestic inputs into mining for foreign inputs and the subsequent growth in exports of mining and engineering services, which is supposed to grow further in the future, constitutes a double benefit for Chile's economy.

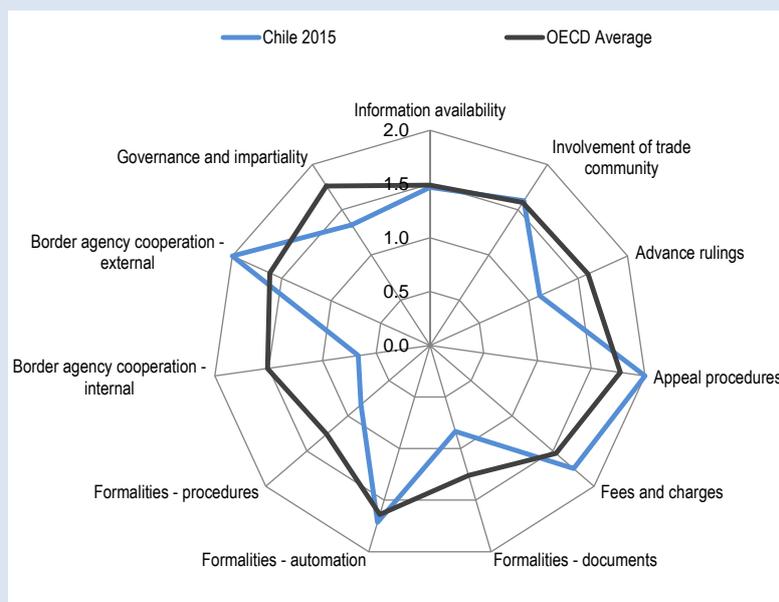
This sort of functional upgrading has also occurred in other sectors. For example, Chile is one of the world's largest exporters of fruit and vegetables. However, the sector's growth was relatively slow, gradually adding more steps to the domestic part of the value added chain: Export orientation began with fresh fruit and vegetables around 1980. The first packing and cold storage units were installed around 1985. Exports of processed fruit and vegetables increased from less than USD 100 million in 1990 (Fernandez-Stark et al., 2011) to more than USD 15.2 billion in 2013 (ProChile, 2015). Due to increasing demand for food products in Asian countries, especially in China, this sector provides high potential for further export diversification in Chile. Importantly, this sort of functional upgrading towards downstream activities is difficult to capture with TiVA data. For example, foreign value added in exports may remain constant, if foreign value added is equally important for all activities involved, such as production, packing, and processing.

Starting to export is still difficult for producers in large parts of Chile. Even though Chile's road infrastructure is relatively robust, internal transport costs constitute an obstacle for exporters of products other than copper. This is also due to the fact that only a small share of exports is shipped from ports in the North or South of Chile. Instead, a significant proportion of exports from these regions is first transported to the middle of the country. This is due to the fact that some ports in the North of Chile specialise in exports of mining products (Mesquita Moreira et al., 2013). In order to increase competitiveness on global markets for all Chilean export products, an efficient transport infrastructure and logistics system is crucial.

### Box 2.1. Chile's trade facilitation performance: OECD Trade Facilitation Indicators

Chile has consistently sought over the last years to streamline its customs and international trade procedures, improve border efficiency and promote trade facilitation. The OECD Trade Facilitation Indicators (TFIs) show that Chile exceeds the OECD average performance in the areas of appeal procedures, fees and charges, and external border agency co-operation. Chile also performs on par with the OECD average in the areas of information availability and automation.

According to the TFIs data, the country's main challenges currently seem to lie in the areas of advance rulings, simplification and harmonisation of documents, streamlining of border procedures and internal border agency co-operation, where Chile will need to further improve its performance in order to reach the OECD average.



*Note:* The TFIs take values from 0 to 2, where 2 designates the best performance that can be achieved. The analysis is based on country replies received by October 2014 and the set of indicators as constructed for OECD countries in "Trade Facilitation Indicators: The Impact on Trade Costs" (OECD Trade Policy Paper No. 118, 2011).

Improving the transparency and user-friendliness of the advance rulings mechanism should be considered, as this could encourage a more extensive use of advance rulings. As regards information availability, other improvements can be brought to the availability of information and guidelines on import and export procedures, documentary requirements, appeal procedures, and penalty provisions. At present, there is also no officially established timeframe for publishing information on new or amended laws and regulations in advance of their entry into force.

Chile has made progress in drawing up an operational risk management system, supported by information technology, as well as in designing reliable IT systems capable of accepting Electronic Data Interchange and exchanging data electronically. Meanwhile, in the area of formalities – which includes the simplification and harmonisation of trade documents, automation and streamlining of procedures – further reforms would be desirable in areas such as:

- expanding the acceptance of copies of documents
- improving the proportion of export procedures expedited electronically
- completing the development of the Single Window currently under elaboration: the export module of the Single Window has been already implemented and it is currently operational, while the import module, currently under elaboration, is expected to be to be up and running in 2017
- further increasing the percent of customs declarations benefitting from pre-arrival processing
- promoting the use of post-clearance audits
- expanding the use of Authorised Operators (AOs) programs, beyond the pilot program initiated in 2013 - establishing additional trade facilitation measures for AOs could provide support in this sense

In order to reach the OECD average on internal border agency cooperation, Chile could for example enhance the cooperation and coordination on both documentary and physical border controls between various border agencies within the country. Internal agency co-operation can also be supported by government agencies delegating some of the controls under their responsibility to Customs authorities.

It is likely that insufficient port capacity in the North and the South of Chile is related to high barriers to the entry of foreign-owned firms in the maritime transport sector. According to the OECD Services Trade Restrictiveness Index (STRI), barriers to the trade of maritime transport services in Chile are higher than in any other OECD country. Around 75% of these barriers are due to restriction on foreign entry, while regulatory transparency, barriers to competition, and restrictions to movement of people are less important. Other areas of the transportation sector are characterised by lower restrictions to trade in transport services. Barriers in Chile's rail transport sector are slightly above OECD average, mostly due to barriers to competition. Restrictions to air transport and especially road transport are substantially lower than in the average of OECD countries. A recent study by Beverelli et al. (2015) finds that services trade barriers, as measured by the OECD STRI, have a significant impact on productivity in downstream industries, especially in countries with working institutions.

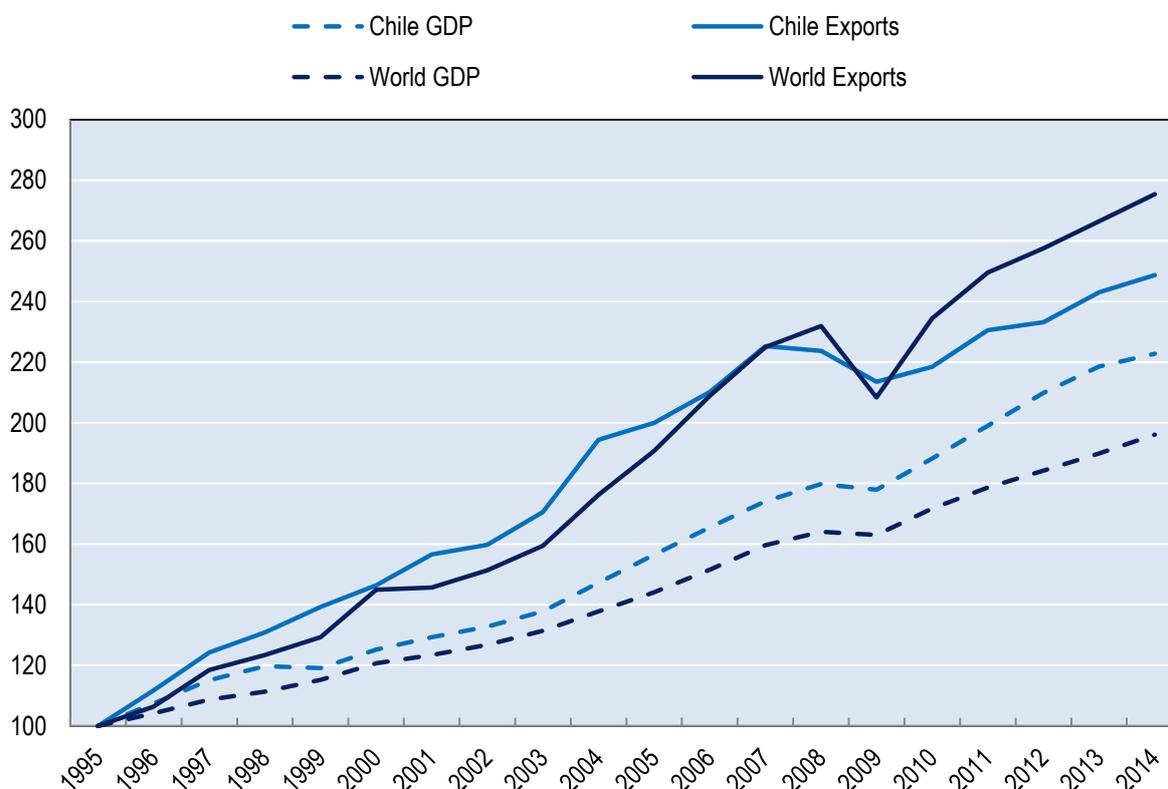
A group of exports which is not affected by traditional transport costs are services. Chile's exports of services add up to roughly USD 900 million in 2008, having risen from almost zero around the year 2000. They can be classified as horizontal activities which provide services to many sectors and vertical activities which belong to a particular industry. Most important contributors to Chile's services exports are engineering services related to mining which alone account for USD 275.6 million, customer relationship management, including call centres with marketing and sales functions, which are classified as business process services, and application software outsourcing, a sub-segment of information technology services (Fernandez-Stark et al., 2011). Importantly, these numbers only refer to direct exports of services, while domestic services are important sources of value added for the exports of other products.

The remainder of this chapter is structured as follows. Section 2.2 summarises recent trends on the patterns of Chile's trade flows. Section 2.3 describes Chile's aggregate participation in GVCs. Chile's copper sector is covered in sections 2.4 through 2.6. In particular, the importance of copper for Chile's trade pattern is described in section 2.4, a thorough analysis of Chile's copper value chains is provided in section 2.5, while new possibilities for Chile to benefit from its comparative advantage in mining are highlighted in section 2.6. Section 2.7 focuses on Chile's manufacturing sector and its participation in global value chains. Section 2.8 takes a regional perspective and points to relatively low levels of regional integration in South America. Section 2.9 summarizes the most important policy implications to address the challenges and opportunities identified in this chapter.

## **2.2. Macro and micro patterns of Chile's trade flows**

Chile's exports in constant prices grew rapidly in recent years, only compromised by a setback during the crisis of 2009. Export growth was higher than growth of Chile's GDP, implying an intensified international integration. Proof of Chile's excellent economic performance during the last 20 years is the fact that its GDP grew substantially faster than world GDP.

Figure 2.1. World GDP, World exports, Chile GDP, Chile exports in constant prices (1995 normalised to 100)

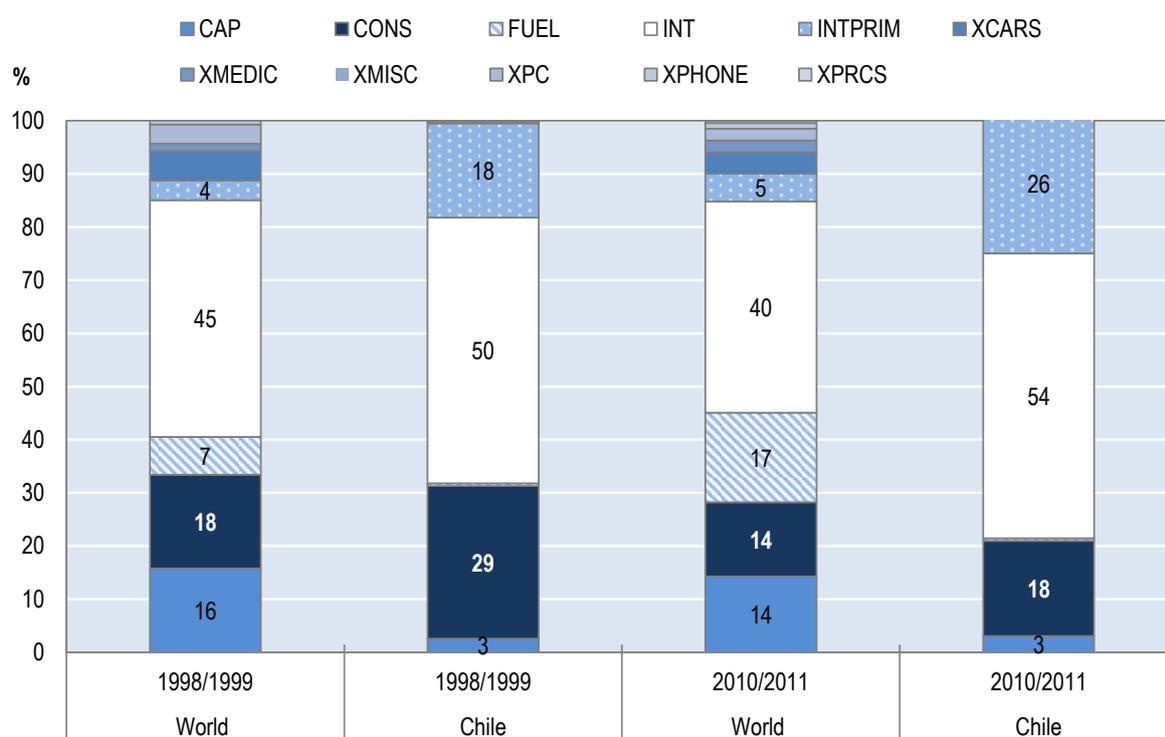


Source: OECD Economic Outlooks 96. Exports and GDP in volume.

Primary and intermediate products account for the major part of Chile's aggregate exports. In 2010/2011 they jointly account for 80% of Chile's exports. Already in 1998/1999, their contribution to Chile's exports had been at 68%. Consumption goods account for 18% of Chile's exports in 2010/2011, down from 29% 12 years earlier. The contribution of other products, such as capital goods, fuel or cars remains negligible. This means Chile is already very much integrated with global value chains as an upstream provider of resources and inputs.

World trade flows show a very different pattern in this decomposition. While the importance of primary intermediate goods has slightly been growing from 4% to 5%, the share of other intermediate products fell from 45% to 40%. Not only intermediate products are less important for world trade than for Chile's exports, but also consumption goods. In 2010/2011 they only account for 14% of world exports, down from 18%. The importance of fuels in world exports is rapidly growing. From a share of 7% in 1998/1999 it went up to 17% in 2010/2011. Capital goods remain important, accounting for 14% of world exports. Other products are only of marginal importance.

**Figure 2.2. Share of exports per product category for Chile and World**



*Note:* All numbers correspond to averages 1998/1999 and 2010/2011.

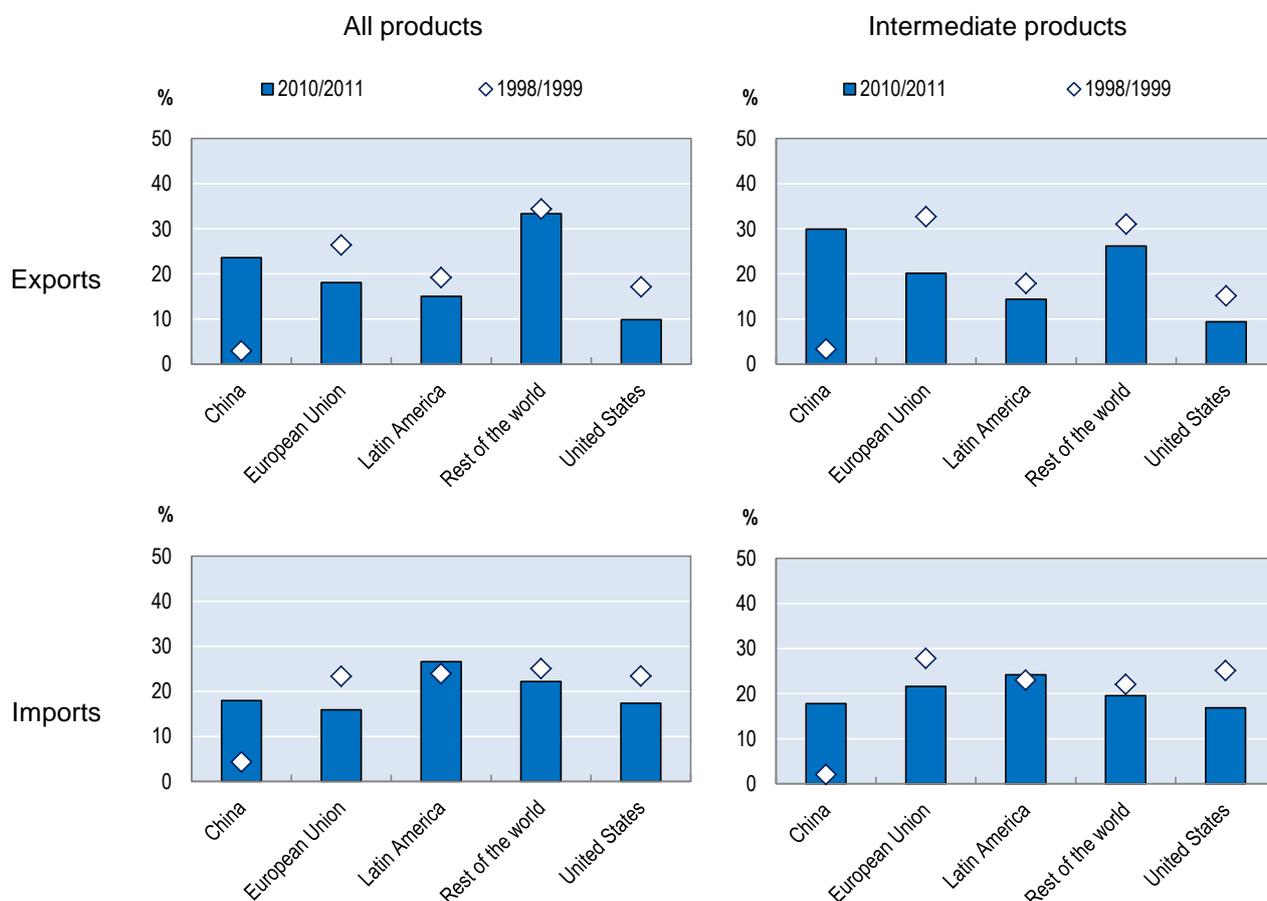
*Source:* Authors' calculations based on CEPII's BACI database.

The importance of China as one of Chile's trading partner grew rapidly during the last decade. In 2010, China was the single most important export destination for Chile. Chile's exports to China were even larger than exports to the entire European Union, around twice as high as exports to all of Latin America, and around three times as high as exports to the United States. The growing importance of China for Chile's exports came about jointly with a falling importance of all other world regions. However, the drop was especially pronounced for the European Union and the United States.

Together with the United States, China is one of the most important partners for Chile's imports. More than 35% of Chile's imports come from these two countries. The contribution of Latin American partners to Chile's imports is substantially higher than the share of these countries in its exports and remained relatively constant since 1998.

In general, export and import patterns are very similar for different product subgroups. For example, the share of trade in intermediate products with the most important world regions is similar to the entire set of products. One important difference is the relatively high share of intermediate inputs exported to China, compared with China's share in Chile's total exports. This comes at the expense of a lower share of intermediate goods exports from Chile to the 'Rest of the world'. On the import-side, the share of Chile's imports of intermediate inputs from the European Union is higher than the share in imports of all products from the EU.

**Figure 2.3. Chile's export and import shares with most important partners/regions**



Source: Authors' calculation based on CEPII's BACI database.

Concentration measures of Chile's exports and imports show relatively high values. One of these measures is the Herfindahl index, which takes the value of one if one product (or market) accounts for the entire volume of a country's exports and the value of zero if the number of products (or markets) approaches infinity. The results imply low levels of diversification on both the country dimension as well as on the product dimension.

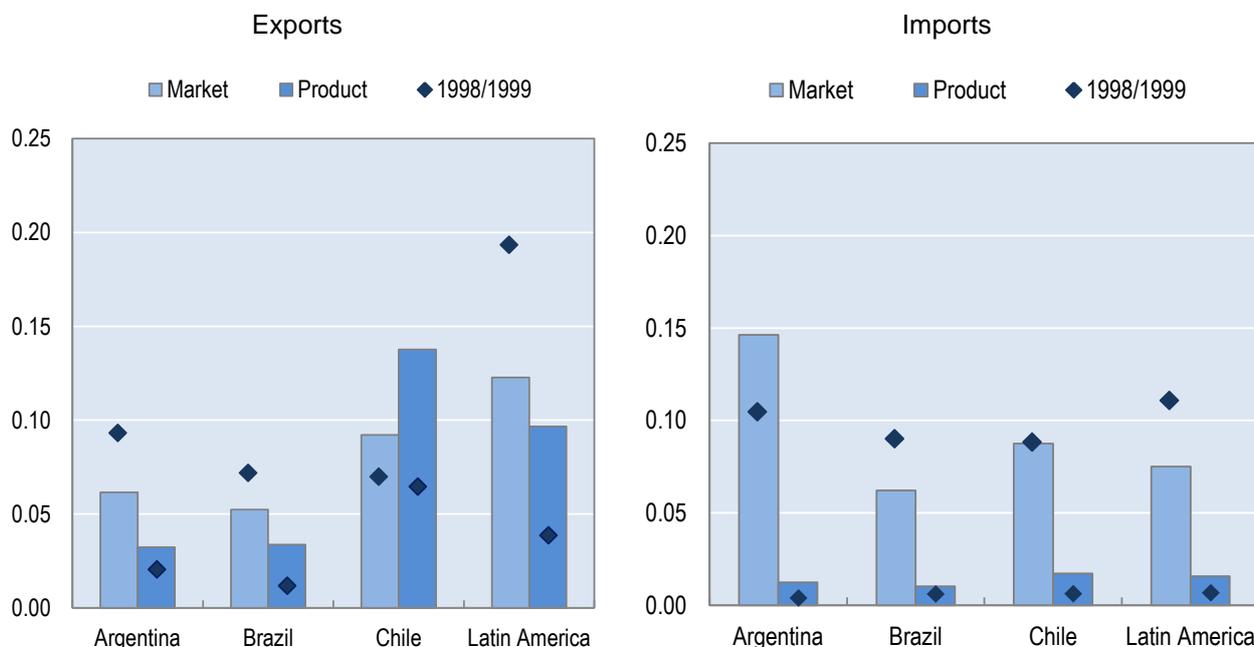
The concentration of exports is especially high on the product dimension. This is due to the high share of copper products in Chile's export volumes. The Herfindahl index of around 0.15 in 2010/2011 is higher than an average of this index for Latin American countries and more than three times higher than the equivalent index in Argentina and Brazil. On the product dimension, Chile's exports became even more concentrated between 1998 and 2011.

The same is true for the concentration of Chile's exports on the country dimension. The relevant Herfindahl index increased slightly from 0.08 to 0.1, while the concentration of Latin American exports on the country dimension fell during the same time span. Chile's high concentration of exports on the country dimension is driven by China, the United States, Japan, and Korea, which jointly account for roughly half of Chile's exports. This concentration of exports on the country dimension is lower than the Latin American average but higher than concentration measures of Argentina and Brazil.

Concentration of imports on the country dimension was relatively constant between 1998 and 2011. Chile's Herfindahl index is slightly higher than the equivalent measure in Brazil and the Latin American

average, while it is lower than in Argentina. Along the product dimension, concentration of imports is relatively low in all Latin American countries, but slightly increasing in Chile since 1998. This means that Chile's imports have become more diversified on the product dimension between 1998/1999 and 2010/2011.

**Figure 2.4. Herfindahl index in Chile and Latin America on country and product dimension**

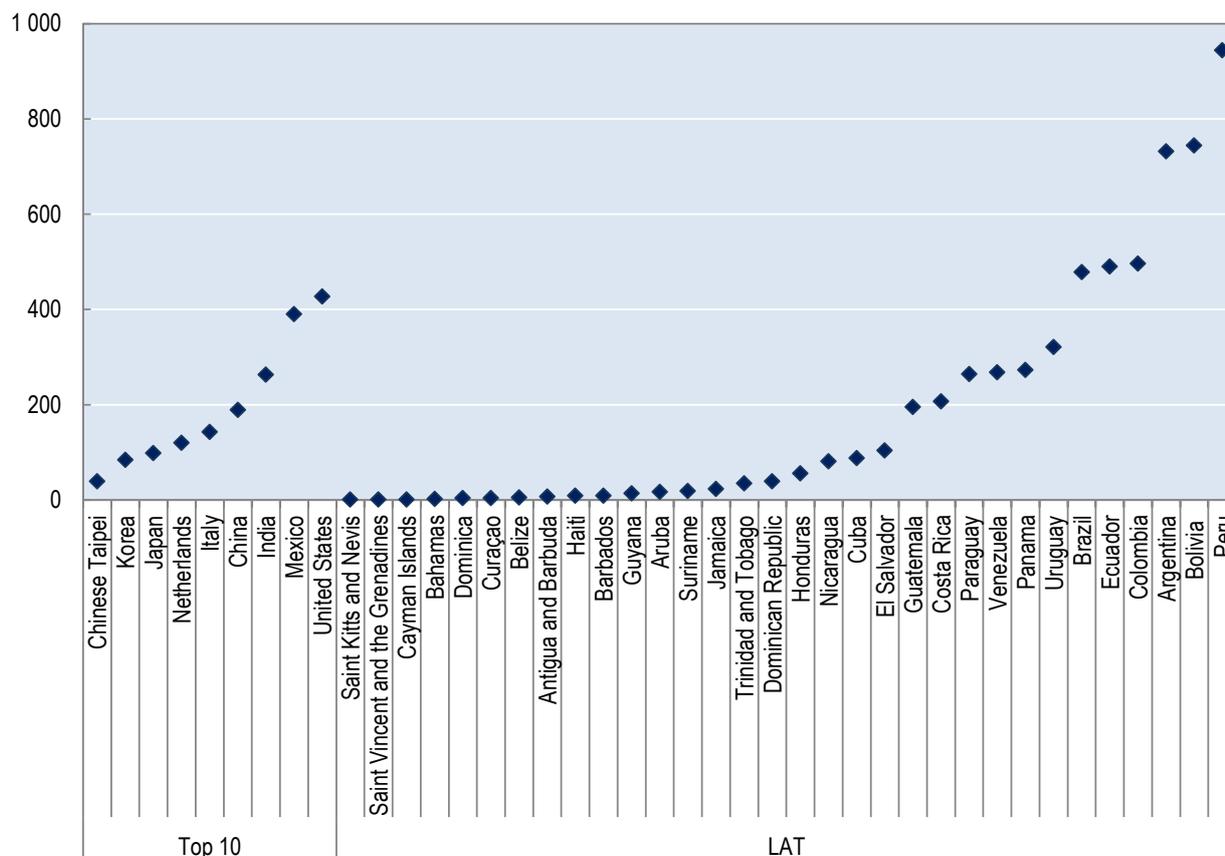


*Note:* Latin America corresponds to the entire region except Argentina, Brazil and Chile in this figure. Bars correspond to averages of the years 2010/2011.

*Source:* Authors' calculations based on CEPII's BACI database.

A further indicator of Chile's relatively weak diversification of exports is the low number of countries to which it exports an exhaustive set of products; where exporting a product is defined by an export value of more than USD 10 000. These countries which import a high number of products from Chile are mostly other South American countries. Peru, Bolivia, and Argentina all import more than 700 HS6 products from Chile. Argentina, Colombia, and Ecuador still import around 500 products. Moreover, North American countries import a significantly higher number of products than European countries. The United States and Mexico both import around 400 products from Chile, while only two European countries (Italy and the Netherlands) import more than 50 products from Chile.

**Figure 2.5. Number of products exported to a partner country, by partner country**



Note: Products for which exports exceed USD10 000.

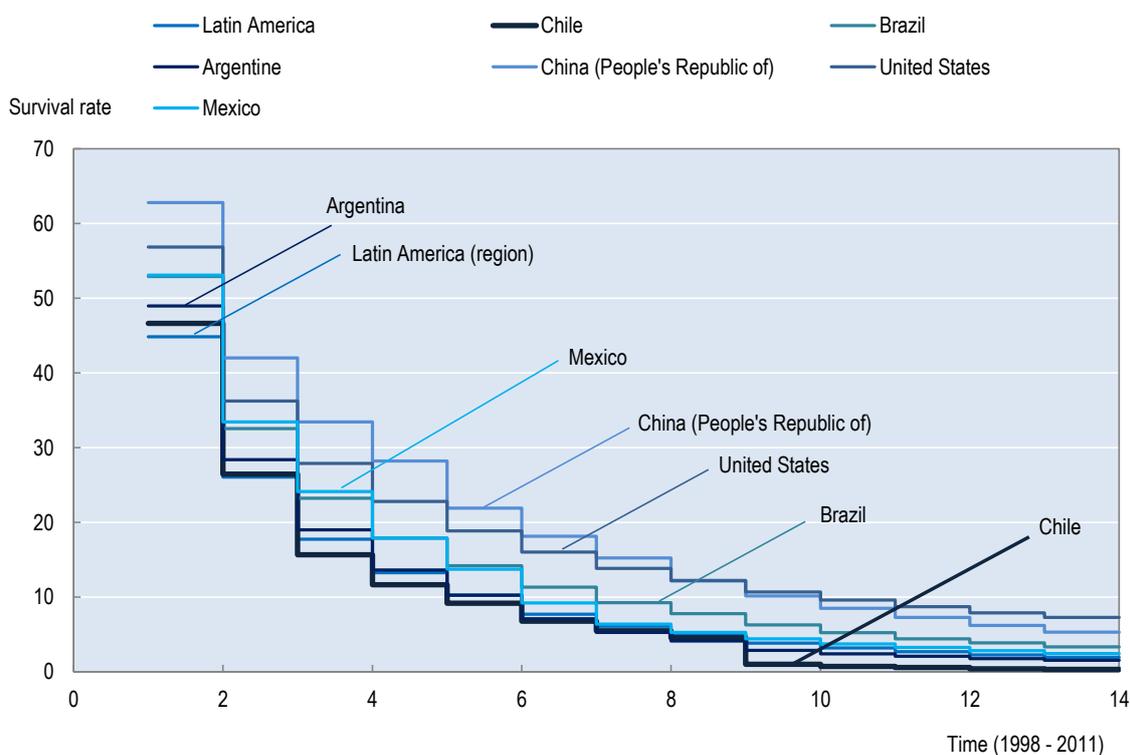
Source: Authors' calculations from CEPII's BACI database.

Product-level export data over many years provides information on the length of exporting spells. These are defined as subsequent years of continued exports of a specific product. Averaging over all products allows calculation of so-called survival rates. They indicate the percentage of exported products which are still exported after one or more years and are a measure of sustained competitiveness on the global market. In Chile, only 45% of products are exported for more than one year. After two years only 25% of products remain, while only 10% of all products are continuously exported for more than five years.

In this respect, Chile performs worse than other Latin American countries. Especially exporters in the large economies of Brazil and Mexico manage to maintain prolonged exporting spells. Even in Argentina exporting spells are slightly longer than in Chile. This is especially true for long exporting spells of more than nine years which basically do not exist at all in Chile. In Chile, exporting spells are relatively similar for products from different sectors. Whether a sector is characterised by large or small export volumes does not matter much in this respect. The reason is that higher export volumes in a sector do not imply more exports of all products, but also coincide with a higher number of products being exported. Therefore, there exist a high number of products with a very low export volume even in important exporting sectors. These products are usually characterised by a high probability of interrupted exporting spells. Many of these products with low export volumes do also originate from Chile's copper industry. Copper ores and copper cathodes, two products which jointly account for more than 50% of Chile's exports, are continuously exported to a high number of countries, but only have a marginal impact on measured survival rates.

Developed economies, such as the United States, are able to maintain long exporting spells. Especially high is the ratio of products which the United States export for more than nine years, while in the short run it is China which is characterised by the highest share of surviving products, with more than 60% of products surviving the first year of exporting.

**Figure 2.6. Survival analysis; product-level exporting spells by country**



Note: Analysis on intermediate goods only.

Source: Authors' calculations from CEPPI's BACI database.

### 2.3. Chile's participation in global value chains

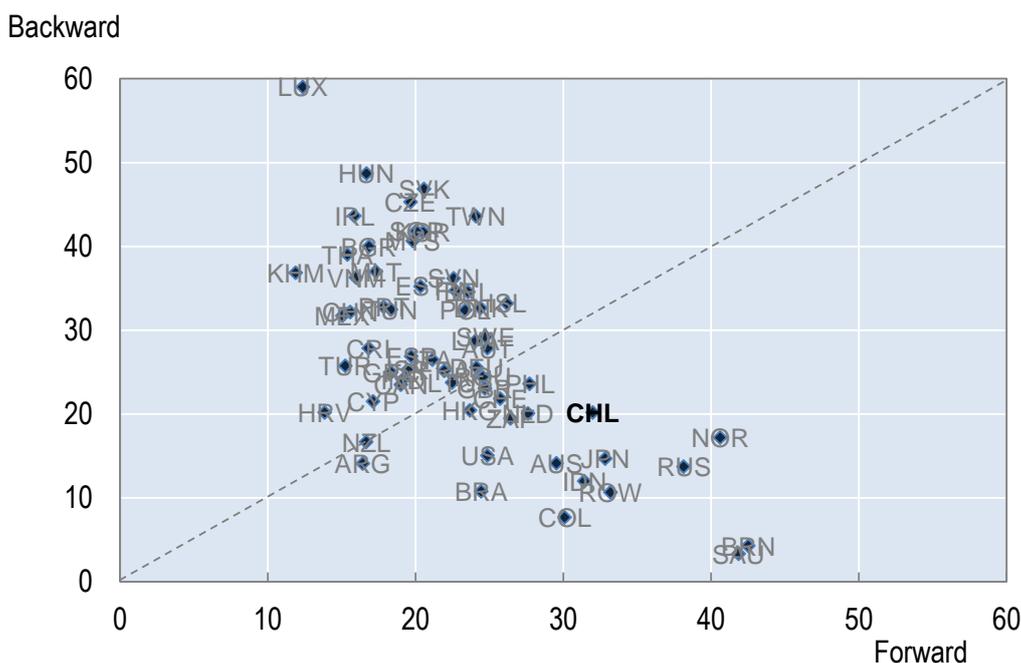
Quantitative measures of a country's participation in GVCs can be derived from inter-country input-output (ICIO) matrices. With the TiVA database, the OECD provides a set of relatively standard indicators that are based on the underlying OECD ICIO matrix. These indicators reduce the complexity and multidimensionality of the ICIO matrix by providing concise and comparable key information.

Two of the most established indicators are a country's backward and forward linkages. They are calculated on the country and time dimension and provide a first impression of a country's participation in GVCs. Country A's forward participation is measured by the value added this country A provides for other countries' exports, divided by the aggregate value of country A's exports. In other words, forward participation measures the share of a country's exports that is further on re-exported by other countries. A high level of forward participation indicates a position that is relatively upstream in GVCs.

An opposite view is provided by a country's backward participation. Backward participation of a country A corresponds to the share of imported foreign value added in country A's exports. A high level of backward participation indicates a position that is relatively downstream in GVCs, using a relatively high proportion of foreign value added.

Based on most recent data from 2011, Chile's forward participation in GVCs is relatively high, compared to other countries, while its backward participation is relatively low. Only a handful of countries in the OECD TiVA database have a higher level of forward participation than Chile. Like Chile, these countries are rich in natural resources. Chile's low backward participation is due to the fact that its exports of primary and intermediate products contain relatively little foreign value added. As mentioned above, this pattern suggests that, on average, Chile's position is relatively upstream in global value chains. However, it should be obvious that no such thing as one single GVC exists. The aggregate indicator results from a high number of different value chains in which each country participates. In some of them, a country might be located on a very different position than suggested by the aggregate indicator.

**Figure 2.7. Forward and backward participation in 2011**

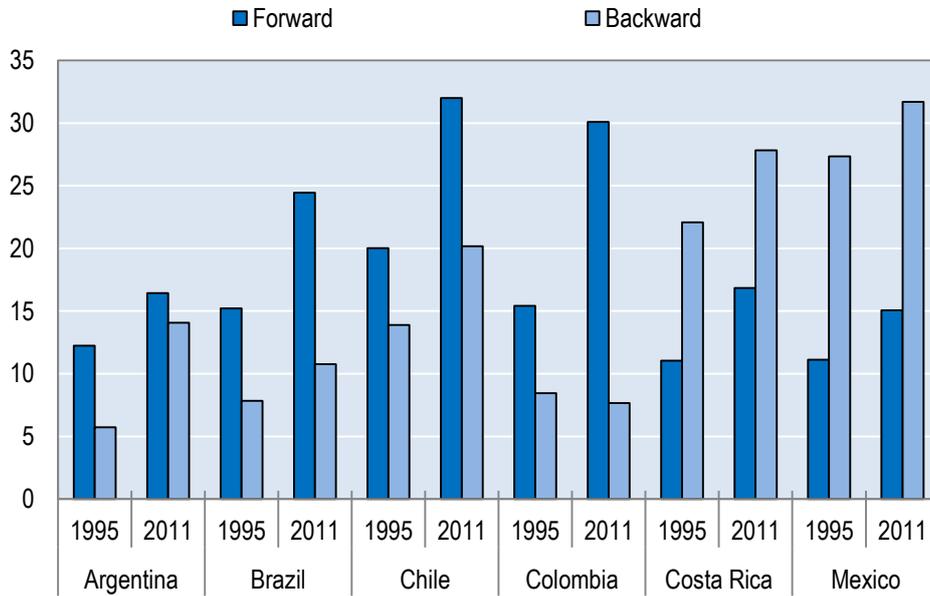


Source: Authors' calculations based on OECD-WTO TiVA database.

The other three South American economies in the TiVA database, Argentina, Brazil, and Colombia are significantly less integrated in GVCs than Chile. However, a comparison of levels is of relatively little significance. Integration in GVCs is negatively correlated with country size, which might already explain most of this difference in levels, especially between Brazil and Chile. More interesting are similarities in the pattern of GVC participation of the three South American countries. All countries have low levels of backward participation and significantly higher levels of forward participation. Consequently, not only Chile, but also Argentina and Brazil seem to be located relatively upstream in global value chains. GVC integration in all three countries is generally on an upward trend, with a setback around 2008 and 2009, due to the worldwide economic crisis, but also due to the collapse of commodity prices in 2008. This leads to a drop in these indicators, if commodities are more important for their GVC trade than for their aggregate exports.

GVC participation of Costa Rica and Mexico, two further Latin American economies in the TiVA database, looks very different from the pattern that is observed in South America. These two countries have relatively high values of backward participation and low values of forward participation. This can be explained by the high share of processing trade in the exports of these countries. Their location in proximity to the United States gives them a natural advantage for this type of specialisation.

**Figure 2.8. Forward and backward participation over time**



Source: Authors' calculations based on OECD-WTO TiVA database.

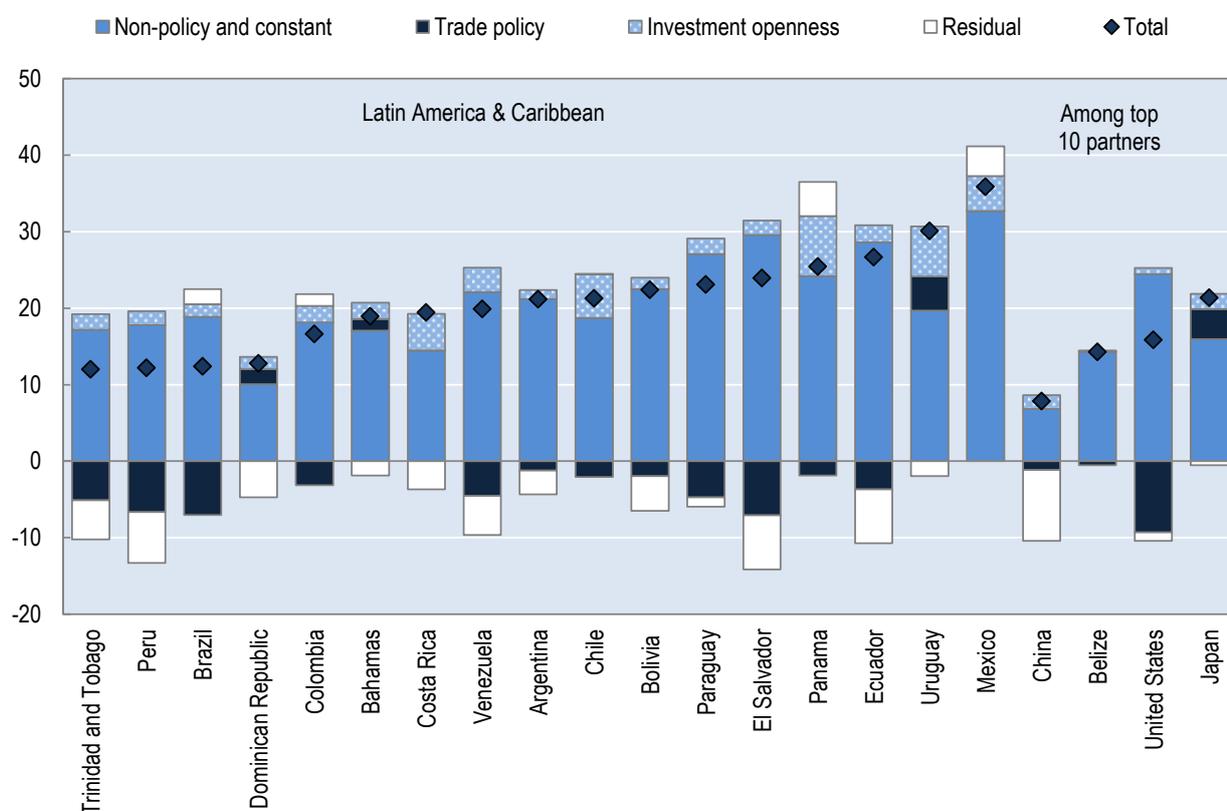
Previous OECD research has provided a decomposition of backward and forward linkages on the country-level into a set of explanatory factors for a set of developing countries in Africa and Asia (OECD, 2015e). The explanatory factors used for this analysis are classified into three groups: non-policy and constant factors, trade policy factors, and investment openness<sup>1</sup>. Even though Chile's aggregate backward participation in GVCs is relatively low, the degree of participation is very similar to what would be expected by Chile's characteristics.

Non-policy factors imply a lower rate of participation than other countries, indicated by the relatively low height of the black bar, labelled 'Non-policy and constant'. Two of the key variables within this group which imply a lower rate of participation for Chile than for other countries concern the distance to manufacturing hubs and important economic centres. However, Chile's favourable investment openness partly compensates for this negative effect of Chile's remoteness with around one third of Chile's backward linkage in GVCs attributed to investment openness, one of the highest ratios in Latin America. Since multinational enterprises export and import more often and more intensively than purely domestic firms, it is no surprise that a high level of FDI inflows explains an important part of Chile's participation in GVCs. Chile's favourable policy with respect to foreign direct investment is crucial in this respect (UNCTAD, 2013b).

<sup>1</sup> This estimation is run on EORA database (containing 187 countries and 22 years) which permits Latin America's coverage. EORA suffers from many drawbacks as compared to OECD TiVA which are described in OECD (2015e) but in this particular case it allows a first-pass comparison with other countries in the region. switching from the OECD TiVA database to EORA with more observations also reduces the risk of endogeneity in the model due to unobserved factors. Structural (non-policy) factors are GDP at constant 2005 prices (log), population (log), share of manufactured value added, distance to closest manufacturing hub (log) and distance to economic activity (log). Trade policy factors are share of imports covered by PTA, share of exports covered by PTA, tariffs charged and tariffs faced. Investment openness is expressed via Revealed Investment openness.

$$BACKWARD_{it} = f(NPOL_{it}^1, \dots, NPOL_{it}^N, POL_{it}^1, \dots, POL_{it}^M, \varepsilon_{it})$$

**Figure 2.9. Decomposition of backward participation into explanatory factors**



Source: Authors' calculation from EORA.

#### 2.4. The importance of copper for Chile's participation in GVCs

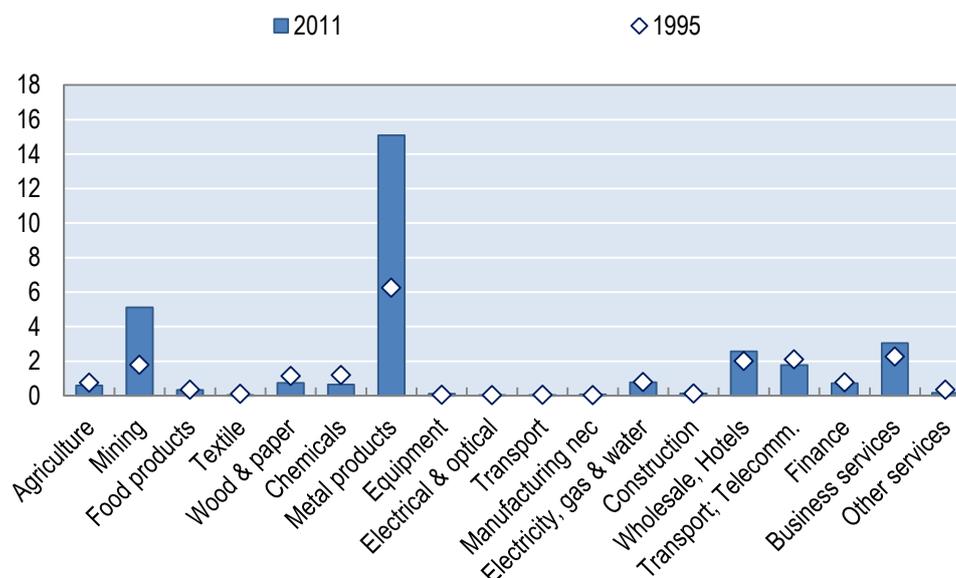
As mentioned above, Chile's exports are mostly based on the exploitation of its copper resources. In the most recent version of the TiVA database, published in June 2015, copper products are classified in two different industrial sectors. Depending on the level of processing, copper exports either belong to exports in the mining and quarrying sector or to exports in the metals sector.<sup>2</sup> This should be born in mind when reading the following sections of this report.

Consequently, Chile's forward participation is mostly driven by exports of value added from the metals industry and from the mining and quarrying sector. In 2011, the metals sector has a forward participation of 15%, meaning that value added from Chile's metal industry that is used in third countries' exports amounts to 15% of Chile's total exports. In addition, the forward participation of the mining sector is 5%. In total, these two sectors sum to a forward participation of 20%, almost exclusively due to exports of copper. Other sectors which contribute to Chile's forward participation are business services (3%), wholesale and retail trade services (2.6%), and transport and telecommunication services (1.7%), whereas all other sectors are only of marginal importance.

<sup>2</sup> Please note that there is discrepancy in how the different activities are assigned to the mining and quarrying and metals sector between the OECD TiVA and the National Accounts of Chile. In the latter, the mining activity ranges from ore extraction to refining, whatever the metallurgical process used for this (see Box 4.3 in Banco Central de Chile (2008)) while this activities are separated into mining and manufacturing in the OECD TiVA.

Given that Chile's aggregate forward participation is 32%, this implies that copper exports from the mining sector and metals account for around 63% of Chile's aggregate forward participation. Moreover, dominance of copper has increased since 1995, when the mining sector and metals sector jointly only accounted for 40% of Chile's forward linkages.

**Figure 2.10. Forward participation by supplying sector**

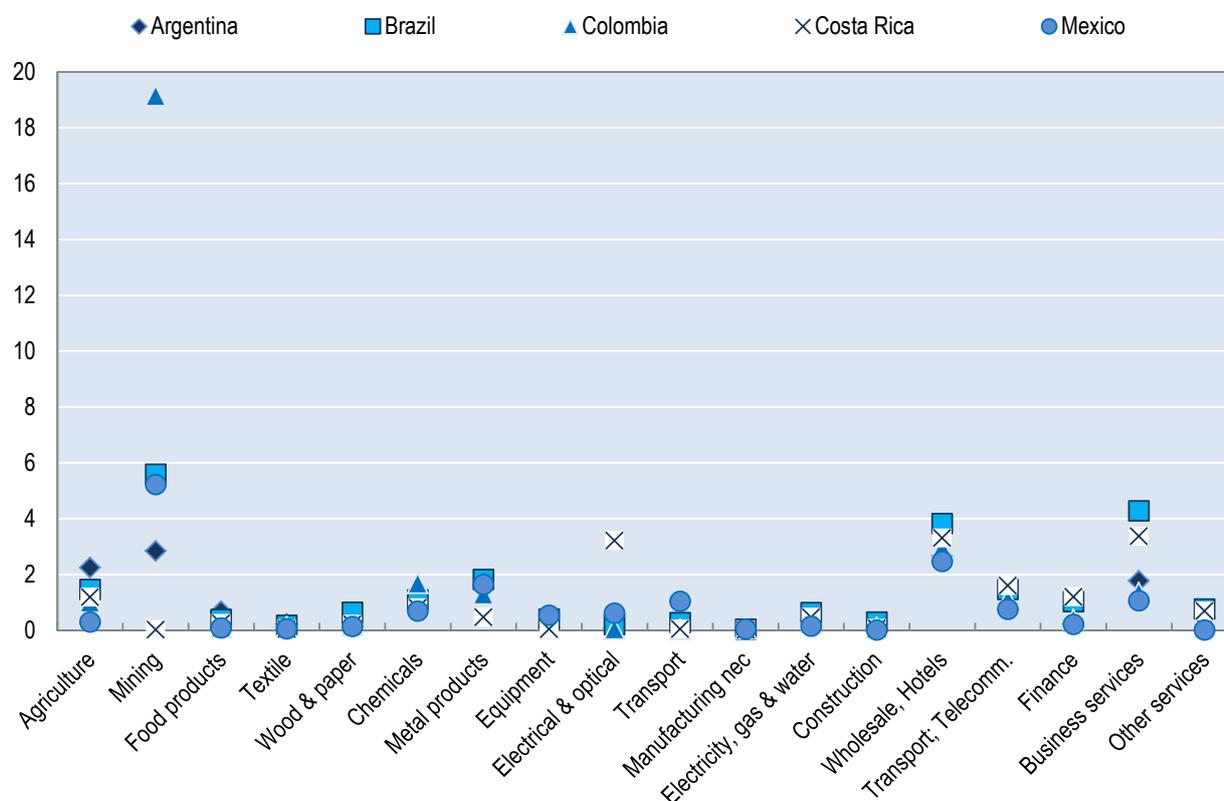


Source: Authors' calculations based on OECD-WTO TiVA database.

A comparison with other Latin American countries in the OECD TiVA database shows that the pattern of forward participation differs quite substantially between these countries. In particular, forward participation from the mining sector is extremely heterogeneous. Colombia's exports of mining products that are used in other countries' exports sum to almost 20% of Colombia's total exports. Two other countries, namely Brazil and Mexico, have a mining forward participation similar to Chile's, while in Costa Rica mining does not play any role at all.

Forward participation from manufacturing is relatively low in all countries. No other country has a substantial degree of forward participation in the metals sector. Costa Rica is the only country which forward participation in GVCs via exports of electrical/optical equipment. All countries have relatively similar levels of forward participation as Chile in service sectors.

Figure 2.11. Forward participation by supplying sector

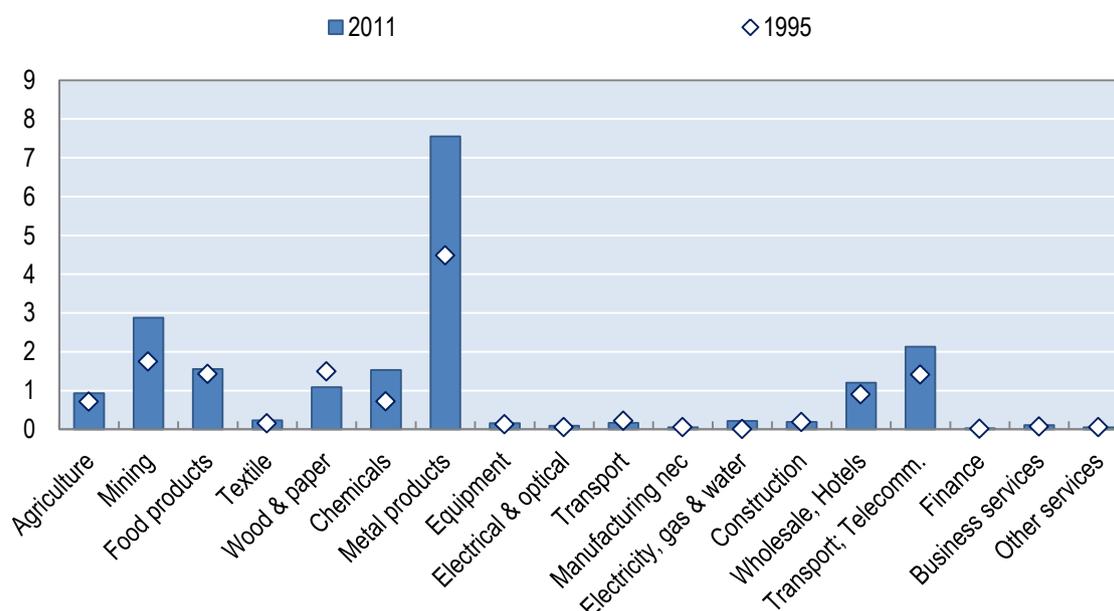


Source: Authors' calculations based on OECD-WTO TiVA database.

Copper exports in the mining sector and metals sector are also a crucial pillar of Chile's backward participation and have even become more important recently. In 1995 Chile's mining sector and metals sector jointly used foreign value added for exports that corresponded to roughly 6% of Chile's total exports. This means that the mining sector contributed around 45% to Chile's total backward participation. Until 2009, joint backward participation of these sectors rose to 10.4%, which corresponds to 52% of Chile's total backward participation.

Also remarkable is Chile's chemicals sector. This sector shows the largest increase in contribution to backward linkages, doubling between 1995 and 2011. Even though the level is still relatively low, this is evidence for the growth of a chemicals industry in Chile which relies on foreign intermediate inputs and is on its way to become an important exporter.

**Figure 2.12. Backward participation by using sector**

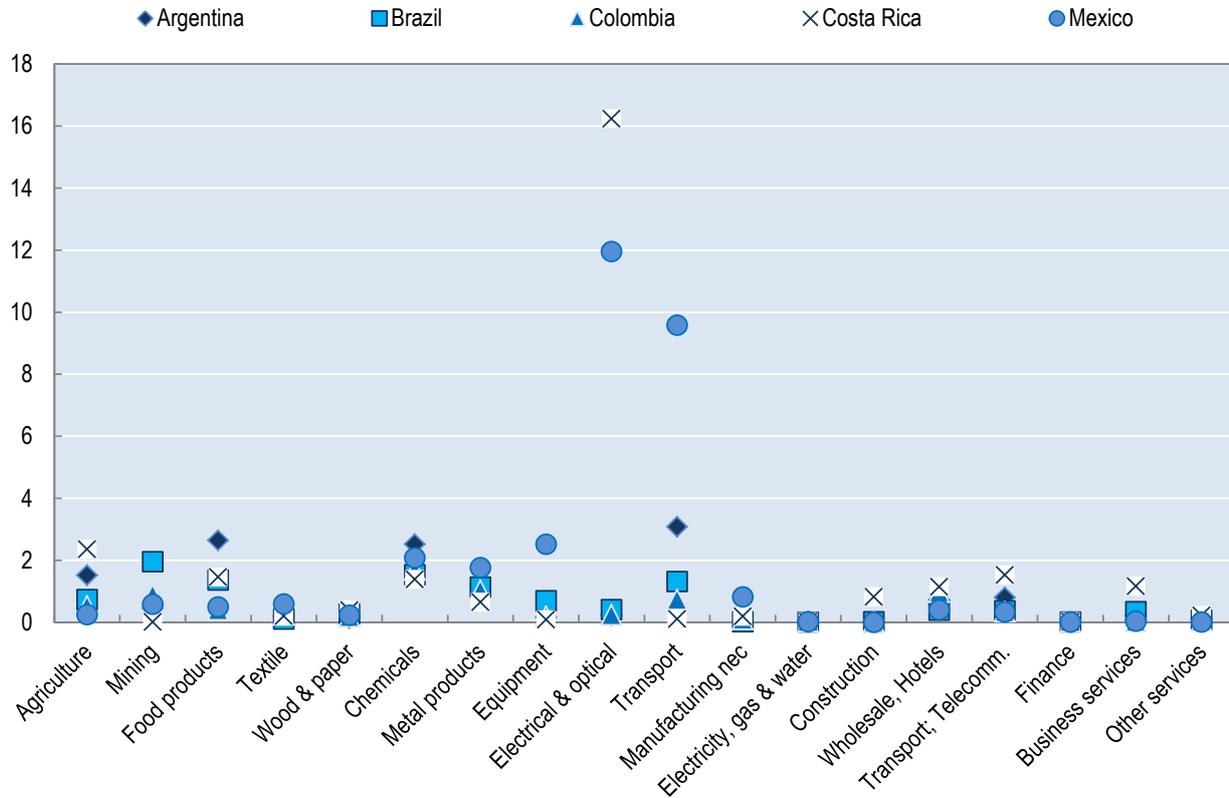


Source: Authors' calculations based on OECD-WTO TiVA database.

Similar to the pattern of forward participation, there exists substantial heterogeneity with respect to the pattern of backward participation in Latin America. As already mentioned above, backward participation is especially pronounced in Costa Rica and Mexico. In Costa Rica backward participation is almost exclusively due to the sector of electrical/optical equipment which uses almost 16% of Costa Rica's total export value as imported value added for its exports. Backward participation is slightly more diversified in Mexico, with electrical/optical equipment and transport equipment having a joint backward participation of 22%. Another country with a contribution of transport equipment to backward participation is Argentina, where this rate is at 3%. Due to the low levels of backward participation in general, this sector is the biggest contributor to Argentina's backward participation.

However, there also exists heterogeneity with respect to backward participation in the primary sector. In Argentina and Costa Rica, both agriculture and food products contribute to backward participation, whereas mining is important for backward participation in Brazil. Backward participation in the service sectors is generally low. Only Costa Rica has similar levels of backward participation in wholesale/retail trade services and transport services as Chile.

Figure 2.13. Backward participation by using sector



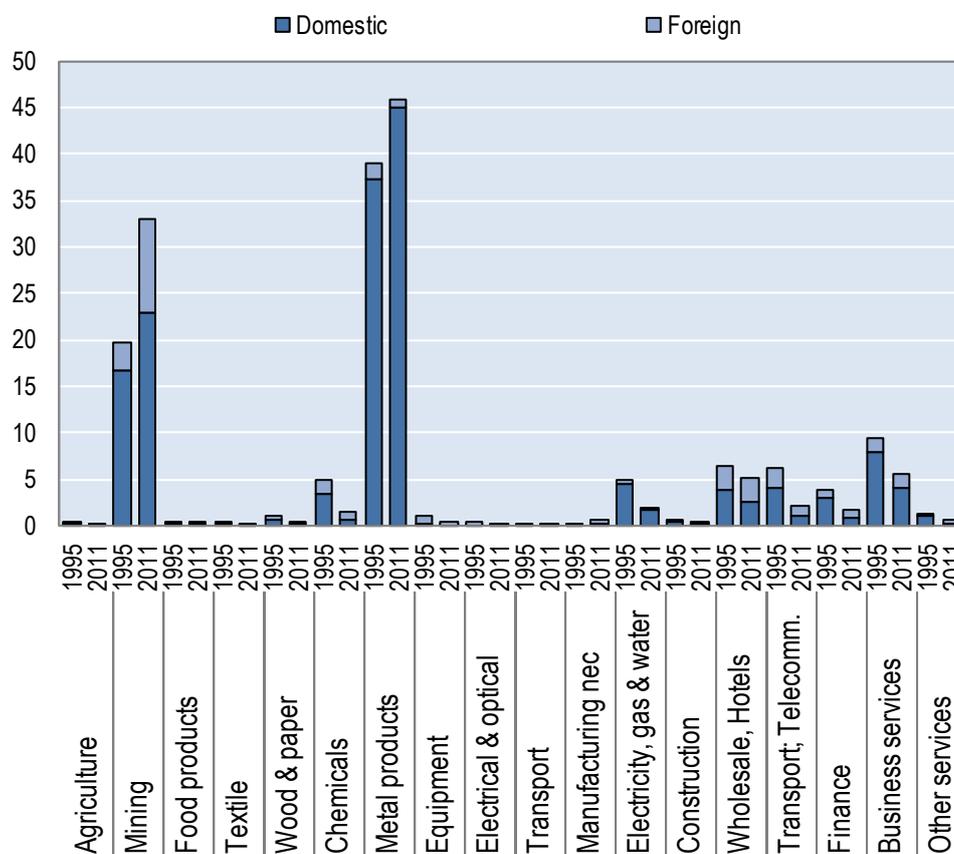
Source: Authors' calculations based on OECD-WTO TiVA database.

The dominance of copper for indicators of Chile's aggregate participation in GVCs becomes obvious when the mining sector and metals sector are excluded from the calculation of country-level backward and forward linkages.

Importantly, a comparison of these measures of participation in GVCs across countries shows that Chile's performance is relatively similar to the majority of OECD countries, when eliminating copper exports from the indicator of aggregate backward and forward participation. Given its relative distance to major economic centres, this result is evidence for the beneficial impact of Chile's policy of trade liberalisation and facilitation on its integration in GVCs. Moreover, it shows that anxiety about Chile's low degree of participation in GVCs should be based on the importance of copper exports for Chile, (as in Rebolledo, 2014) and not on the erroneous belief of low levels of GVC participation in all economic activities. Controlling for its specialisation in copper, Chile's participation in GVCs is comparable to other OECD countries.



**Figure 2.15. Source sectors of inputs into mining and metals exports, as a share of total mining exports and metals exports**



Source: Authors' calculations based on OECD-WTO TiVA database.

As mentioned above, service inputs are more important than manufacturing inputs for Chile's exports in the mining sectors. It is remarkable that services contribute less to exports in the mining and metals sector in Chile than in most other countries. While only 15% of the export value represent value added created in service sector, this share is above 20% in most other countries.

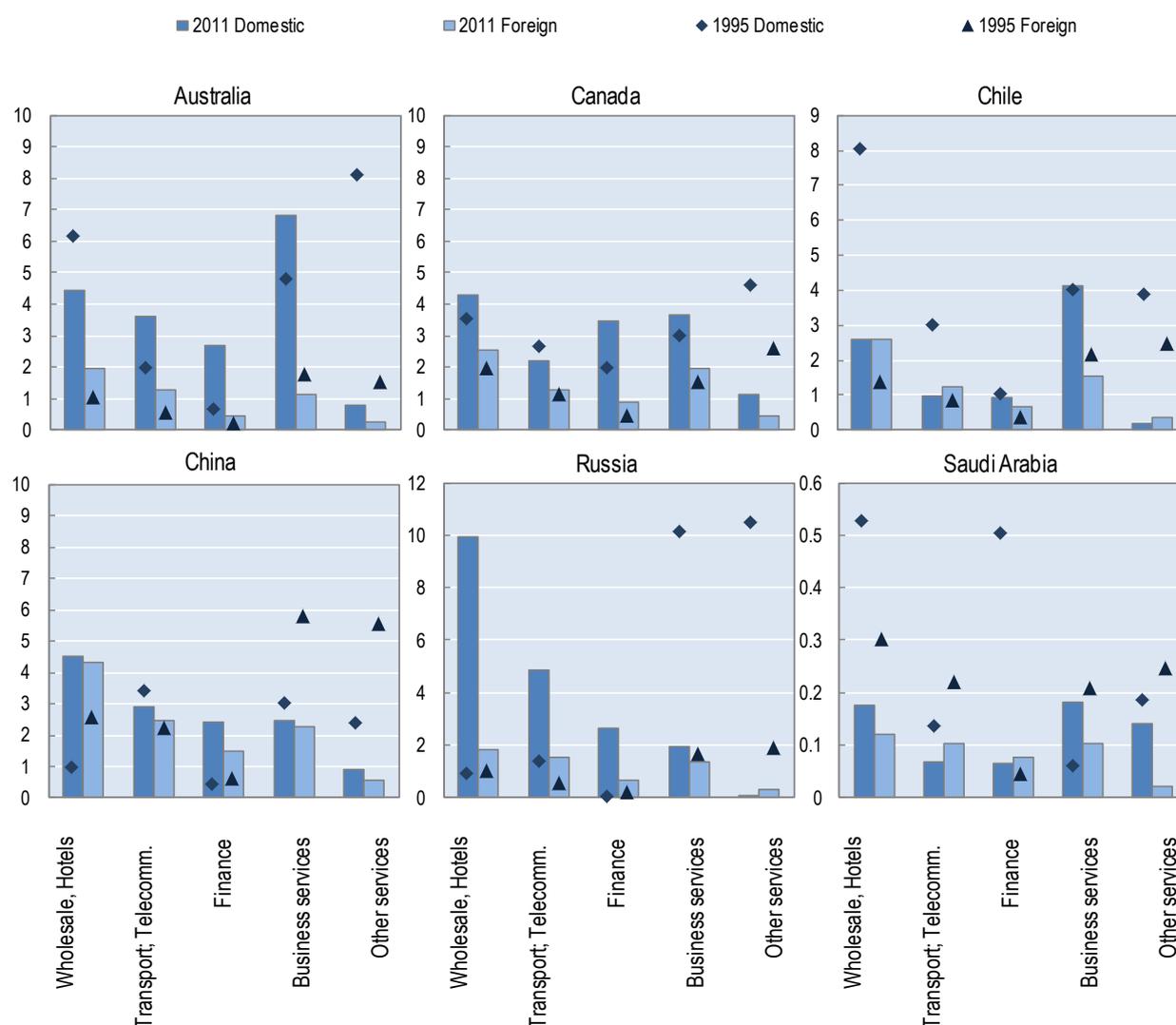
With respect to the distribution between domestic and foreign services, there seem to be two distinct patterns. On the one hand, the developed economies of Australia and Canada, as well as Russia, use a relatively high share of domestic services inputs. On the other hand, Chile, China and Saudi Arabia use foreign and domestic services in relatively equal proportions. The only exception in Chile is the sector of business services, which relies more intensively on domestic sources.

The distribution across services from different sectors is relatively similar in most countries. Wholesale/retail trade and restaurants, as well as business services, are usually the two most important categories. In Chile, the dominance of these two sectors is slightly more pronounced than in other countries. These two sectors jointly account for more than 70% of all services inputs in mining and metals exports.

Transport services and financial services are usually of intermediate importance. In Chile, their importance is slightly smaller than in other countries. Usually, around 35% of all services inputs come from these two sectors, while their share of services inputs in Chile's mining and metals exports is only

25%. In general, transport services are more important than financial services. Canada is the only country where this ranking is reversed. The residual category of other services is generally least important.

**Figure 2.16. Services inputs into mining and metals exports, as a share of total mining exports and metals exports**



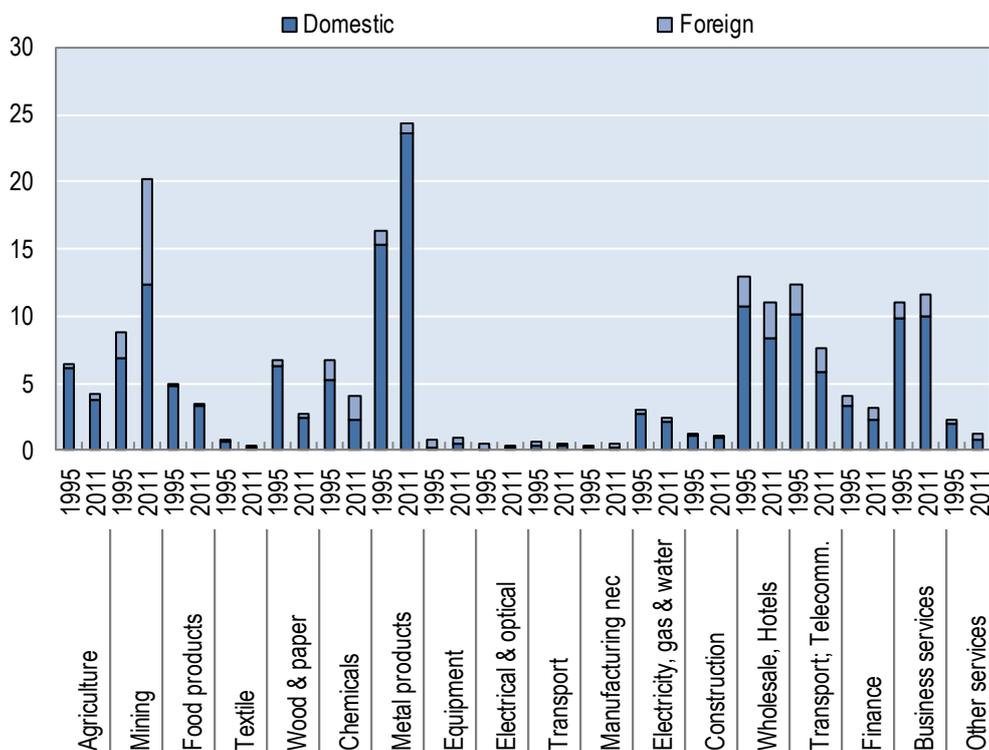
Source: Authors' calculations based on OECD-WTO TiVA database.

Foreign mining does not only provide value added for Chile's exports of copper in the mining and metals sector, but also for exports in other Chilean sectors. Indeed, foreign mining was the most important foreign contributor of value added to Chile's exports in 2011, with roughly 7.9% of Chile's exports being contributed by foreign mining.

Even though value added from foreign mining is dwarfed by the contribution of Chile's domestic mining sector, the importance of value added from foreign mining for Chile's exports has an important implication: Chile's concentration in the mining sector does not simply rely on extraction and exports of domestic natural resources, but also on imports of foreign resources. It is noteworthy that the product overlap between Chile's imports and exports in the mining sector is relatively small. In 2011, while more than 80% of Chile's exports in the mining sector are exports of copper ores and concentrates, more than

78% of Chile's imports of mining products are crude petroleum oils and crude oils from bituminous minerals, bituminous coal, and natural gas. This suggests that value added from foreign mining does not compete with the domestic mining sector but rather has to be considered as complementary (i.e. it consists of different products from those produced by Chile and is used as an input into Chilean production).

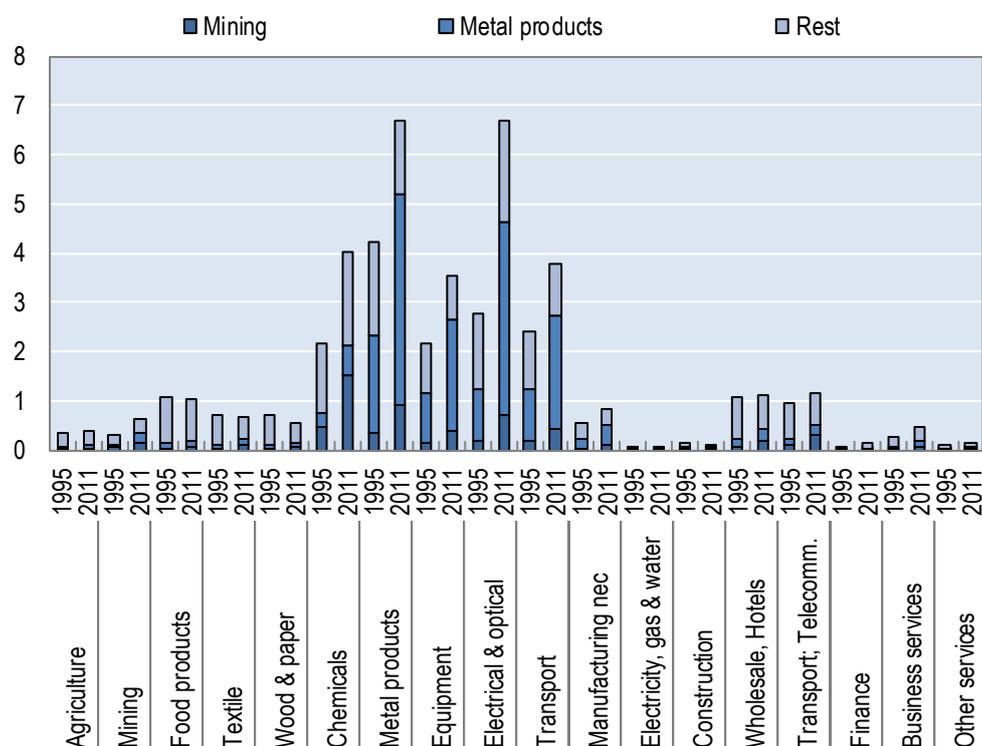
**Figure 2.17. Chile's exports by origin of value added and supplying sector**



Source: Authors' calculations based on OECD-WTO TiVA database.

Manufacturing sectors are most important foreign re-exporters of Chilean copper and of value added from Chile in general. While most of Chile's copper ores, exported as value added from the mining sector, are used in foreign exports of chemicals, most of the more processed copper products, exported in value added from Chile's metals sector, is re-exported as metal products or as electrical/optical equipment. Other sectors which are re-exporters of Chile's metals are the sectors of machinery and other equipment and of transport equipment. Moreover, the contribution of Chilean value added to exports in all these sectors grew sharply between 1995 and 2011.

Figure 2.18. Foreign using sectors of Chile's forward participation



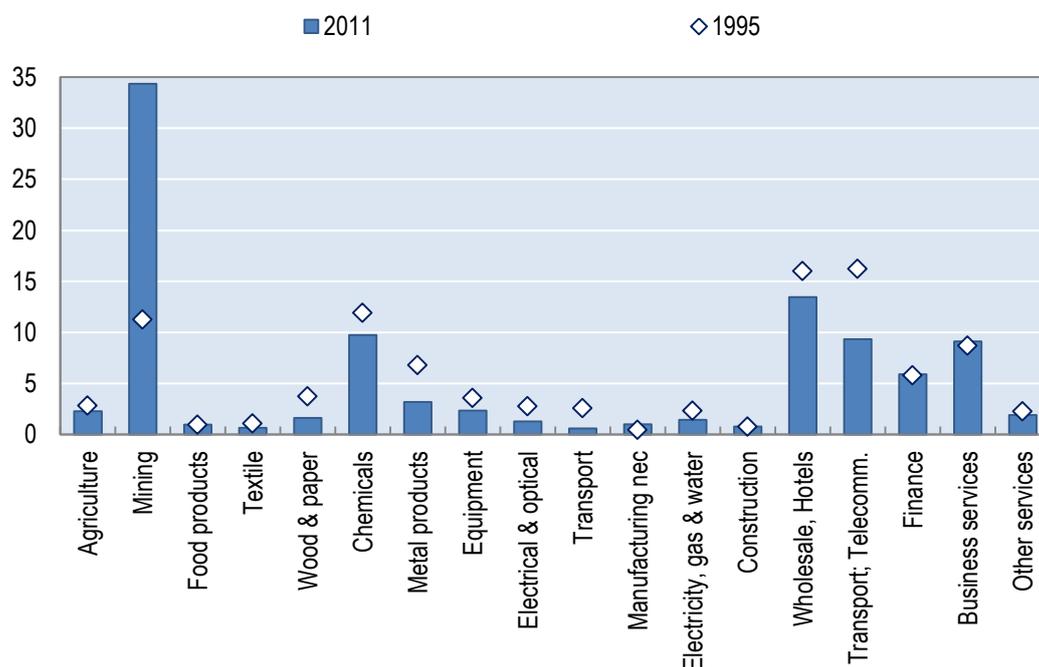
Source: Authors' calculations based on OECD-WTO TiVA database.

## 2.6. Mining clusters and upgrading in copper

The sectoral composition of value added in Chile's imports shows that mining imports are the single most important source of foreign value added. In 2011, they accounting for almost 35% of Chile's imports, up from only 11% in 1995. The sharp increase in the importance of foreign mining imports since 1995 can at least partly be explained by price changes. Part of these imports is for domestic consumption while an important share is re-exported as value added imbedded in Chilean export products.

However, imported services are also relatively important for Chile. Around 40% of imports represent value added from foreign services. A substantial share of this service value added is imported imbedded in manufactured products. Among imported services, value added from foreign wholesale/retail trade and hotel services is most prominent, accounting for roughly 13.5% of Chile's imports. However, the share of services in Chile's imports has been declining since 1995. Value added from foreign manufacturing is the least important component of Chile's imports. Biggest contributor within this group is the sector of foreign chemicals and non-metallic minerals products.

Figure 2.19. Composition of Chile's imports by foreign supplying sector

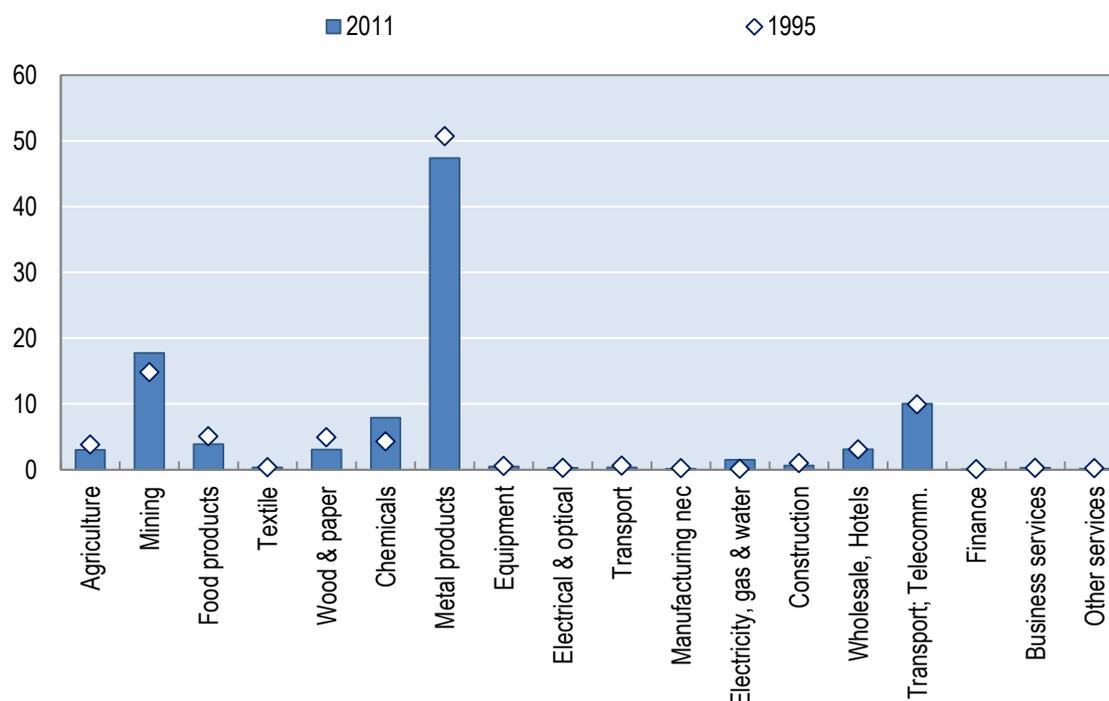


Source: Authors' calculations based on OECD-WTO TiVA database.

The following analysis describes how value added from foreign mining is used for Chilean exports. Importantly, this pattern has remained relatively constant between 1995 and 2011. Around 50% of mining re-exports are imbedded in exports of Chilean metal products. This is clearly due to the high importance of foreign energy sources in the copper smelting process. Value added from foreign mining is also used in Chile's mining sector and in the exports of transportation services.

However, the biggest growth in the usage of foreign value added from mining occurred in Chile's chemicals sector. In 1995 this sector only used 4.3% of the total important mining value added. Until 2011 this value has almost doubled so that Chile's mining sector re-exports 7.9% of the total imported mining value added.

Figure 2.20. Chile's re-exports of foreign mining value added by sector

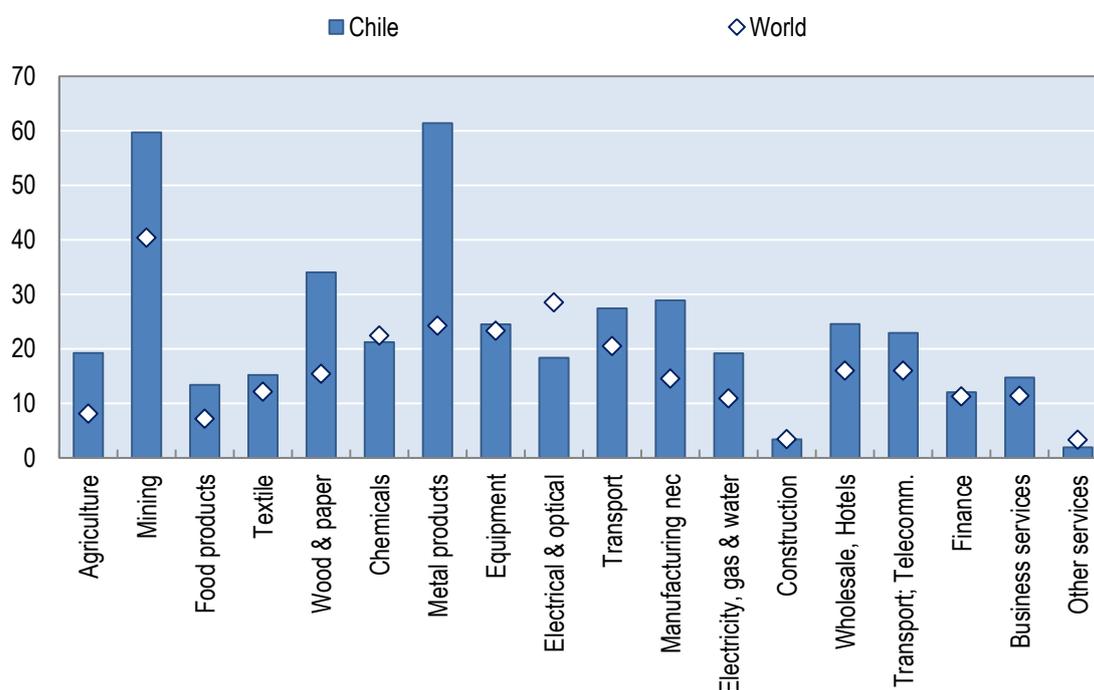


Source: Authors' calculations based on OECD-WTO TiVA database.

In order to compare Chile's value chains with other countries', we calculate the ratio of exported value added (for other countries' exports or for their final demand) relative to total domestic value added in a sector. This indicator is related to sector-level export intensity, defined as exports of a particular sector divided by output in this sector. Whereas such sector-level export intensity counts the value of exports and output in the sector where final processing takes place, the ratio of exported value added relative to domestic value added contributes each bit of value added to the sector where it actually originates from. In most industries Chile performs similar to the world average. This implies that deviations from this pattern cannot be caused by aggregate factors, such as aggregate trade costs, but by structural characteristics of a sector.

The deviation of this measure from the world average constitutes an indicator of revealed comparative advantage. Chile exports a high share of value added in a sector because other countries prefer to import a product from Chile instead of producing it themselves. This is the case especially for exports of value added from the mining sector and the metals sector, but also for agriculture, the wood and paper industry, and other manufacturing products. On the other hand, Chile seems to be uncompetitive in the manufacturing of electrical and optical equipment.

**Figure 2.21. Exported value added relative to domestic value added**

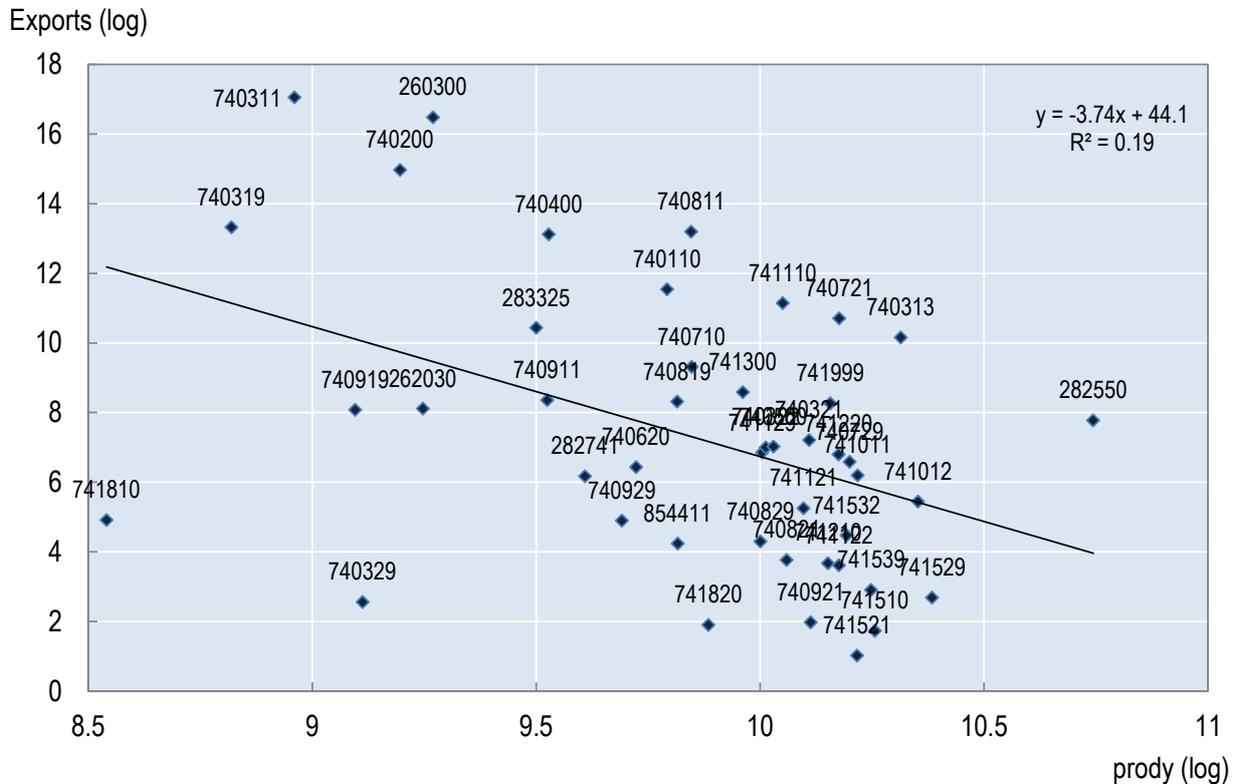


Source: Authors' calculations based on OECD-WTO TiVA database.

While this measure of revealed comparative advantage is an indicator of the current situation, it tells us relatively little about the potential for export driven economic growth in a particular sector. For this purpose we analyse the product-level exports of Chile in a sector where Chile has its largest comparative advantage: copper. Recent evidence suggests that economic growth of countries is correlated with an upgrading of exports in the product space by changing the product-level composition of exports and integrating new products into a country's export basket. Upgrading in this context means a growing weighted average of product-level sophistication in a country's exports. According to this approach, all products are characterised by a particular level of sophistication. This degree of sophistication can be measured as a weighted average of the GDP per capita of all countries exporting this product. The weight of each country's GDP per capita in the sophistication level of a particular product is proportional to the share of this product in the country's total exports. Consequently, if a product is only exported by one country, this products sophistication level is equal to the country's GDP per capita. If a product is exported by two countries, accounting for 1% of the first countries exports and 9% of the second countries exports, the products sophistication level is a weighted average of the two countries' GDP per capita, where the first country has a weight of 0.1 while the second country has a weight of 0.9 (Hausmann et al., 2007).

In order to analyse Chile's potential to upgrade to higher value activities on the copper value chain we calculate these product sophistication indicators for all products containing copper. A list of these measures for all products with their respective HS6 code is reported in the appendix. Chile should potentially be able to export all these products after adequate investment in capital and skills. It turns out that the product sophistication indicators are negatively correlated with Chile's product-level export volumes. This implies that Chile exports high volumes of less sophisticated copper products and low volumes of more sophisticated copper products.

Figure 2.22. Product sophistication and export value



Source: Authors' calculations based on CEPII's BACI database.

Interestingly, other Latin American countries seem to be more capable for exports of these sophisticated copper products. Both, Brazil and Peru, export on average higher volumes of the products characterised by a prody index of more than 10. While Peru is an important source of raw copper itself (3<sup>rd</sup> after Chile and China in 2014), Brazil seems to have specialised in the stages of copper processing. Importantly, most of the copper processed from Brazil originates from Chile. Between 2006 and 2013, Chile exported copper ores and concentrates (HS 260300) valued at roughly USD 800 million to Brazil each year, while annual exports of copper cathodes (HS 740311) were at USD 1.3 billion. Brazilian imports of copper from Peru are much lower; the two products combined averaging at slightly more than USD 400 million each year since 2006.

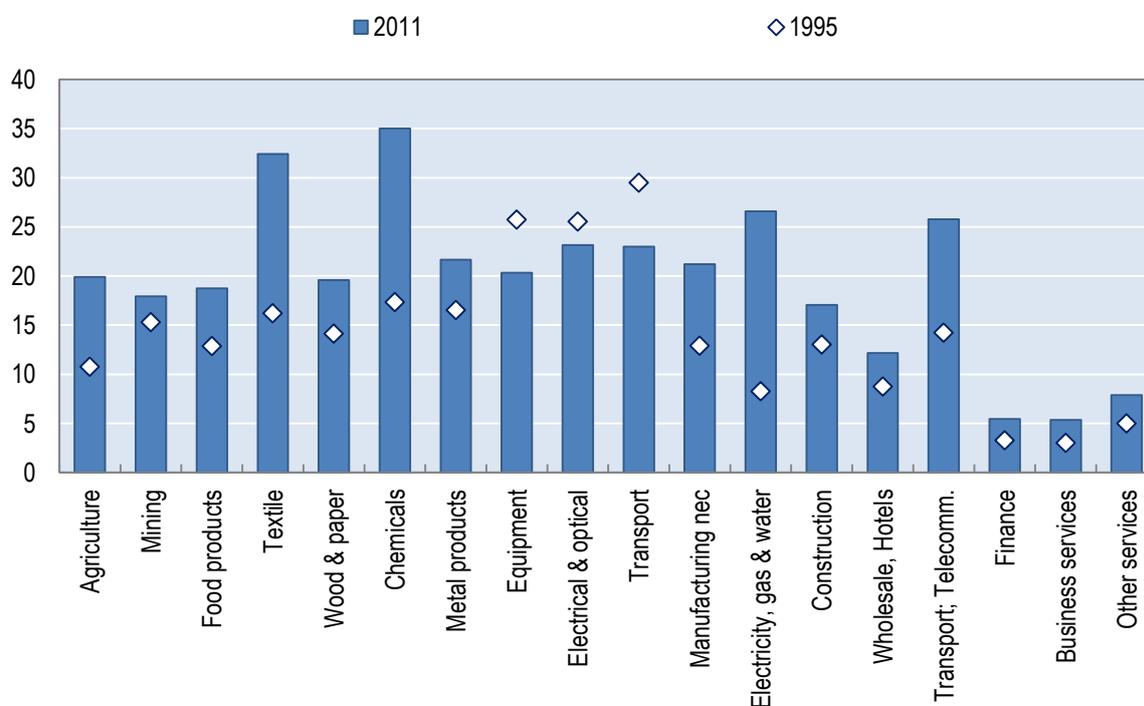
## 2.7. Beyond mining – Chile's manufacturing sector

A further measure of backward integration is the share of foreign value added in each sector's exports. Comparing levels across sectors shows that some manufacturing sectors use a substantially higher share of foreign value added for exports than primary sectors do. In the chemicals and non-metallic minerals sector foreign value added accounts for 35% of exports and in the textile sector foreign value added accounts for 32.4% of exports. Service sectors generally have very low backward linkages, with the exception of transport services (25.8% foreign value added in exports).

In general, foreign value added has become more important between 1995 and 2011 for exports in most sectors. There are only three exceptions to this trend: machinery and other equipment,

electrical/optical equipment, and transport equipment. While these sectors had the highest share of foreign value added in their exports in 1995, their backward linkages were just about average in 2011.

**Figure 2.23. Sector-level backward participation by using sector**



Source: Authors' calculations based on OECD-WTO TiVA database.

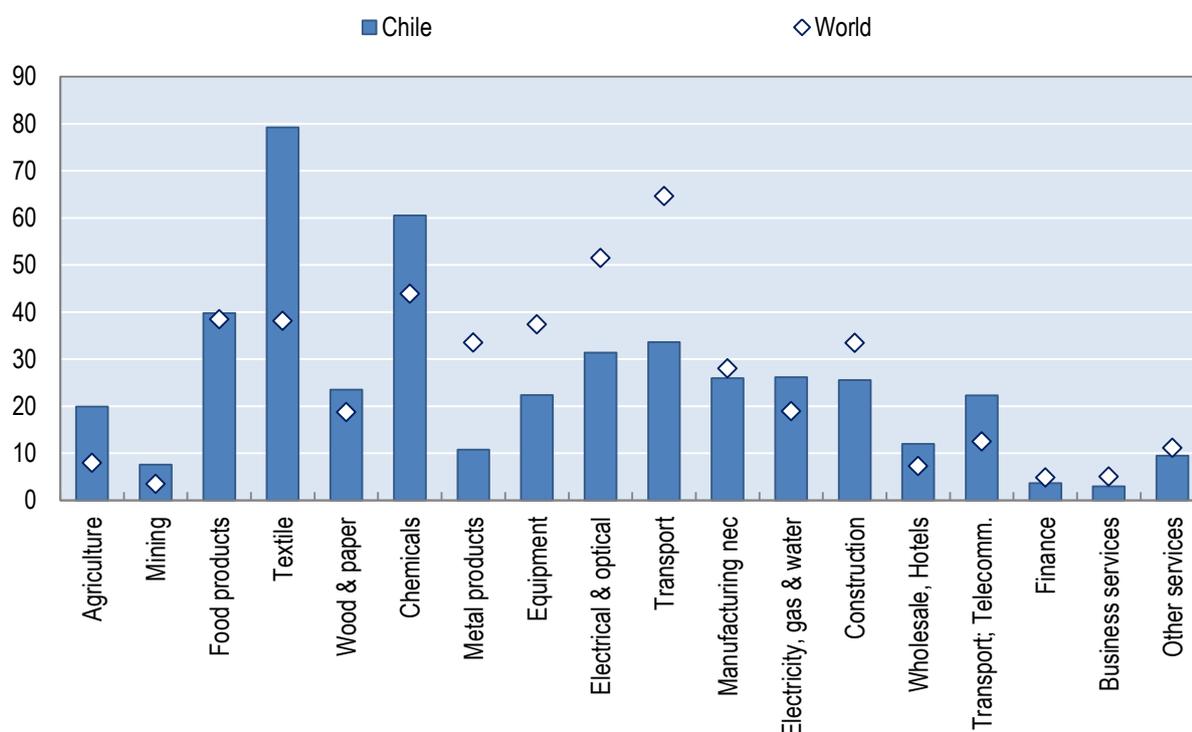
Does the rising importance of imported intermediate inputs mean that Chile benefits less from its exports than in 1995? The answer could be affirmative, since a rising importance of imported value added in exports means that a smaller share of export revenue can be distributed to domestic workers and capital owners. However, it is well known that the use of foreign intermediate inputs affects a country's export performance by increasing competitiveness on global markets. If a growing share of foreign value added in exports leads to a higher aggregate export volume, exports of domestic value added might actually increase.

This seems to have been the case in Chile between 1995 and 2011. It can be shown by looking at the growth rates of sector-level backward linkages and the growth rates of the domestic value added embodied in exports of each sector between 1995 and 2011. The analysis shows that in sectors and time periods in which backward linkages became more important, the domestic value added embodied in Chile's exports was growing more than in sectors in which backward linkages became less important. In other words, a high growth rate of backward linkages usually coincides with a high growth rate of exported domestic value added which implies that domestic workers and capital owners benefit from a growing importance of imported intermediate inputs in their sector.<sup>3</sup> This analysis shows that competitiveness on global markets can be increased by using a higher share of foreign intermediate inputs. In order to identify particular sectors where an intensified use of foreign value added could be especially beneficial for Chile, the rest of this section will be dedicated to a comparison of Chile and the rest of the world with respect to the relative importance of foreign and domestic value added in production and exports.

<sup>3</sup> A complete list of the sector names and labels used in the TiVA database can be found in the Annex.



Figure 2.25. Imported value added relative to domestic value added

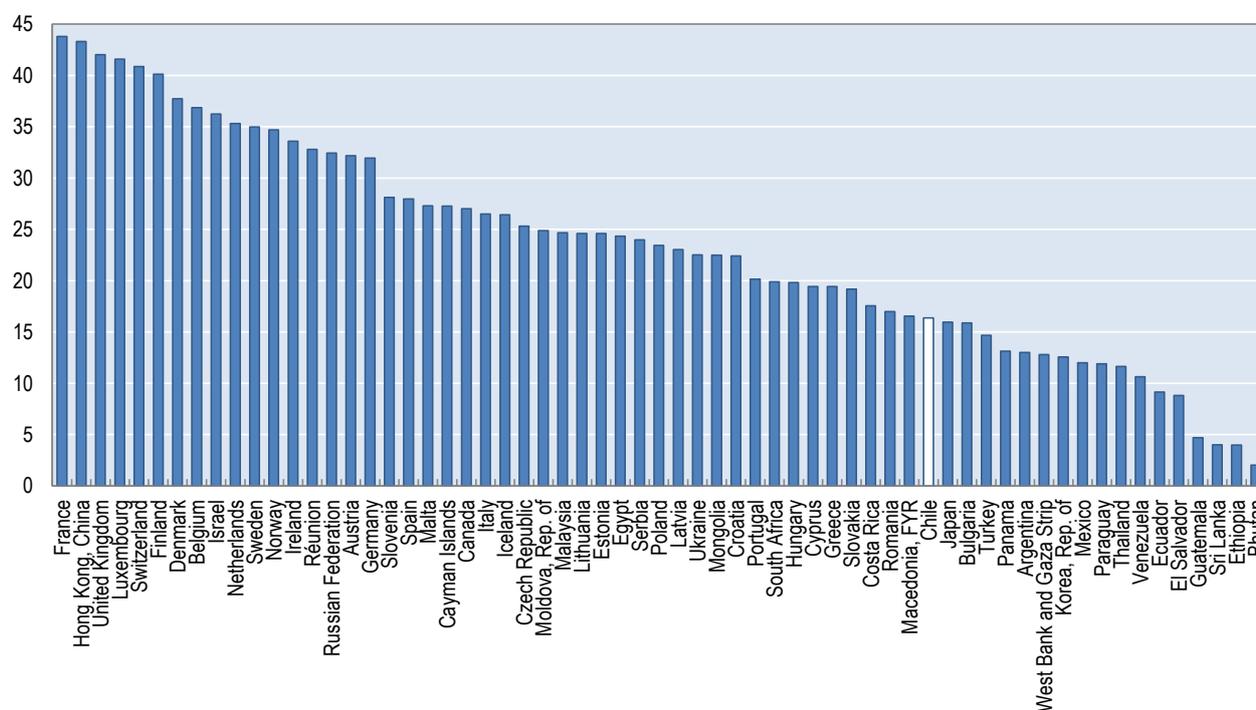


Source: Authors' calculations based on OECD-WTO TiVA database.

In addition to an increase in the share of foreign intermediate inputs, growth and export competitiveness of the manufacturing sector in Chile could also be enhanced by a skill upgrading of the workforce in manufacturing. Data from the International Labour Organization (ILO) shows that the share of professional workers in Chile is relatively low in the sample of countries for which data is available.<sup>4</sup> Even though the correlation is not perfect, a higher share of professional workers in manufacturing is clearly positively correlated with economic development of a country. There are only few exceptions of advanced economies with a low share of professional workers, such as Japan or Korea, while most developed countries are characterised by a high share of professional workers in their manufacturing sectors.

<sup>4</sup> All the countries included in the ILO database are included in Figure 2.26.

Figure 2.26. Share of professional workers in manufacturing<sup>5</sup>

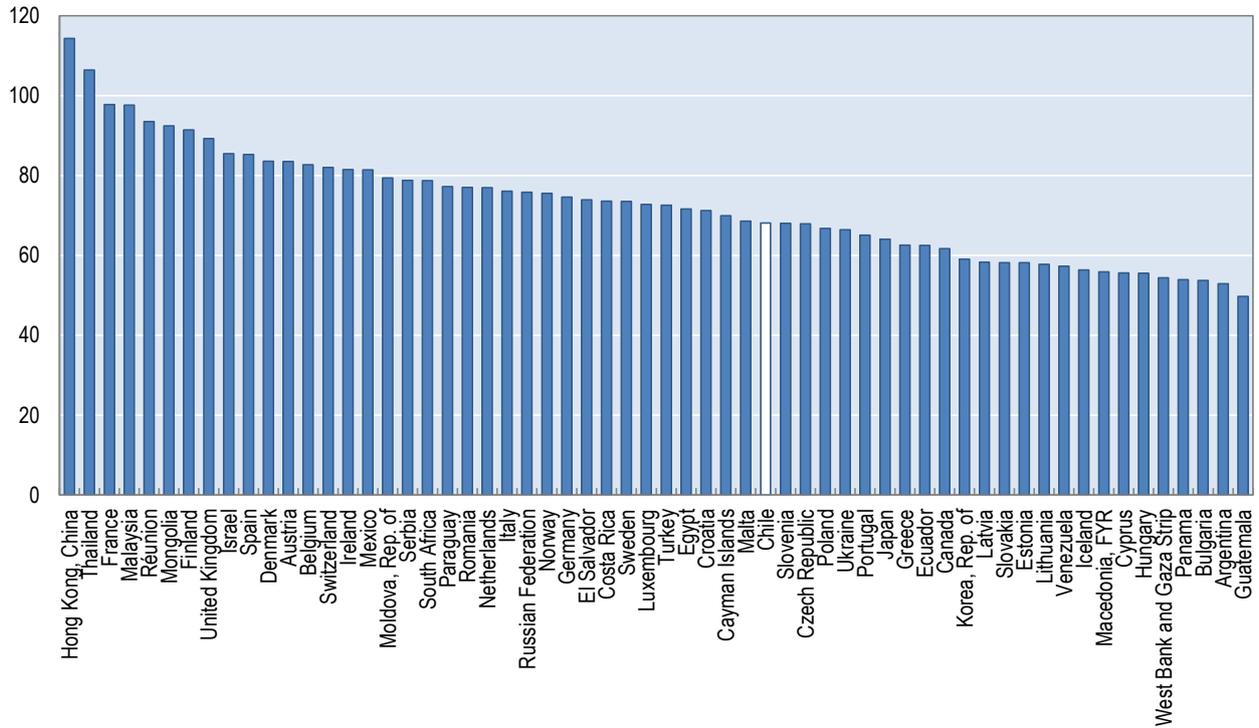


Source: Authors' calculations based on data from ILO.

However, differences in this measure could also be due to differences in the classification of professional education in different countries. Therefore, we normalise the share of professional workers in manufacturing by the share of professional workers in the entire workforce. This measure shows that rapidly growing countries such as Hong Kong China, Thailand, and Malaysia are characterised by very high levels of professional workers in their respective manufacturing sectors, relative to the availability of professional workers in the total workforce. Also in most industrialised countries in Europe, such as France, Finland, United Kingdom, Spain, Denmark, Austria, Belgium, Switzerland, and Ireland there exists a high importance of professional education for workers in the manufacturing sector. While the normalised share of professional workers in manufacturing in Chile is higher than in other South American countries, such as Ecuador, Venezuela, and Argentina, it is lower than in developing countries that managed to establish a successful manufacturing sector which is connected to GVCs such as Costa Rica.

<sup>5</sup> Footnote by Turkey: The information in this document with reference to “Cyprus” relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognizes the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of United Nations, Turkey shall preserve its position concerning the “Cyprus” issue. Footnote by all the European Union Member States of the OECD and the European Union: The Republic of Cyprus is recognized by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

Figure 2.27. Normalised share of professional workers in manufacturing



Source: Authors' calculations based on data from ILO.

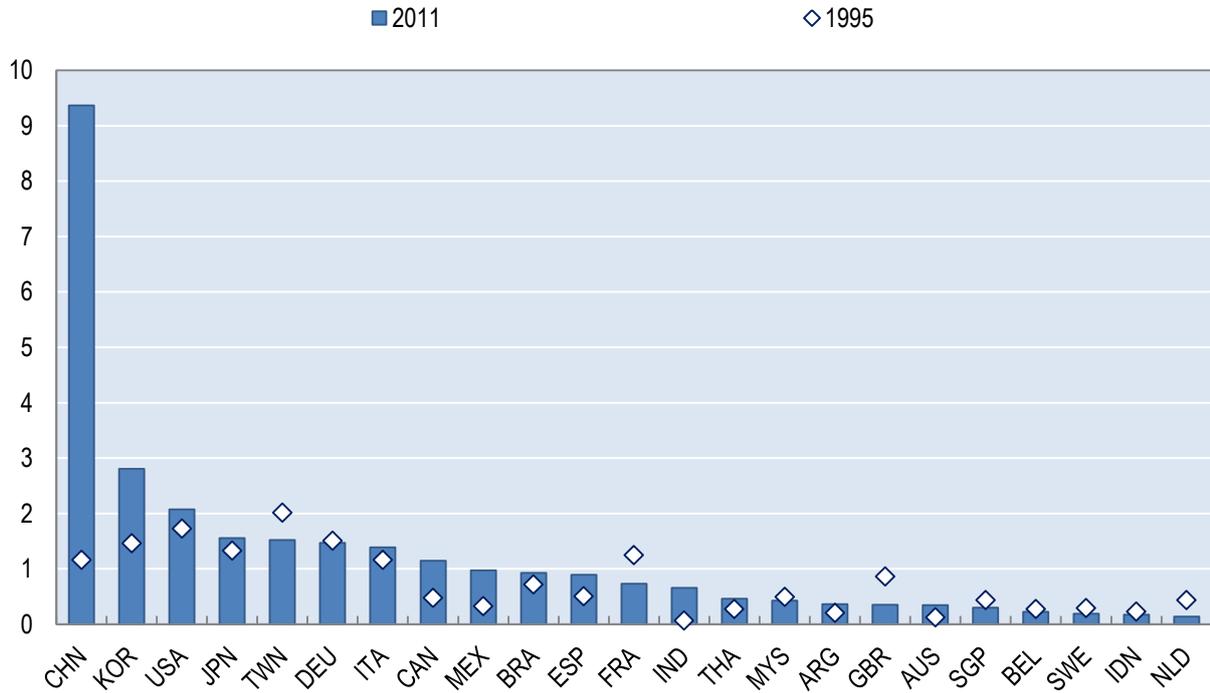
## 2.8. The importance of regional value chains

Regional trade is of little importance relative to global trade in South America. For example, European countries trade three times more with their neighbours than South American countries do (OECD, 2013d). Moreover, intra-regional GVC linkages are roughly three times more important in South East and East Asia than in Latin America (OECD, 2015e). In this respect, Chile's trade flows and GVC participation patterns do not differ substantially from those of its South American neighbours.

The most important partner country for Chile's forward participation in GVCs is China. In 2011, the value of Chilean value added which is re-exported from China to other countries corresponds to 9.4% of aggregate Chilean exports. In other words, around 30% of Chilean value added embodied in its exports and used in third countries' exports comes from Chinese exports. This dominance is a relatively new phenomenon, which is due to rapid growth of China's GDP and trade in the last two decades. In 1995, China was of hardly any importance for Chile's forward linkages.

Other countries that became more important for Chile's forward linkages are Korea, Canada, Mexico, and India, whereas Chinese Taipei, France, Great Britain, and the Netherlands lost importance. As mentioned above, other South American countries are of relatively little importance for Chile's forward linkages. Brazil, the biggest South American economy, contributes less to Chile's forward linkages than much smaller and more distant economies, such as Korea and Chinese Taipei.

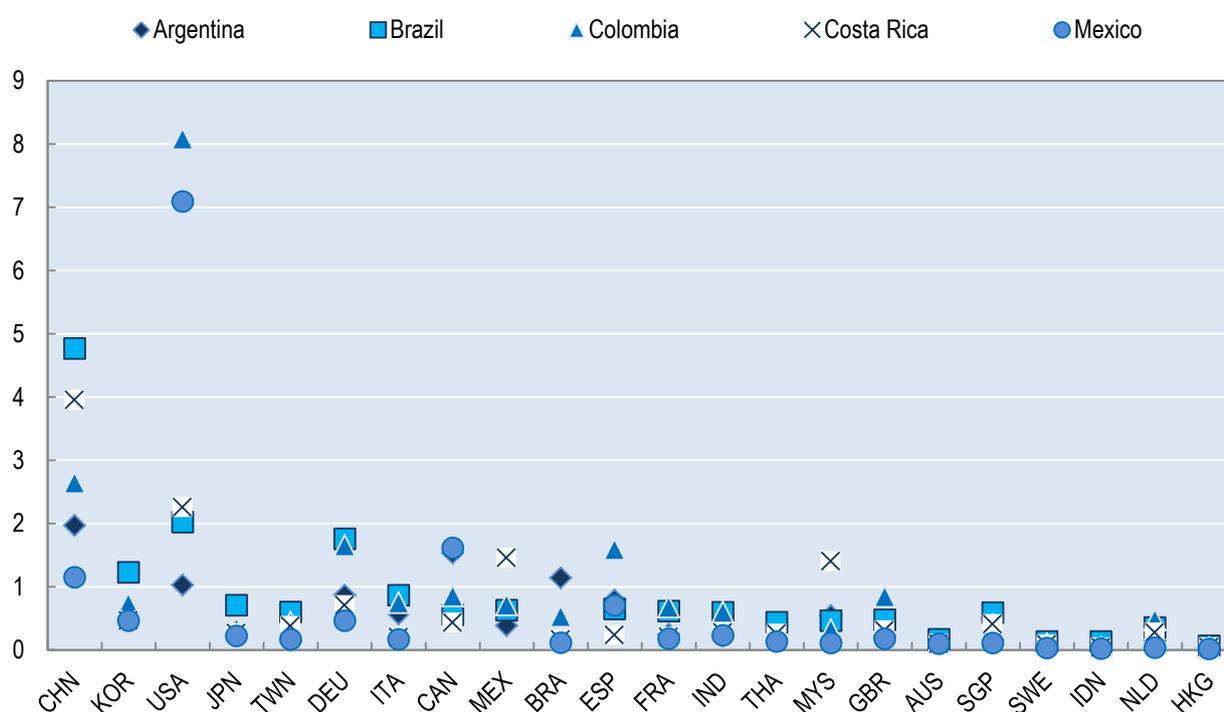
Figure 2.28. Most important countries for Chile's forward linkages



Source: Authors' calculations based on OECD-WTO TiVA database.

China also is the biggest contributor to forward participation of three other Latin American countries in the OECD TiVA database, Brazil, Costa Rica, and Argentina, while for Colombia and Mexico the United States represent the most important forward linkages. Korea is of intermediate importance for all five countries, but not nearly as important as for Chile. The same is true for Japan and Chinese Taipei. Germany is a relatively important market with respect to forward participation for Brazil and Costa Rica. Due to its location in North America, Mexico has a very high level of forward linkages with Canada. Brazil is very important for Argentina but, surprisingly, not so much for Colombia. However, there seem to exist strong ties between Colombia and Spain. Costa Rica has high levels of forward participation with Malaysia, which is only of intermediate importance for all other countries.

**Figure 2.29. Most important countries for forward linkages of Latin American countries**



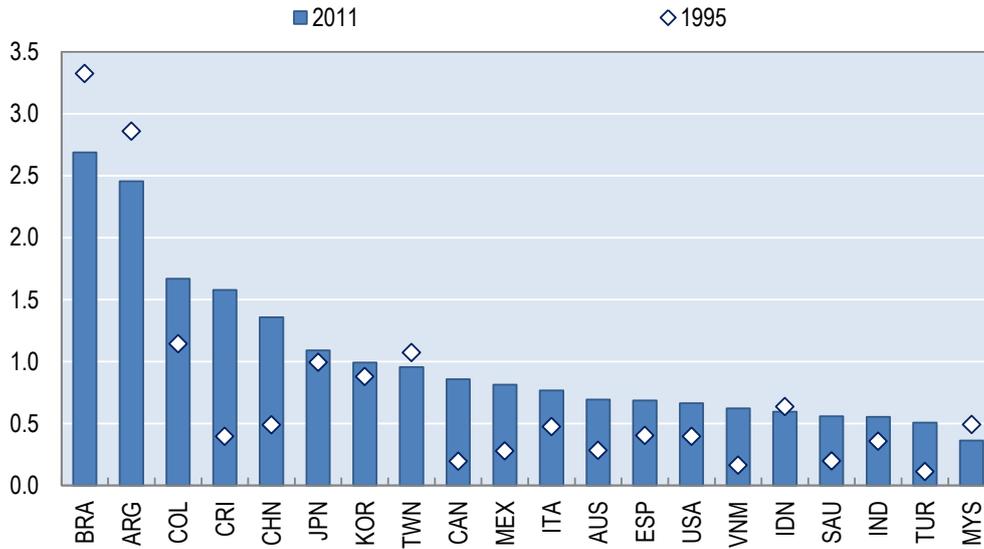
Source: Authors' calculations based on OECD-WTO TiVA database.

Next, we want to know about the reasons for the low importance of South American partners for Chile. In particular, we want to know where this pattern is due to the relatively small economic size (measured by GDP) of South American countries, relative to economic giants such as China and the United States. Moreover, we account for the role that a lower degree of GVC participation in the partner countries plays for these results. We do this by dividing the value Chile's value added in a country's exports by aggregate foreign value added in this country's exports. This is equivalent to measuring Chile's share in all partner countries' backward linkages.

As expected, geographical proximity does now play a much more important role. It means that low levels of value added trade within Latin America are at least partly due to a generally low participation in GVCs of important Latin American countries. Chile's forward linkages are most important for Brazil and Argentina, where Chilean value added accounts for 2.7 and 2.5%, respectively, of total foreign value added in exports. However, Brazil and Argentina use relatively little foreign value added for their exports, so that absolute levels of trade in value added are low.

Moreover, both Brazil and Argentina have increasingly turned to other sources of value added for their exports. This stands in sharp contrast to the global trend of a rising contribution of Chilean value added to exports in almost all countries. This is partly due to the fact that there seems to be a standstill in trade liberalisation between Chile, Brazil, and Argentina, while Chile proceeded with relatively rapid and ambitious liberalisation agreements with many other countries.

**Figure 2.30. Countries with the highest importance of Chile's forward linkages for their backward linkages**

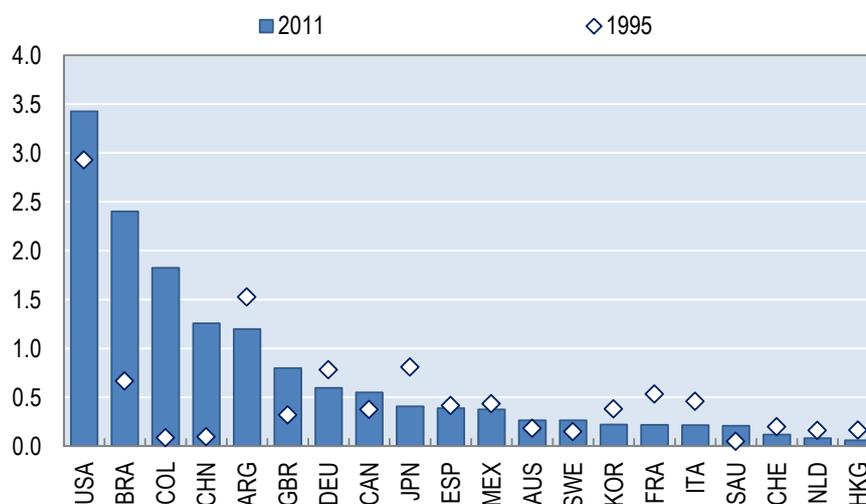


Source: Authors' calculations based on OECD-WTO TiVA database.

Since Chile's backward participation is somewhat lower than its forward participation in GVCs, the contribution of individual countries is lower as well. The biggest contributor of value added to Chile's exports are the United States (3.4% of Chile's exports in 2011), which account for roughly 17% of Chile's backward participation and managed to increase their supply of value added for Chile's exports since 1995. However, growth rates of Chile's backward linkages with Brazil, Colombia, and China are substantially higher, so that these countries will most likely become more important than the United States relatively soon if they continue growing at the current pace. Some other countries, such as Argentina, Germany, and Japan became less important sources of value added for Chile's exports since 1995.

For Chile's backward linkages, regional value chains seem to be more important than for its forward linkages. Brazil, Colombia and Argentina all contribute value added to Chile's exports. In 2011, Brazilian value added accounts for roughly 2.4% of Chile's exports, rising from 0.7% in 1995. Colombian value added in Chile's exports is 1.8% in 2011, up from only 0.1% in 1995. Argentina still contributes 1.2% of value added to Chile's exports, down from 1.5% in 1995. However, the importance of regional value added in Chile's backward linkages is still much lower than the importance of regional value chains for European or South East Asian economies.

**Figure 2.31. Most important countries for Chile's backward linkages**

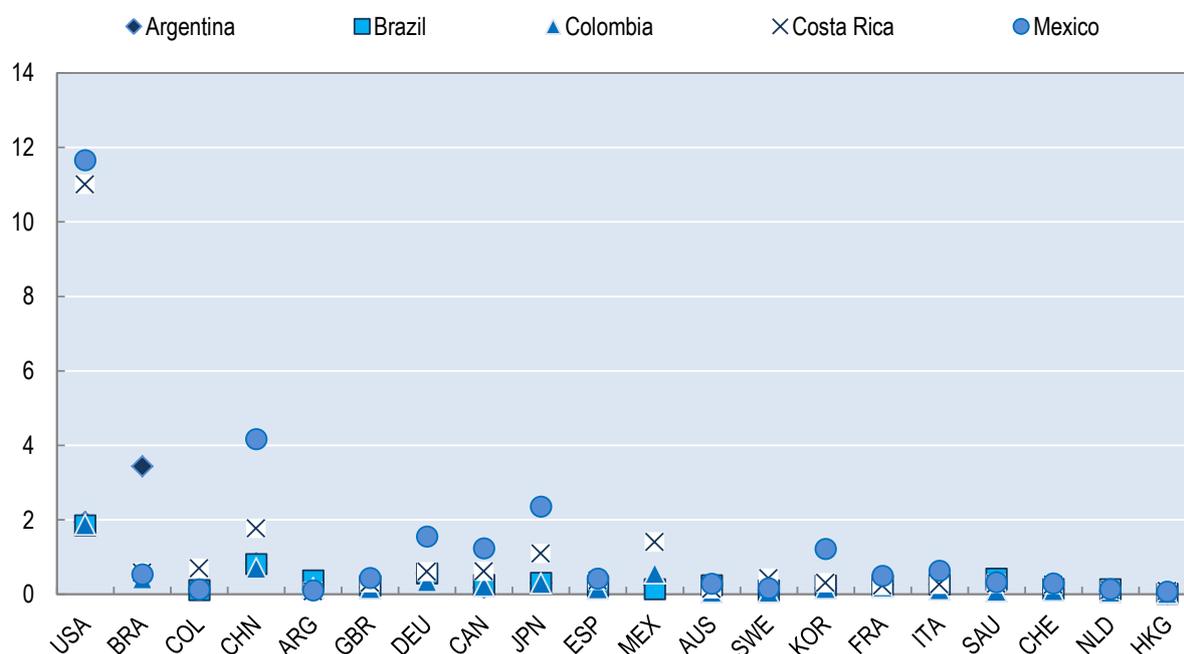


Source: Authors' calculations based on OECD-WTO TiVA database.

The United States also are an important source of intermediate inputs for exports of other Latin American countries, especially for Costa Rica and Mexico. Nearly 12% of these countries exports are value added which was created in the United States. In contrast, the importance of value added from the United States for exports of Argentina, Brazil, and Colombia is at around 2%. Argentina is the only country, which does not have the United States as most important source of value added for exports. Instead, most of the imported value added for exports comes from Brazil. However, for Colombia, Costa Rica, and Mexico, value added from Brazil is substantially less important than for Chile.

Colombia, Argentina, and Great Britain are important sources of value added for Chile's exports, but to a much smaller degree for exports in other Latin American countries. Mexico relies substantially on value added from China, whereas the contribution of China to exports in all other countries is similar to its contribution to exports in Chile. In general, Mexico and Costa Rica rely more on imports from developed economies, such as the United States, Germany, Canada, Japan, or Korea than Chile does.

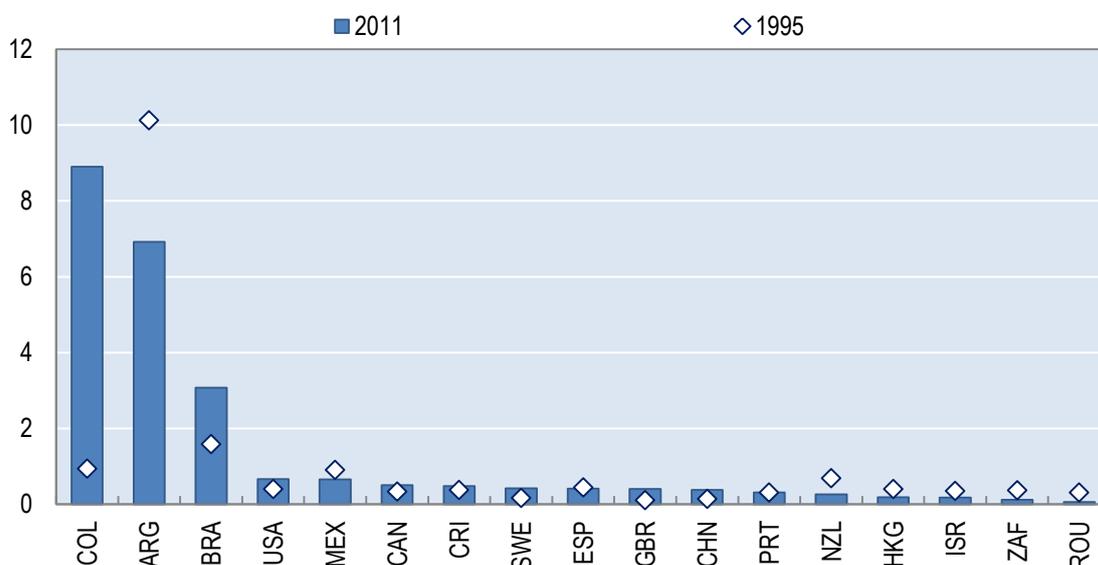
**Figure 2.32. Most important countries for backward linkages of Latin American countries**



Source: Authors' calculations based on OECD-WTO TiVA database.

Again, we want to analyse whether the fact that the United States are still the most important source of foreign value added for Chile's exports is due to a relatively smaller GDP and low aggregate levels of GVC participation in Latin America or due to a pattern of GVC linkages that favours inter-regional connections. In this case, this can be done by dividing bilateral backward linkages by the partners' total forward linkages. Again, it turns out that low GDP and low aggregate forward participation of Latin American countries plays a crucial role. For example, almost 9% of the value added that Colombia provides for third countries' exports is value added provided for Chilean exports. Almost 7% of Argentinian value added for third countries' exports is value added in Chilean exports. And 3% of Brazilian value added for other countries exports is value added in Chilean exports. However, again it is striking that the importance of Chile as a user of value added from Argentina has substantially decreased since 2009.

**Figure 2.33. Countries with the biggest importance of Chile's backward linkages for their forward linkages**



Source: Authors' calculations based on OECD-WTO TiVA database.

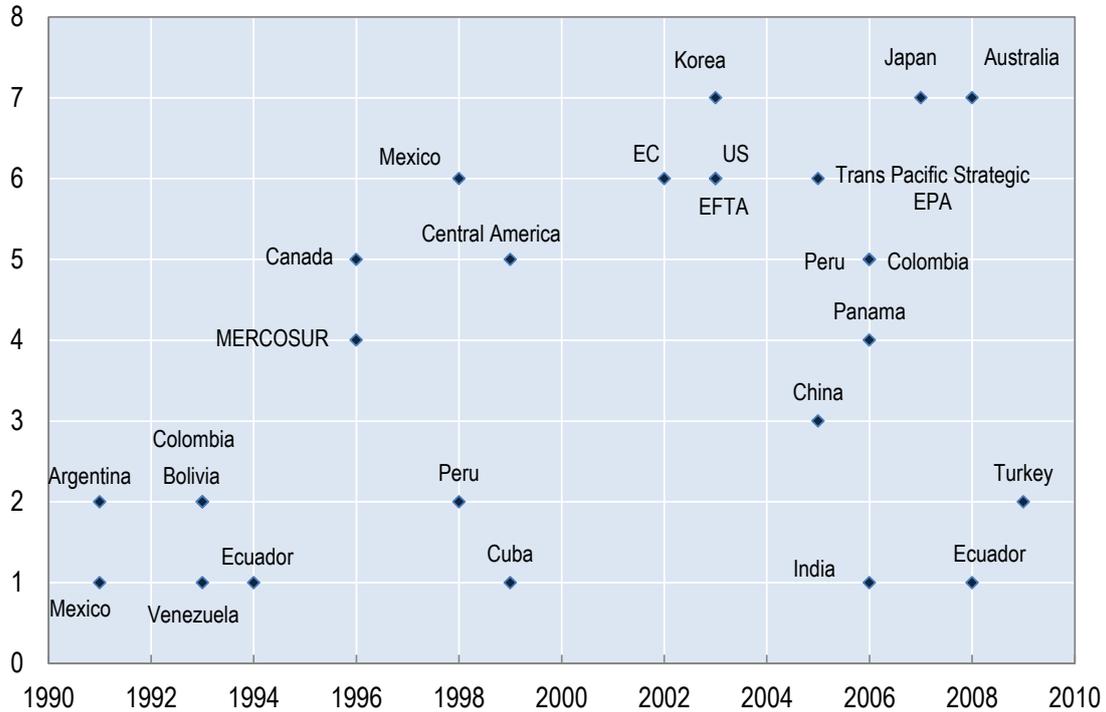
These indicators presented on the previous pages show that regional partners are not of major importance for Chile's participation in GVCs. And that part of this low importance is due to the fact that Chile's South American neighbours are not very active in GVCs themselves. However, this is not the entire picture. Another important reason for the low share of regional trade in value added in Latin America can be traced back to the pattern of preferential trade agreements. These trade agreements generally raise trade flows between involved partners. Moreover, Chile has a high number of preferential trade agreements currently in place.

However, free trade agreements with different partners may be substantially different. A new measure on the heterogeneity of free trade agreements has recently been introduced (Dür et al., 2014). It quantifies the depth of more than 600 agreements, assigning a level from 0 to 7 to each of them. The respective value indicates whether the agreement contains a substantive provision in seven key areas. These areas are services trade, investment protection, technical barriers to trade (TBT) and/or sanitary and phytosanitary (SPS) measures, public procurement, competition, and intellectual property rights.<sup>6</sup>

There is a general trend that trade agreements are characterised by deeper integration over time, covering a higher number of issues. This trend can also be observed for Chile. However, one further phenomenon can be observed. Chile's trade agreements with developed countries are substantially deeper than Chile's trade agreements with emerging economies. For example, Chile's agreements with Korea, Japan and Australia are classified with the highest level of seven. Recent agreements with the European Union and the countries of the European free trade area still reach a level of six. Other recent agreements, such as those with India and Turkey are characterised by very low levels of less than two. Moreover, Chile's agreements with South American countries, such as the MERCOSUR, as well as agreements with Peru, Colombia, and Ecuador only imply relatively shallow trade integration. Consequently, the relatively less ambitious trade agreements of Chile with other South American countries are one further explanation for the relatively low importance of South American value chains for Chile.

<sup>6</sup> Velasco and Wager (2014) also highlight the importance of foreign public procurement in order to generate export opportunities for Chilean firms.

**Figure 2.34. Depth of Chile's trade agreements**



*Note:* The values indicates whether the agreement contains substantive provisions in one or more of the seven key areas: services trade, investment protection, technical barriers to trade (TBT) and/or sanitary and phytosanitary (SPS) measures, public procurement, competition, and intellectual property rights (the value of 1 if only one area covered, 7 of all areas covered).

*Source:* DESTA database (Dür et al., 2014).

## 2.9. Recommendations and policy implications

Chile’s economy is highly integrated with the rest of the world via trade of goods and services. Its policy strategy of opening up to trade has brought the country huge benefits. Nevertheless, several challenges for Chile have been identified in this chapter.

Copper contributes to roughly half of Chile’s exports. In particular, Chile exports relatively unprocessed copper products, such as copper ore, concentrates, and copper cathodes. This specialisation in relatively homogeneous products makes the country dependent on the evolution of world copper prices. There are several obstacles to a diversification of the copper export basket to include more refined products, not all of which are easy to overcome. On the one hand, there are some limitations in natural resources which are required for the processing of copper. Even though water is abundantly available in most parts of Chile, water scarcity is a problem in Northern regions where the largest copper deposits are located. However, water is crucial to physically separate copper ore from gangue via froth flotation. Moreover, Chile is also struggling with ensuring low and stable energy costs which currently already account for 14% of total production cost in Chile’s copper industry (CSIRO Futures, 2014). While Southern Chile recently has started to make use of hydropower energy, no sufficient high-capacity grid is available in order to transport electrical energy to the North.

On the other hand, some of the reasons for Chile’s concentration on the early stages of copper production are related to the institutional setup of copper mining in Chile. The largest copper company in Chile is the state-owned enterprise CODELCO, which accounts for more than 30% of Chile’s copper production. The company is in charge of copper mining and commercialisation in order to maximise

profits which go directly into the national budget. While this source of income is crucial for public spending in Chile, it is unclear whether a one-dimensional focus on transfers into the national budget is actually most beneficial for the Chilean economy.

Such an analysis of the benefits from copper production should not only be based on current productivity levels, cost structure, and market prices, but should also take dynamic learning processes and future trends into account. Moreover, it is pivotal to carefully consider the social and environmental effects in areas such as water consumption, emissions, biodiversity and waste disposal.

An additional aspect of diversification of exports in Chile's copper industry is the direct export of services related to mining. While these exports do already take place, their volume is tiny relative to the high value of exported copper and only a very small proportion of the 6 000 mining companies in Chile export their services. The World Class Suppliers Programme (Programa de Proveedores de Clase Mundial) aims to increase the number of mining services exporters to 250 by 2035. The main aspect of the program is the collaboration between mining companies, public research centres and universities with the target to overcome particular technological challenges. Importantly, these challenges are defined by mining companies that would like to contract specialised services from external suppliers. It is key for the success of this programme that these mining companies are indeed able to correctly identify technological challenges which constitute profitable investment opportunities in order to guarantee an efficient allocation of resources. Measures have to be introduced to guarantee that co-funding from public resources in universities or research centres does complement, but not substitute, private investment.

Moreover, Chile's copper exports are very concentrated with respect to trade partners, with most copper exports going to Asian countries, especially China. The prospect of economic slowdown in China thus creates a substantial threat for Chile's export performance. In the past it has been a profitable strategy to focus on China as the main destination for copper exports. However, continuous growth in China cannot be taken for granted. Nevertheless, given its population size and rapid urbanisation, it is very likely that China will continue to be a huge importer of copper in the future.

Substantial effort is currently already being undertaken in Chile that aims at a broadening of the export basket, for example using strategic programs by the Production Development Corporation (CORFO). These programs aim to resolve coordination failures originating from transaction costs, asymmetric information, or economies of scale in order to benefit from underlying comparative advantages. Very often, these coordination failures crystallise as a lack of technological infrastructure, a lack of human capital or a lack of scientific know-how, which can be ameliorated by public contributions to research centres and public technological institutes.

In addition, there exist so called 'activating platforms' ('plataformas habilitantes') which are supposed to increase output and productivity across several sectors. These activating platforms have been identified as logistics, energy and water, intelligent industries, and advanced manufacturing. On a national level, these activating platforms are especially relevant for seven key sectors of the Chilean economy. Even though mining is one of these sectors, a balanced programme from which all sectors can benefit equally should increase diversification of Chilean exports. The other six sectors, which have been identified as especially promising for Chile by CORFO are sustainable tourism, agriculture and food industry, construction, creative economy (e.g. design industry), sustainable fisheries and aquaculture, and advanced manufacturing (e.g. metallurgy).

However, heterogeneity across regions is substantial: While fishing is more relevant in the South of Chile, fruit farming is important in the central regions. Tourism is important all over Chile, although with a slight dominance in the South. While the South has potential for hydropower energy production, solar energy can become increasingly important in the North.

Chile's exports are almost entirely covered by preferential trade agreements. While additional trade agreements may seem irrelevant in this situation, this has to be seen in light of a high and growing concentration of exports on the partner country dimension. Further extending, and deepening, Chile's set of trade agreements could lead to more diversification of exports in this dimension, reducing the dependence on potentially volatile demand from individual countries, such as China.

In particular, we propose the following measures:

1. To continue and intensify programs that foster exports in mining-related services. In particular, this refers to the World Class Mining Suppliers Programme, as outlined above. Particular attention must be paid to an efficient allocation of public resources to ensure that public spending complements private investment rather than being substitute for it.
2. To further analyse the potential for an upgrading of Chile's copper exports. This requires a growing manufacturing sector for processing of raw copper so that the share of relatively sophisticated copper products in Chile's total copper exports is raised. One on the hand, a sophisticated copper industry would be able to produce customised copper products for foreign customers, which would give Chilean producers a certain degree of market power in order to reduce the vulnerability with respect to exogenous price fluctuations on the world market. On the other hand, this would allow Chile to diversify its copper exports in terms of partner countries by reducing the dependency on copper processing plants in China and Japan.
3. To reduce the degree of concentration in Chile's exports by increasing exports in sectors other than mining. These sectors should be identified based on the systematic analysis of a set of pre-determined criteria. Amongst others, these criteria should be based on:
  - a. Natural resources which provide a natural comparative advantage in sectors such as agriculture or tourism.
  - b. Productive knowledge that is available in the country or can be acquired relatively easy via technological diffusion or inward FDI.
  - c. A set of skills which is available in the local workforce or can be acquired by increased education effort and continued learning.
  - d. The expected market growth for products or services in a specific sector.
  - e. A potential for increasing returns to scale in the production of a particular good or service.
  - f. The possibility of a dynamic learning process which drives up profitability.
4. To strengthen the ambition for increased regional integration via agreements that cover topics such as rules of origin, investment protection, technical barriers to trade (TBT) and/or sanitary and phytosanitary (SPS) measures, public procurement, competition, intellectual property rights, and double taxation. While positive results in the short run are most likely with a selected group of countries, such as in the Pacific Alliance, a region-wide integration in the long run should try to integrate as many partners as possible. With the Latin American Integration Association there already exists a framework, however requiring modernisation and updating in order to effectively regulate recent developments of international integration, such as trade in services, foreign direct investment, and government procurement.
5. To proceed with the strategy of bilateral trade integration, including by deepening existing agreements. Since almost all of Chile's exports are already under bilateral trade agreements, this strategy could especially contribute to reduce the concentration of Chile's exports in terms of partner countries.

## ANNEX 2.A1. FIGURES

**Figure 2.A1.1. List of copper products and product sophistication indicators**

HS6 Code	HS6 product name	PRODY
740311	Copper cathodes and sections of cathodes unwrought	4482.819
741810	Table/kitchen articles of copper, pot scourers	5119.848
740319	Refined copper products, unwrought, nes	5495.903
740200	Unrefined copper, copper anodes, electrolytic refinin	8225.664
740919	Plate, sheet, strip, refined copper, flat, t > 0.15mm	8918.985
740329	Copper alloys, unwrought (other than master alloys)	9068.148
260300	Copper ores and concentrates	9249.08
262030	Ash or residues containing mainly copper	10373.29
283325	Copper sulphates	13232.49
740911	Plate, sheet, strip, refined copper, coil, t > 0.15mm	13699.26
740400	Copper/copper alloy waste or scrap	13733.66
282741	Chloride oxides and chloride hydroxides of copper	14909.62
740929	Plate/sheet/strip, copper-zinc alloy, flat, t > 0.15m	16182.65
740620	Powders, copper, of lamellar structure and flakes	16704.42
740819	Wire of refined copper < 6mm wide	18316.25
854411	Insulated winding wire of copper	18327.95
740110	Copper mattes	18623.21
740710	Bars, rods & profiles of refined copper	18920.4
740811	Wire of refined copper > 6mm wide	19053.52
741820	Sanitary ware and parts thereof of copper	19626.96
741300	Stranded copper wire/cable/plaits/etc, uninsulated	21214.39
740829	Wire, copper alloy, except nickel/zinc alloys	22054.15
741129	Pipes or tubes, copper alloy except nickel/zinc alloy	22151.71
740322	Copper-tin base alloys, unwrought	22318.67
740500	Master alloys of copper	22734.76
741110	Pipes or tubes, refined copper	23278.76
740821	Wire, copper-zinc base alloy	23379.26
741121	Pipes or tubes, copper-zinc base alloy	24282.95
740321	Copper-zinc base alloys, unwrought	24583.81
740921	Plate/sheet/strip, copper-zinc alloy, coil,t > 0.15mm	24665.75
741210	Pipe & tube fittings, of refined copper	25631.77
741999	Articles of copper, nes	25796.97
741220	Pipe & tube fittings, of copper alloys	26258.85
741122	Pipes or tubes, copper-nickel alloys	26275.74
740721	Bars, rods & profiles of copper-zinc base alloys	26418.4
741532	Copper screws, bolts or nuts except wood screws	26725.23
740729	Bars, rods & profiles, copper alloy nes	26914.2
741521	Copper washers, including spring washers	27357.05
741011	Foil of refined copper, not backed, t < 0.15mm	27393.67
741539	Copper screw hooks and similar articles	28234.81
741510	Copper nails, tacks, drawing pins, staples etc	28462.45
740313	Billets, copper, unwrought	30348.61
741012	Foil, copper alloy, not backed, t < 0.15mm	31350.74
741529	Copper cotters/cotter pins/unthreaded hardware nes	32333.64
282550	Copper oxides and hydroxides	46466.95

**Figure 2.A1.2. List of sectors in TiVA database**

Code	Label
01T05	Agriculture, hunting, forestry and fishing
10T14	Mining and quarrying
15T16	Food products, beverages and tobacco
17T19	Textiles, textile products, leather and footwear
20T22	Wood, paper, paper products, printing and publishing
23T26	Chemicals and non-metallic mineral products
27T28	Basic metals and fabricated metal products
29	Machinery and equipment, nec
30T33	Electrical and optical equipment
34T35	Transport equipment
36T37	Manufacturing nec; recycling
40T41	Electricity, gas and water supply
45	Construction
50T55	Wholesale and retail trade; Hotels and restaurants
60T64	Transport and storage, post and telecommunication
65T67	Financial intermediation
70T74	Business services
75T95	Other services

## CHAPTER 3. INTERNATIONAL INVESTMENT

### 3.1. Introduction

International investment is one of key elements of global economic integration, and the activities of MNEs one of its important drivers. Coordinating large and complex production networks, known as GVCs, MNEs influence in important ways the global distribution of economic activity and the associated cross-border flows of trade, finance, ideas and people. Hoping to benefit from the positive effects of the MNEs presence – such as employment and income generation, access to new technologies and managerial best-practices, and increased overall productivity–governments often compete to attract foreign investors. Whether foreign investment brings the desired effects depends to large extent on the type of investment involved, the characteristics of foreign and domestic firms, and the overall regulatory environment in which they interact and compete.

Previous literature has shown the overall positive contribution of foreign investment on the Chilean economy. For example, Alvarez (2002) studying the period between 1990 and 1996 has found positive effects on the level of growth and the growth rate of domestic manufacturing firms. Alvarez and Crespi (2007) found similar positive effects. Ramondo (2009), looking at the impact on productivity, found that foreign firms are systematically more productive than domestic firms in Chile, and impact positively the average productivity level in the sectors in which they operate; while Fernandes and Paunov (2012) found evidence of positive vertical spillovers into manufacturing from foreign investment in services in Chile. Most recently, concerns have been raised whether these positive patterns are still to be found and, more generally, if changes in the country's investment policy are not required to help the country benefit more from the increasing fragmentation of global production, including in knowledge-intensive activities.

A number of factors influence investment location decisions of firms. They include, but are not limited to, the size of the market, its growth rate, the presence of MNEs and domestic firms that can become future suppliers or clients, and the overall business environment – including trade and investment openness (see OECD, 2008a for a literature overview). The relative importance of these factors differs, depending on the investor business motivation and the type of business activity (OECD, 2008b; UNCTAD, 2009). For example, access to resources and regulatory stability are more important for resource-seeking investors and firms operating in the extractive industry, while the quality of skilled labour and the robustness of the national innovation system for those seeking R&D-intensive opportunities (OECD, 2011; OECD, 2008a; OECD, 2008b; UNCTAD, 2009). As Chile considers the design of its future investment promotion strategy, the analysis of inward FDI trends and the characteristics of dominant investors can help provide insights on the character of FDI attracted so far and the potential pull factors in the future.

### 3.2. How important is FDI in the Chilean economy?

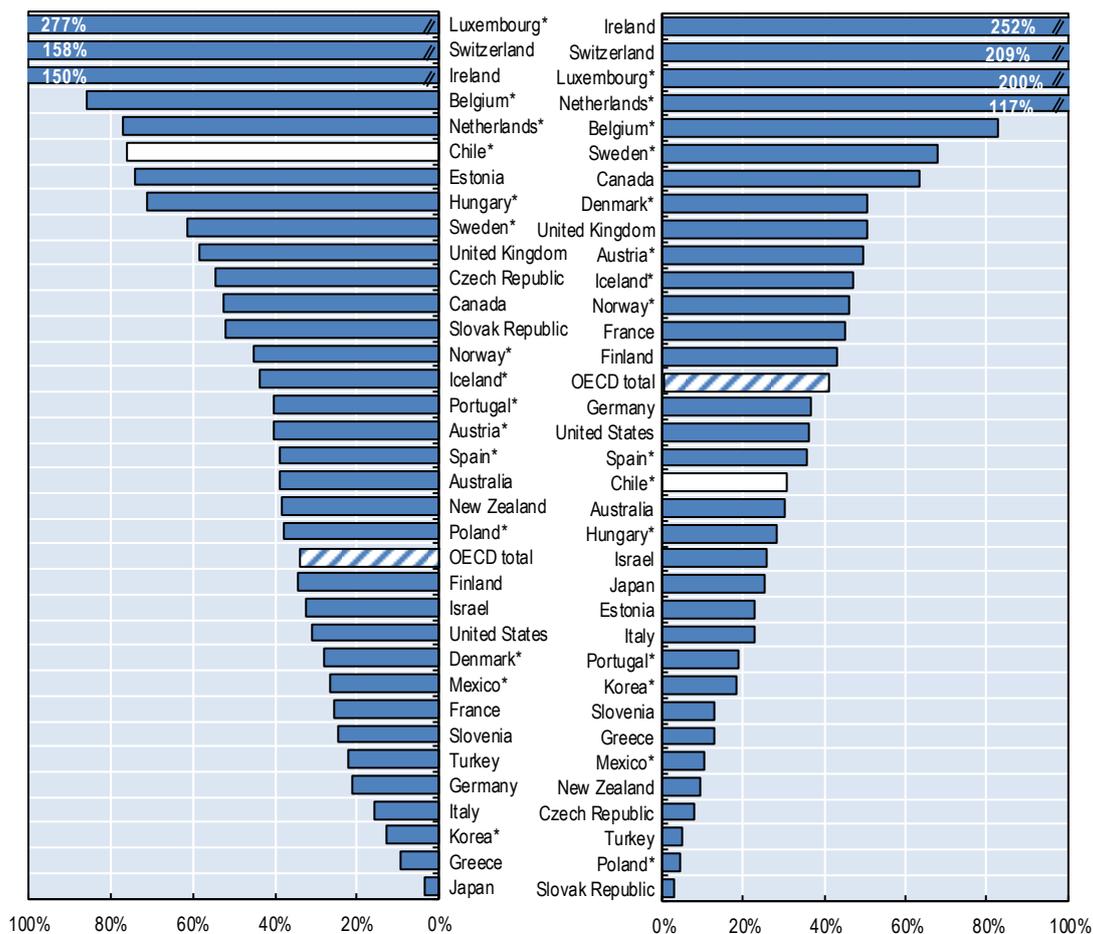
The importance of FDI to the Chilean economy is reflected in the high shares of FDI stock to GDP, which stood at 76.3% for inward FDI (USD197 billion) and 30.8% for outward FDI (USD 80 billion) in 2014.<sup>1</sup> This is higher than in several OECD countries with a similar market size, such as the Czech Republic or Slovakia, or other resource-rich OECD countries like New Zealand or Australia (Figure 3.1). In addition, both inward and outward FDI flows grew at a fast rate in Chile, outpacing many Latin American

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<sup>1</sup> These numbers already exclude any transactions of special purpose entities (SPEs) resident in Chile – i.e. companies that do not have substantial economic activity in Chile but provide support functions to MNEs (OECD, 2015d). In the case of Chile, resident SPEs accounted for 2% of inward FDI stock, and hence are relatively insignificant.

economies (Figure 3.2). As a result, Chile's share of total FDI inflows and outflows from Latin America increased, albeit moderately, since the early 2000s (Figure 3.3). In 2010-2014, Chile accounted on average for 13% of inflows into Latin America, and 37% of outflows from the region. Hence, besides being an attractive destination for inward FDI, Chilean companies increasingly invest abroad and account for over a third of total outward investment flows originating from Latin America. In 2014, FDI inflows into Chile reached USD 22.9 billion (i.e. 6% of GDP) while FDI outflows USD 13 billion (3% of GDP), recovering from a drop in 2013.

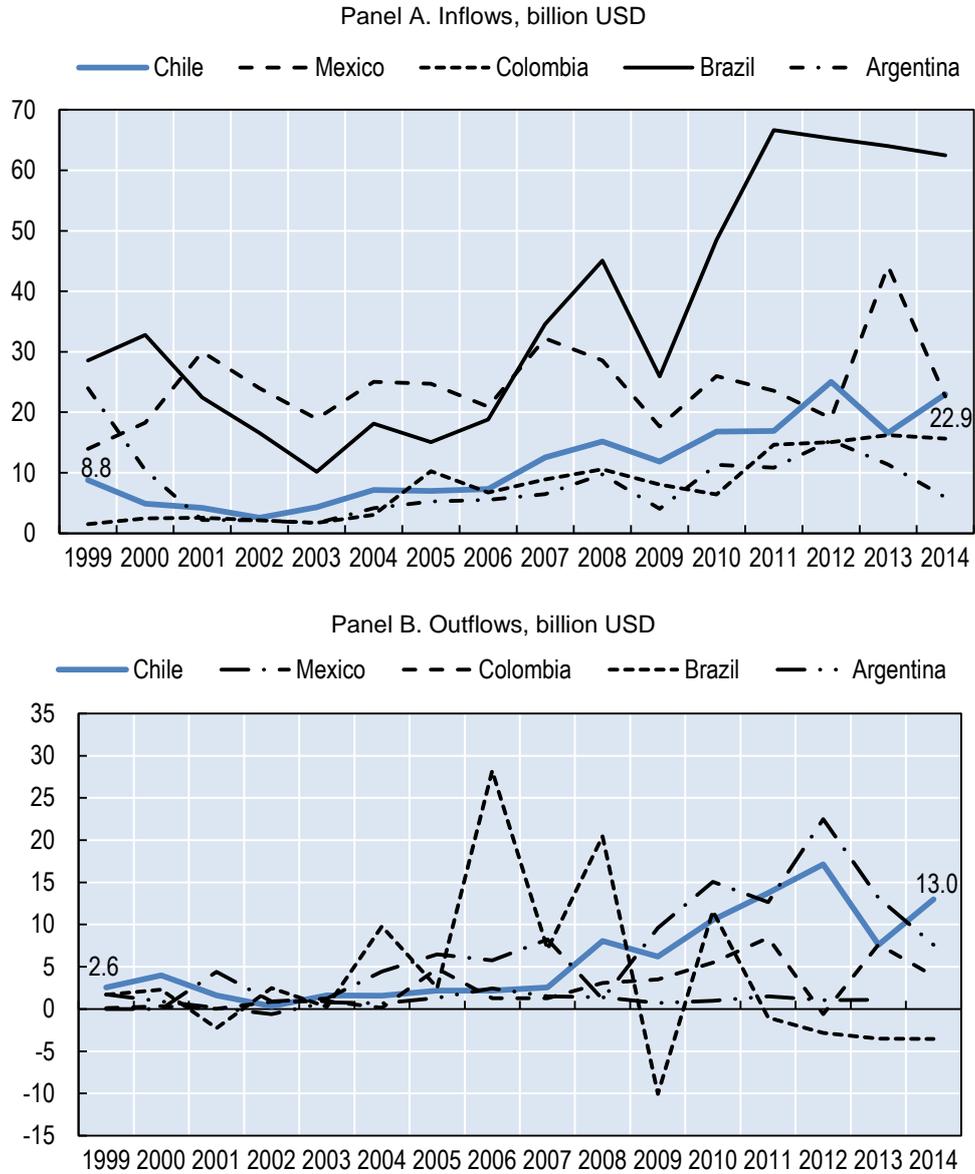
Figure 3.1. FDI positions, at-end 2014 or latest available year



Note: \* FDI data exclude resident Special Purpose Entities (SPEs). Inward and outward FDI positions as a share of GDP are calculated using GDP at current prices and current exchange rates. The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Source: OECD International Direct Investment statistics and OECD National Accounts database.

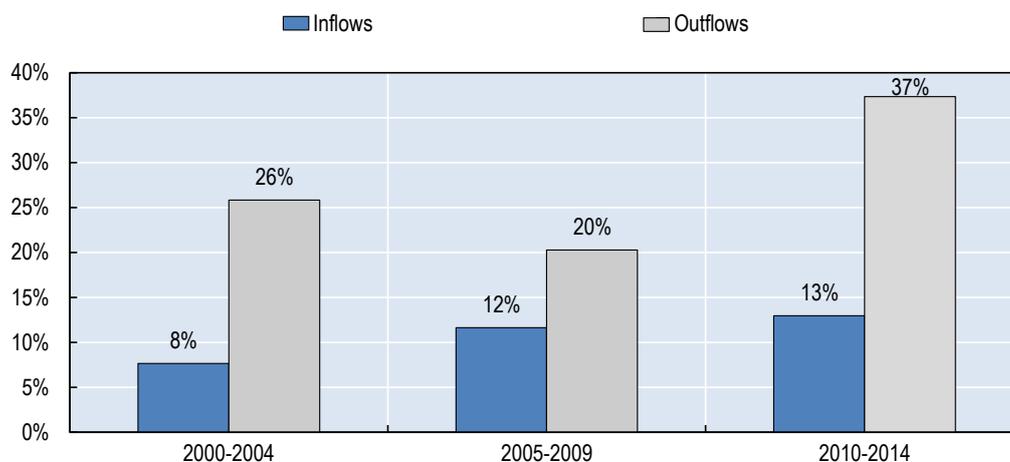
**Figure 3.2. Inward and outward FDI flows in Chile and Latin American countries, 1999-2014**



*Note:* Negative outflows mean either that the resident direct investor divested its assets in a direct investment enterprise, that the direct investor borrowed money from its affiliate (or the affiliate paid off a loan from its direct investor), or that reinvested earnings are negative.

*Source:* OECD International Direct Investment statistics and IMF.

**Figure 3.3. Inward and outward FDI flows of Chile as a share of total Latin America (%), 2000-2013**

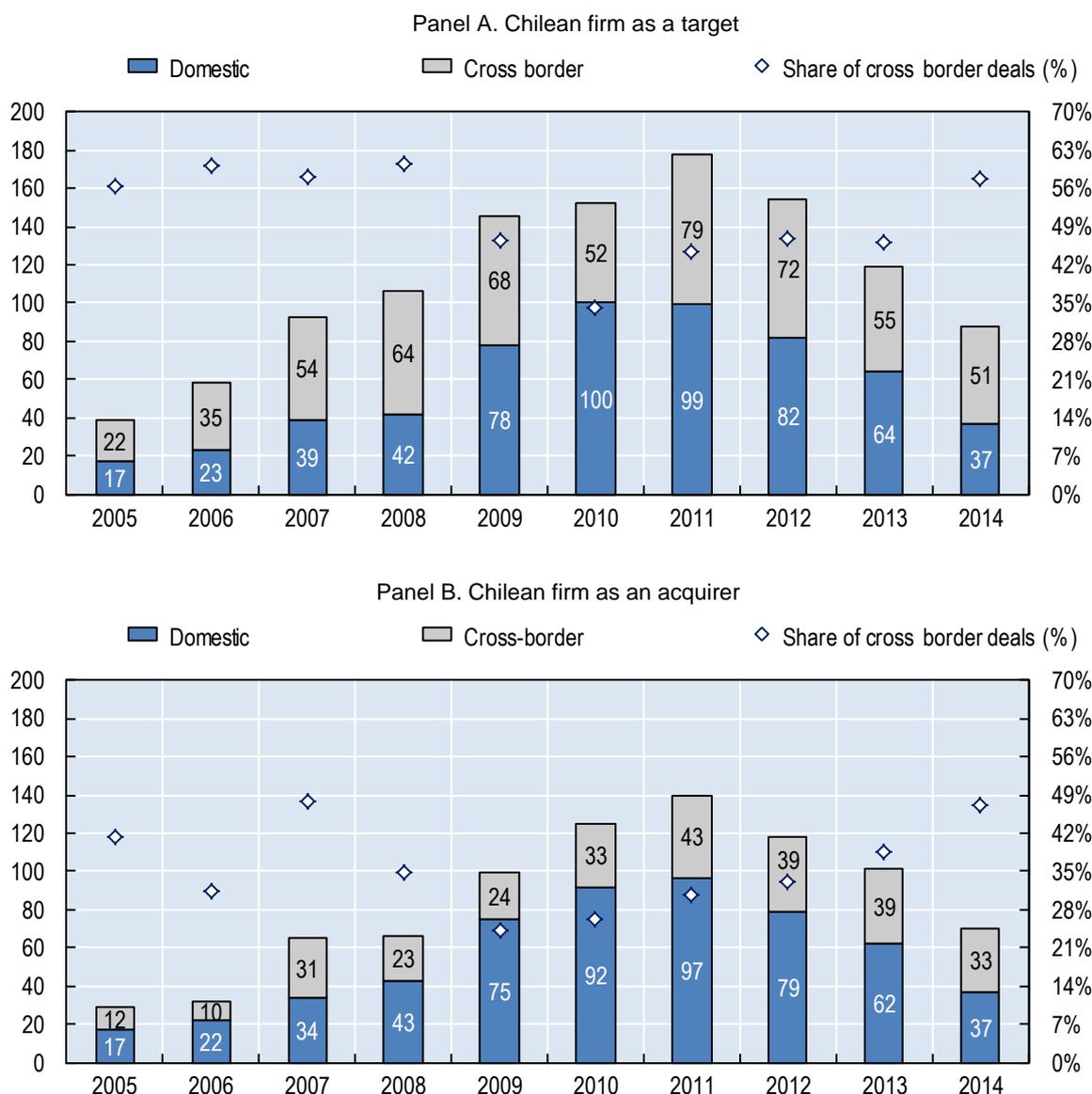


*Note:* The following countries are covered in the Latin America region: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela.

*Source:* OECD International Direct Investment statistics and IMF.

Cross-border Mergers and Acquisitions (M&A) were also buoyant in Chile (Figure 3.4). After a peak in 2011, there were 51 cross-border deals involving a Chilean target with the total registered value of USD 12.9 billion in 2014. M&As are a dominant FDI type and they help firms achieve economies of scale and access new technologies and markets, hence playing a fundamental role in GVCs. M&A is also not a phenomenon that is restricted to foreign acquisitions taking place in Chile, and the foreign investors entering the Chilean market. Chilean firms increasingly acquire other firms abroad. In 2014, 47% of the deals involving a Chilean acquirer were cross-border in nature. In the case of Latin America, M&A activity allowed the emergence of a new class of home-grown MNEs (so-called *Translatinas*) that increasingly compete in global markets, including Chile's *Falabella* (retail), *LATAM* (air transport) or *Compañía Sudeamericana de Vapores* (shipping services) (see Table 3.A1.2 in Annex for the list of twenty largest firms in Chile).

**Figure 3.4. Number of cross-border and domestic merger and acquisition deals in Chile, 2003-2015**



*Note:* A deal is considered to be cross-border when a target is located in a different country than the acquirer's ultimate parent.

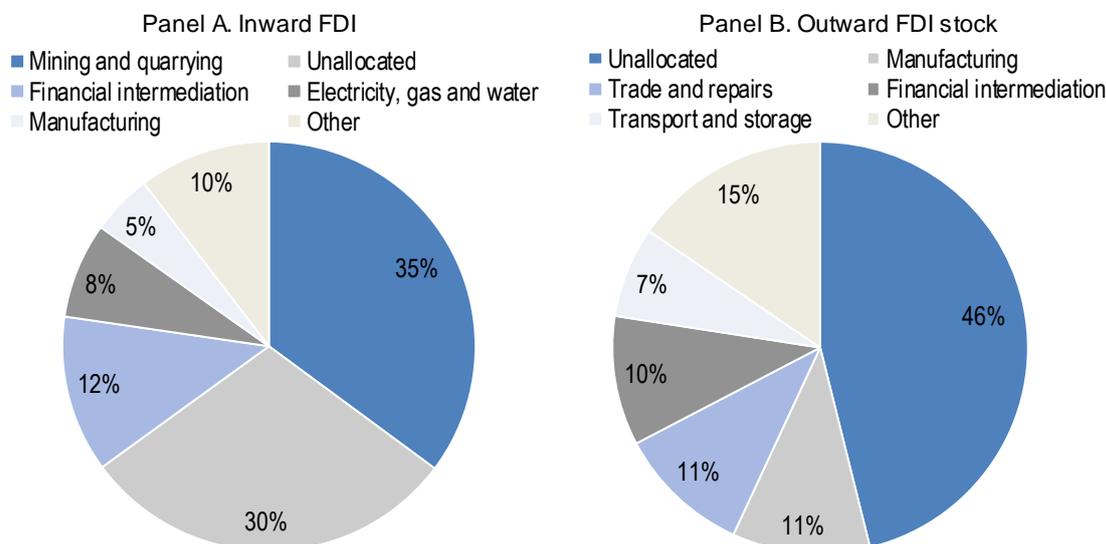
*Source:* Authors calculations using ThomsonReuters One database.

### ***Mining retains its leading position...***

With Chile's rich resource endowments, it is unsurprising that mining attracts the highest share of inward FDI, accounting for 35% of inward FDI stock at end-2013 and 50% of inflows in 2009-2013 (Figures 3.5-3.6). Services were also an important recipient of FDI, and in particular financial intermediation and electricity, gas and water (accounting for 22% of FDI stock and 26% of inflows). The actual share of FDI in mining (and in other sectors) in Chile is likely to be higher than reported in the official statistics, given that a large share of FDI remains unallocated to any given sector (Box 3.1). This is confirmed by other data; for example, 43% of sales of the largest foreign MNEs operating in Chile were in

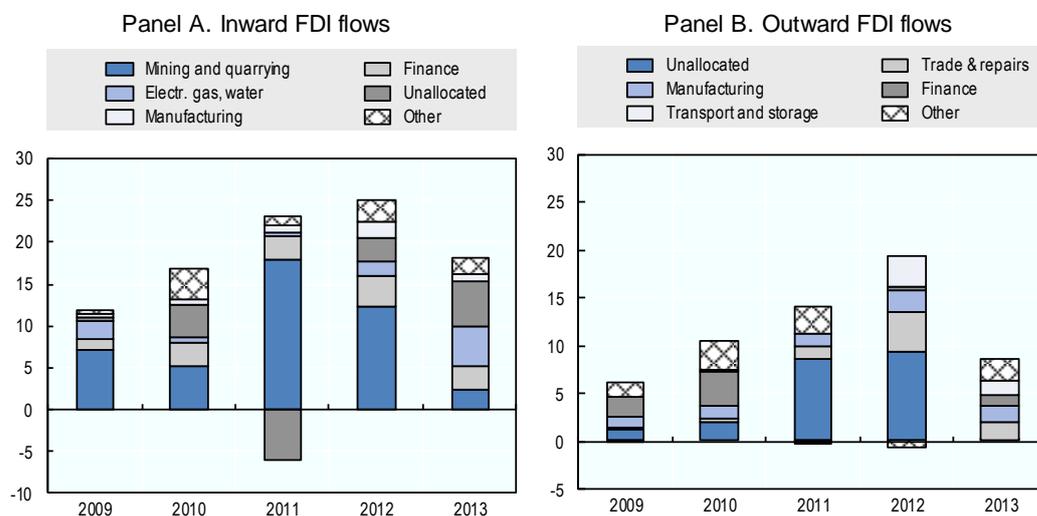
mining in 2012 (i.e. USD 27.4 billion), and most of cross-border M&A deals took place in mining and metals sector (Figure 3.7).

**Figure 3.5. FDI positions of Chile at-end 2013, by sector**



Source: OECD International Direct Investment statistics.

**Figure 3.6. Evolution of Chile's FDI flows by sector, in billion USD, 2009-2013**



Note: Negative inward flows mean either that the non-resident direct investor divested its assets in a resident direct investment enterprise, that direct investor borrowed money from its affiliate (or the affiliate paid off a loan from its direct investor) or that reinvested earnings are negative. In the case of Chile the negative portion of the inward inflows is not allocated to any given industry (see Box 3.2 for details on Chile's international investment statistics).

Source: OECD International Direct Investment statistics.

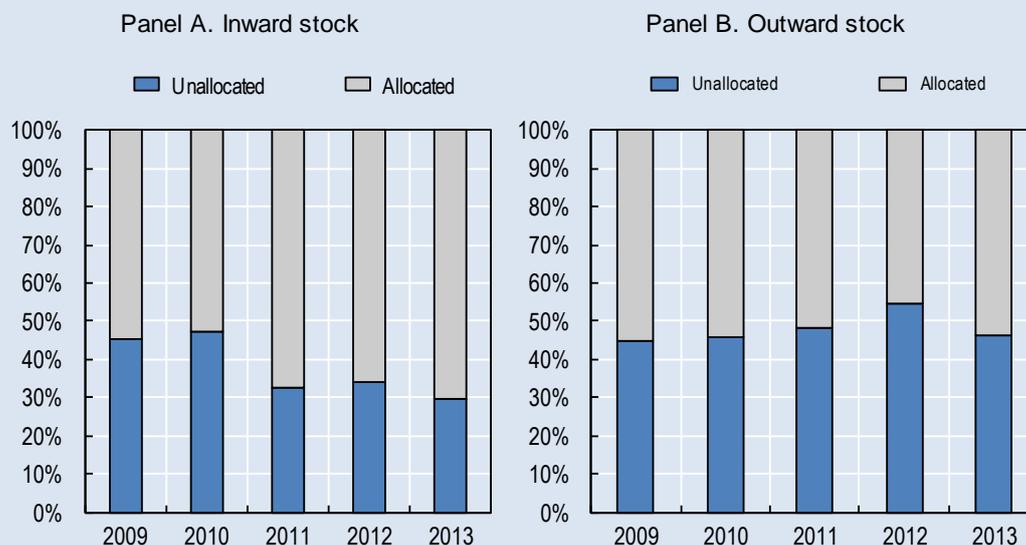
**Box 3.1. International Investment Statistics in Chile: improvements undertaken and the room for future action**

When acceding to the OECD, Chile adhered to the OECD’s *Benchmark Definition of Foreign Direct Investment 4<sup>th</sup> edition* (BMD4) that sets out state-of-the-art guidelines on collection of Foreign Direct Investment (FDI) statistics. Chile has been reporting its FDI statistics to the OECD and participating formally in the meetings of the OECD Working Group on International Investment Statistics (WGIIS) since 2009.

Several improvements were undertaken by the Central Bank to align Chile’s FDI statistics with BMD4. First, the Central Bank took steps to ensure complete coverage of FDI in their statistics. This included: 1) strictly applying the 10 percent of voting power criteria to identify foreign direct investment relationships; 2) including reinvested earnings in financial flows and expanding the coverage of debt flows to include trade credits; and 3) covering transactions between fellow enterprises. Second, the Central Bank identified resident Special Purpose Entities (SPEs) to compile FDI statistics separately for resident SPEs, which we now know account for 2% of inward FDI stock in Chile. Third, the Central Bank began to publish a geographic and sectoral breakdown of FDI flows, stocks, and incomes with detail by component. Finally, aggregate FDI statistics are published according to the two presentations recommended in international guidelines: the asset-liability presentation and the extended directional principle. These steps have greatly enhanced the usefulness of Chile’s FDI statistics.

Several features of Chile’s FDI statistics still confound an analysis of the role of FDI in the Chilean economy and distribution across countries and sectors. First, the share of FDI flows, stocks, and income unallocated by industry remains high. This is true even several years after the reporting year, when other countries are usually able to make an attribution to a specific industry or sector by that time. For example, the FDI stock unallocated to an industry accounts for 30-50% of the total FDI stock during the period 2006-2013 (Box Figure 3.1.1). Reducing the amount of the FDI stock and flows unallocated to an industry would greatly enhance the usefulness of Chile’s FDI statistics. Second, the industry information in Chile is published according to ISIC Rev. 3 rather than ISIC Rev. 4, which is now used by many OECD economies. Third, the Central Bank could publish supplemental presentations of FDI statistics that would provide valuable information such as inward FDI stocks by Ultimate Investing Country, which identifies the country of the investor who ultimately controls the investment. This would help understand who the ultimate owners of incoming FDI are, and hence capture better the overall importance of certain investors or countries.

**Box Figure 3.1.1 The share of unallocated to the rest in inward and outward FDI stocks of Chile, 2006-2013**

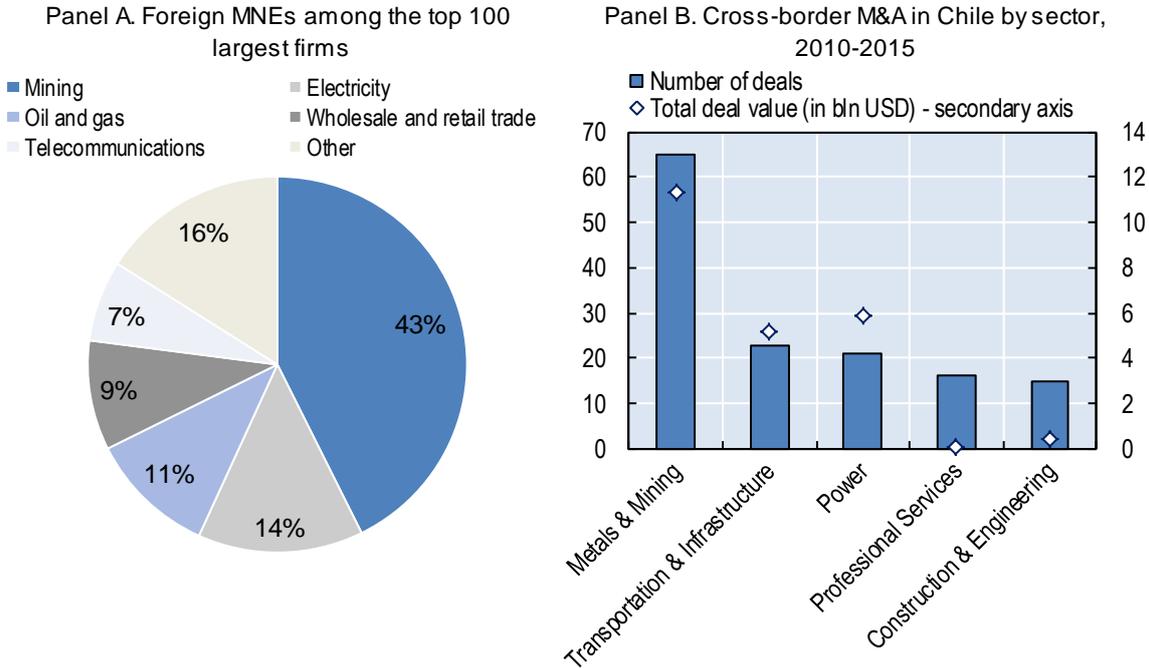


Source: OECD International Direct Investment statistics and IMF.

Last but not least, as Chile is undergoing an institutional reform of its investment regime with new responsibilities acquired by the Foreign Investment Committee (see section 4), it will be important to ensure a mutually reinforcing delineation of responsibilities between FIC and the Central Bank to avoid undue duplication and help maximise the impact of the statistical-gathering efforts in each institution.

Source: OECD.

**Figure 3.7. Cross-border M&A deals and sales of largest foreign firms in Chile by sector, 2010-2015**

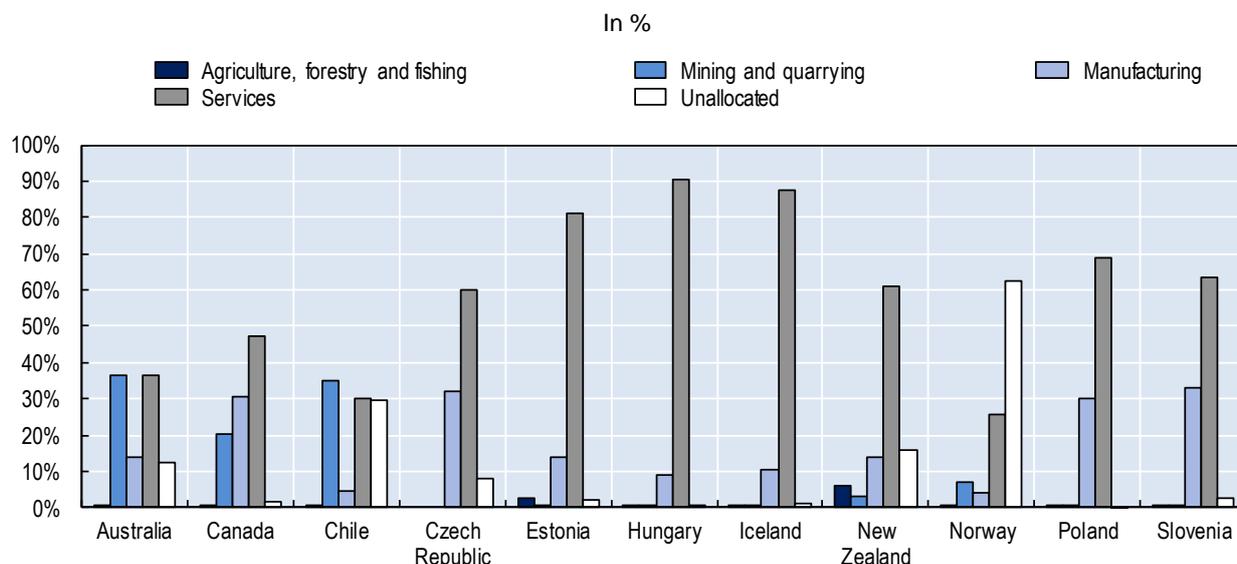


*Note:* A deal is considered to be cross-border when a target is located in a different country than the acquirer’s ultimate parent.

*Source:* Author’s calculations using the ThomsonONE database and América Economía rankings of top 100 firms in Chile

Overall, compared to other resource-rich OECD countries, Chile receives a relatively higher share of FDI in mining and a lower share in other sectors (Figure 3.8). One notes in particular the relative absence of FDI in manufacturing in Chile accounting for less than 5% of the inward FDI stock. This contrasts with the experience of other small economies that have integrated intensely into GVCs, such as the Czech Republic and Slovenia. To the extent that manufacturing supports innovation and job creation, there may be scope for facilitating and attracting more investment in that sector in Chile, especially if such attraction can build on Chile’s existing vast engineering know-how related to the extractive industry.

**Figure 3.8. Inward FDI stock by sector as share of the country's total inward FDI stock, 2013**



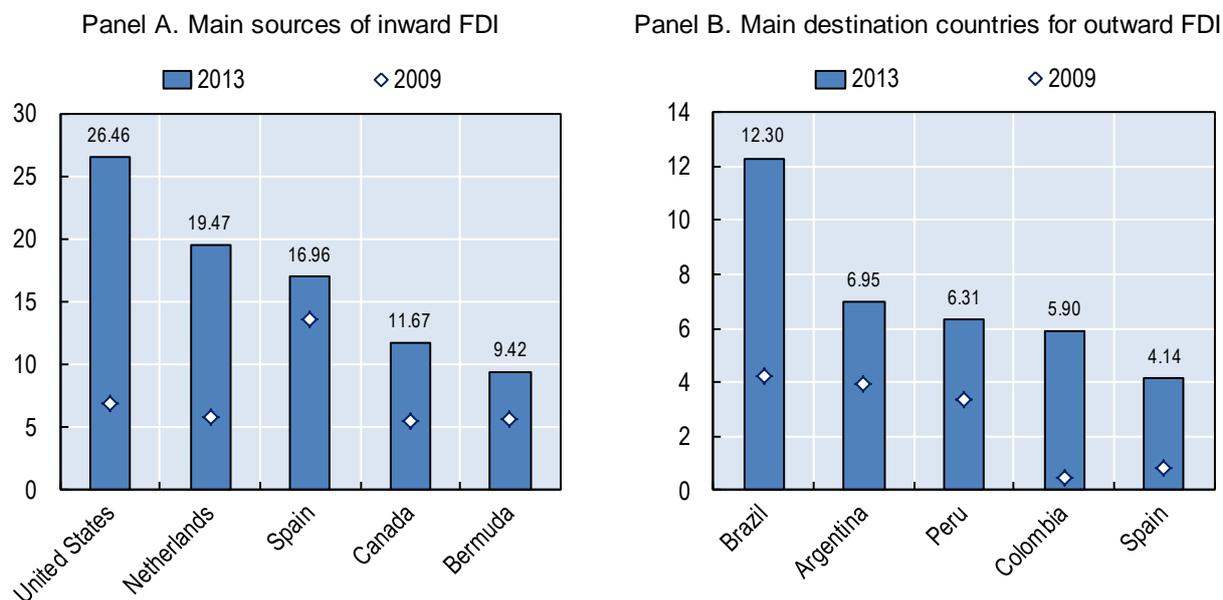
Source: OECD International Direct Investment statistics.

*...as do investors from the United States and Europe*

Investors from the United States and Europe remain the leading foreign investors in Chile, accounting for 22 and 13% of inward FDI stock, respectively, at end-2013. Among European countries, Spain and Netherlands remain the most important (Figure 3.9). The United States have also accounted for 22% of the largest foreign MNEs in Chile (USD 14.4 billion) and 21% of total materialised investment under the Foreign Investment Statute between 2003 and 2012, discussed later. Only a small share of inward FDI in Chile comes from Latin America (4% in 2013), while neighbouring countries account for the lion's share of Chile's outward FDI stock (42% in 2013) and remain top destinations for Chilean outward investments.<sup>2</sup>

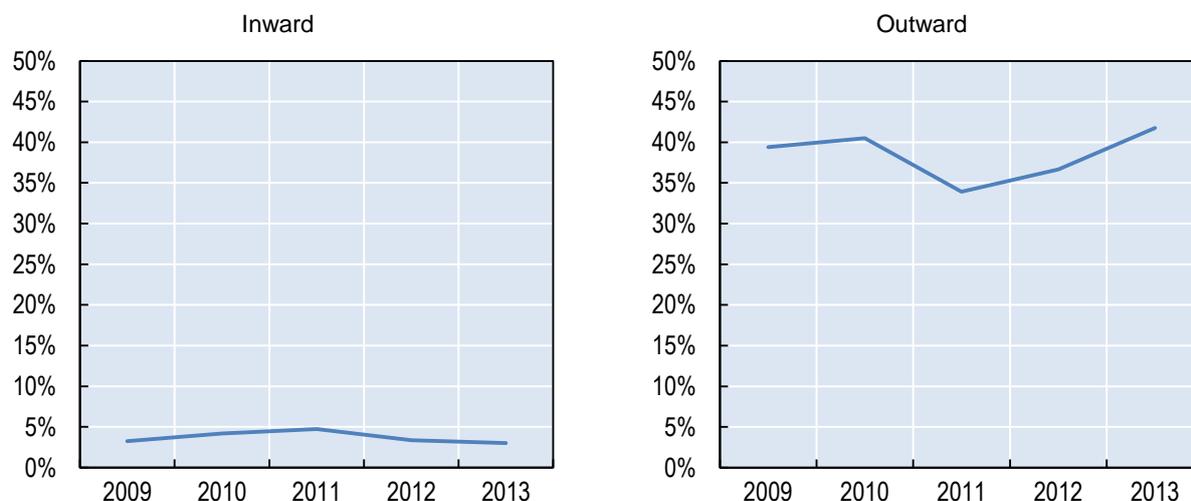
<sup>2</sup> The Ministry of Foreign Affairs of Chile has recently published a series of reports analysing the evolution and nature of Chile's outward FDI. To access the reports, see: [www.direcon.gob.cl/inversiones-exterior](http://www.direcon.gob.cl/inversiones-exterior).

**Figure 3.9. Top five source and destination countries for Chile's FDI stock, in billion USD, 2013**



Source: OECD International Direct Investment statistics and IMF.

**Figure 3.110. Share of Latin America within total inward and outward FDI positions of Chile, as % of total**



Note: The following countries are included under the Latin America region: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, Paraguay, El Salvador, Uruguay, Venezuela.

Source: OECD International Direct Investment statistics.

Overall, we see that Chile has attracted a large quantity of FDI over the last decade, with most of it going into mining as well as financial services and electricity. To what extent has this structure of FDI impacted the nature and opportunities for GVC participation of foreign and domestic firms in Chile? These issues are explored in the next sections.

### 3.3. What are the characteristics of foreign firms in Chile?

It is the firms—not countries or sectors—that participate in GVCs. Characteristics of foreign investors are thus equally, or perhaps more, important, than the nature of the sectors in which they operate. Since Chile is not integrated into the OECD Activity of Multinational Enterprises database (AMNE) nor the Trade by Enterprise Characteristics (TEC) database<sup>3</sup>, we use the information from the Chilean manufacturing survey (ENIA) provided by the Chilean authorities<sup>4</sup>, and the data on activities of U.S. owned foreign affiliates as reported by the U.S. Bureau of Economic Analysis<sup>5</sup> to explore the degree of GVC participation of foreign and domestic firms in Chile, and other factors that impact their competitiveness, including the level of their knowledge-intensity and productivity.

#### *How intensely do they participate in GVCs? The case of manufacturing*

According to ENIA, foreign firms accounted for 6% of all manufacturing firms in Chile, and accounted for 27% of Chile's manufacturing exports and 15% of imports of intermediate inputs. They were more engaged in GVCs than domestic firms, having exported on average 26% of their sales and imported 18% of their intermediate inputs in 2008-2012, as compared to 6% and 5% of purely domestic firms. Still, this means that the foreign firms were primarily oriented towards the domestic market, sourcing most of their inputs and selling most of their products locally. It is possible, nevertheless, that some of the exports and imports were taking place indirectly – for example through the company's retail or wholesale branch, and hence would not be captured in the survey that covers manufacturing sector only.

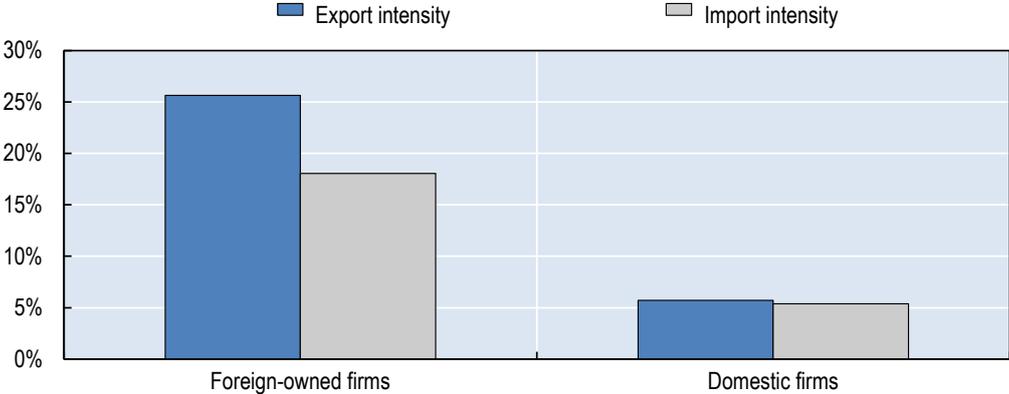
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<sup>3</sup> The AMNE database presents detailed data on the activities of foreign affiliates in OECD countries (inward and outward activity). It contains 17 variables broken down by country of origin (inward investment) or location (outward investment) and by industrial sector for a large number of OECD countries. The Trade by Enterprise Characteristics (TEC) database contains annual data on international trade in goods broken down by different categories of enterprises. The export and import values and the number of exporting and importing enterprises are available for 26 OECD and six non-OECD economies. For more information, see: [oe.cd/amne](http://oe.cd/amne) and [oe.cd/tec](http://oe.cd/tec).

<sup>4</sup> The Chilean Manufacturing survey (*Encuesta Nacional Industrial Anual*, ENIA) is a plant-level survey conducted by the National Statistical Institute (INE) of Chile on an annual basis. It provides useful information on manufacturing plant characteristics, including size, employment, intermediate inputs purchases, sales, exports and imports. For the purposes of this report data for years 2000-2012 are used. While access to the survey allows useful insights into firm characteristics in Chile, certain concepts are not fully compatible with the methodologies used in other OECD databases, such as the OECD International Investment Statistics, OECD AMNE database or OECD TEC and hence call for attention in interpreting the results. For example, the concept of foreign ownership is not fully compatible with the OECD Benchmark Definition of Foreign Direct Investment (BMD4) as it takes into account the residency of the direct company owner only. As a result, the extent of foreign ownership in the manufacturing sector in Chile may be understated. In addition, it needs to be noted that the response rate to the survey has been falling in recent years in Chile, which may also be impacting the representativeness of the survey and some of the observed trends.

<sup>5</sup> BEA gathers and reports information on operations of US-owned affiliates, including sales, trade in goods and employment. It provides more detailed information on activities of majority US-owned companies, including sales of goods and services by destination and type of transaction (i.e. intra-firm trade vs. trade with an unaffiliated party). For more information, see: [www.bea.gov/international/di1usdop.htm](http://www.bea.gov/international/di1usdop.htm)

**Figure 3.11. Average export and import intensity of foreign-owned and domestic firms in Chile, 2008-2012**

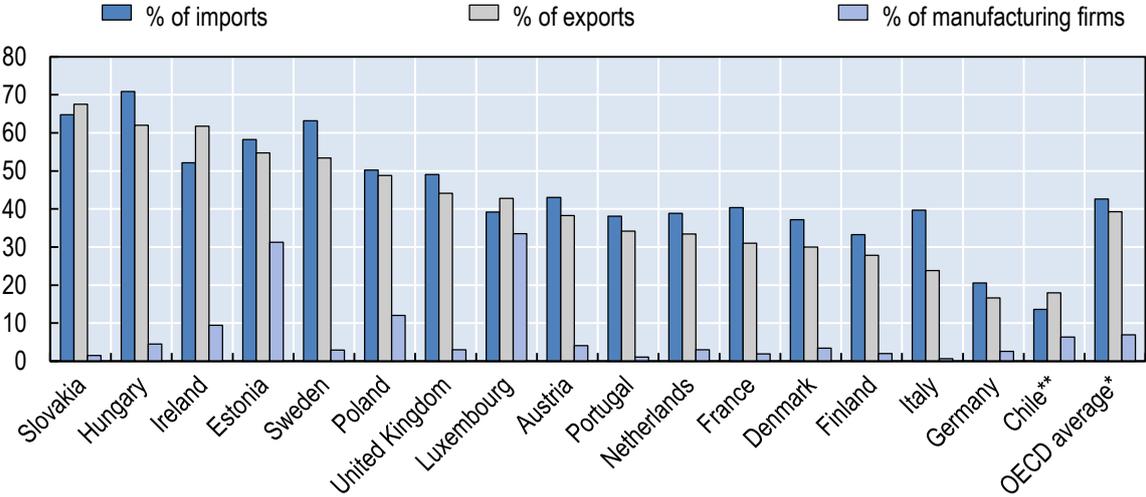


*Note:* Firms are considered to be foreign if foreign participation in the firm’s capital exceeds 10% (official FDI threshold). Most foreign firms in ENIA are majority foreign-owned, however, and the choice of the ownership threshold does not change the results.

*Source:* Author’s calculations using ENIA.

In order to provide a (rough) comparison of these numbers to those reported in other OECD economies, we use the available information from the OECD AMNE and TEC databases<sup>6</sup>. While the share of foreign firms among all manufacturing firms is similar in other OECD economies, generally the contribution of foreign firms to exports and imports in Chile is lower. This contrasts with the experience of small open OECD economies that positioned themselves as platforms for GVC trade and investment, such as Slovakia, Ireland, Hungary or Estonia, where foreign investors engage intensely in GVC activities (Figures 3.12 and 3.13).

**Figure 3.12. Share of foreign firms in the total number of firms and their contribution to trade (%), 2011**

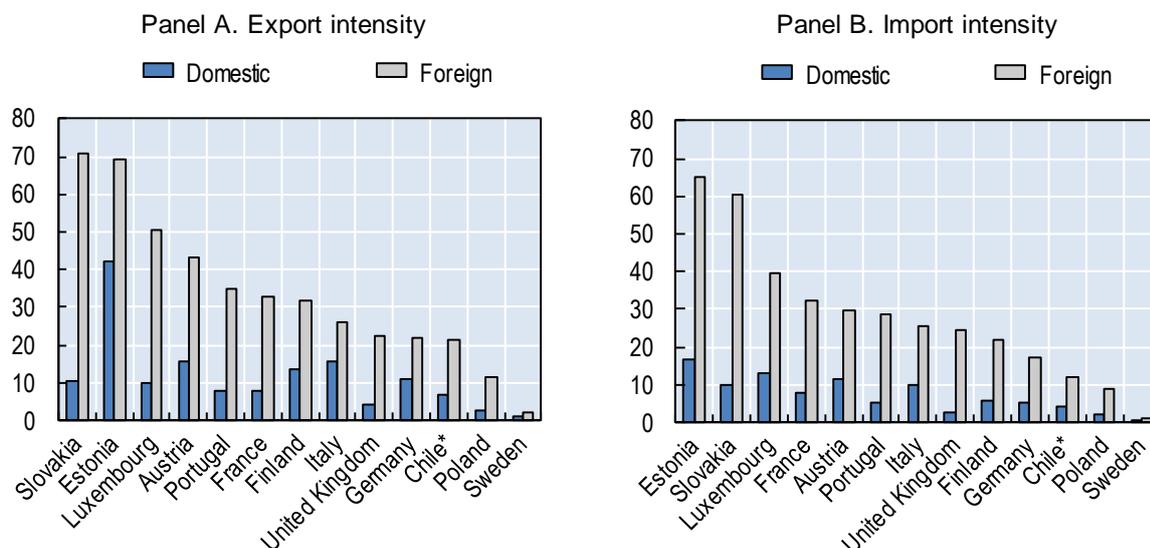


*Note:* \*The OECD average is for 17 OECD countries presented in the graph. 2011 is chosen to maximise the number of OECD countries reporting the data. For the OECD countries export and import shares cover the total economy as no breakdown by sector is available.

*Source:* Author’s calculations using the TEC database and Chile’s manufacturing survey (ENIA).

<sup>6</sup> Information on exports and imports for the OECD countries cover the whole economy and not just manufacturing. There may also be other differences between the treatment of ownership or other variables.

**Figure 3.13. The share of export and imports to turnover in Chile and OECD economies, by firm type, 2011**



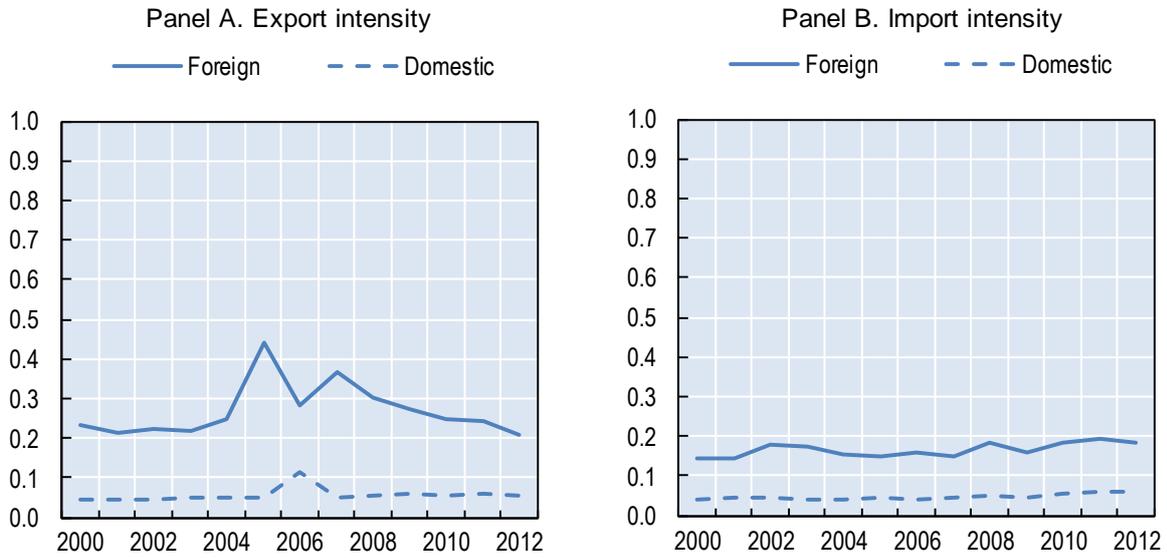
*Note:* Export (import) intensity is defined as exports (imports) over total turnover. 2011 is chosen to maximise the number of OECD countries reporting the data. Information for the OECD covers all sectors (except wholesale trade) while information for Chile manufacturing only.

*Source:* Author's calculations using the TEC database and Chile's manufacturing survey (ENIA).

Average trade intensity of foreign and domestic manufacturing firms also appears not to have changed much over time (Figure 3.14). It is possible that these firms are using Chile as a platform for expanding in the Latin American region through their foreign affiliates or indirect exports, but this trend is not visible in the direct trade activity of the manufacturing plants.<sup>7</sup> It is worth noting that a short-term increase in export intensity of foreign firms between 2004 and 2007 is explained fully by increased exports of basic metals, where most foreign firms operate (Figure 3.15). More generally, foreign firms' presence and exports are largely limited to three manufacturing sectors – basic metals, where they account for one third of total output and half of total exports as well as food and tobacco and chemicals sectors (Figure 3.16). Domestic firms' exports are more evenly distributed across different sectors.

<sup>7</sup> This does not take into account indirect exports. As section 1 showed manufacturing accounted for 11% of Chile's outward FDI stock so manufacturing firms may be expanding abroad through foreign affiliates.

**Figure 3.14. Export and import intensity of foreign and domestic firms in Chile, 2000-2012**

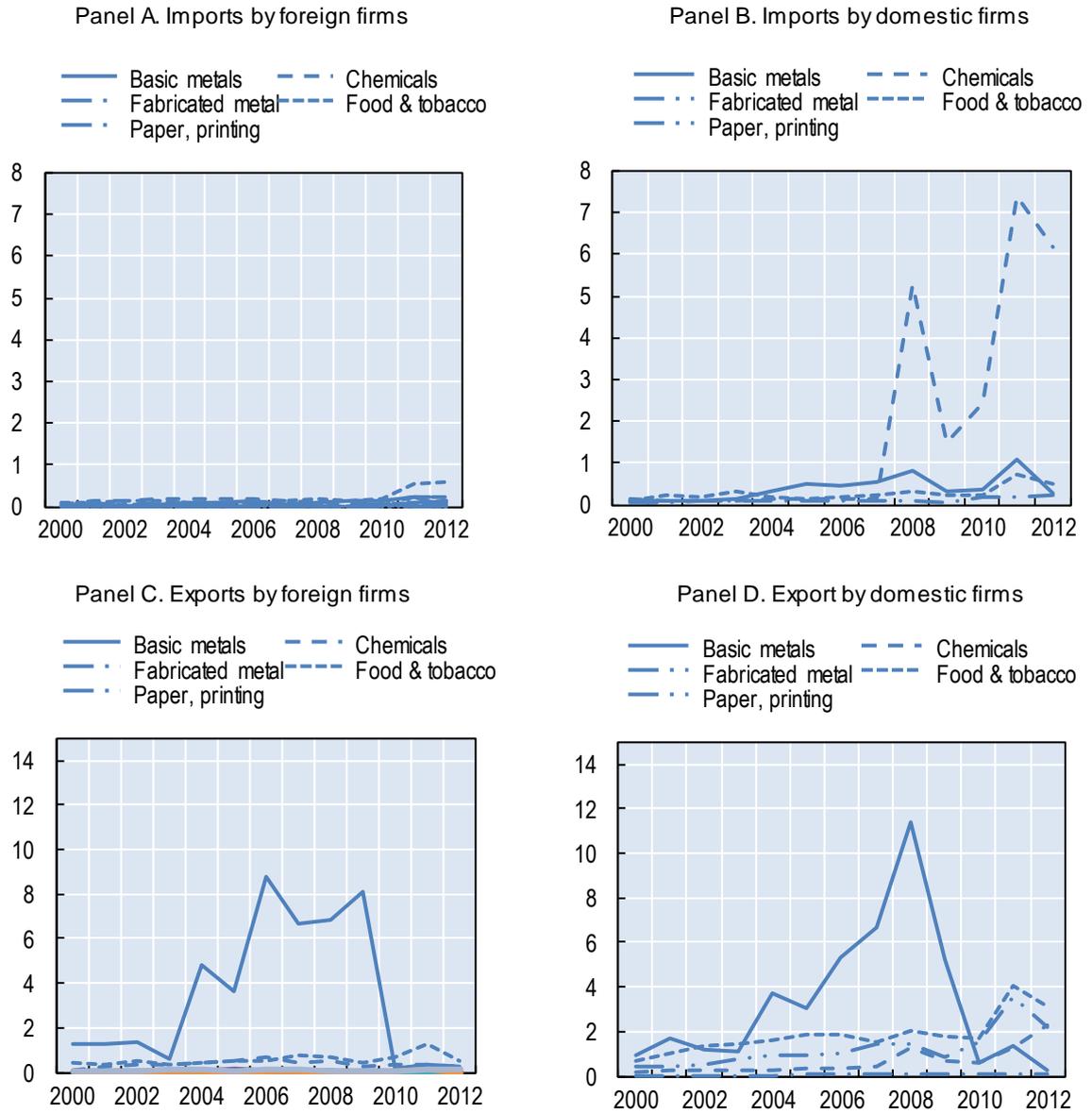


Source: Author's calculations using ENIA.

Basic metals and food and tobacco are also sectors where foreign firms display the highest export intensity (Figure 3.17), while they import most of their intermediate inputs in the more downstream fabricated metals sector. This may point to differences in production function compared to domestic firms. In general, foreign firms export a larger share of their sales than domestic-owned firms and import a larger share of their intermediate inputs in all manufacturing sectors in which they operate in Chile (Figure 3.17). Notably, foreign-owned firms relied relatively more on imported intermediate inputs in the more downstream fabricated metals sector (sourcing one third and one-sixth of their inputs from abroad, respectively), while the opposite was true for domestic-owned firms that imported relatively more inputs in the basic metals sector. As we will explore later, there are also interesting differences in the productivity level and skilled labour content between domestic and foreign firms in these sectors in Chile.

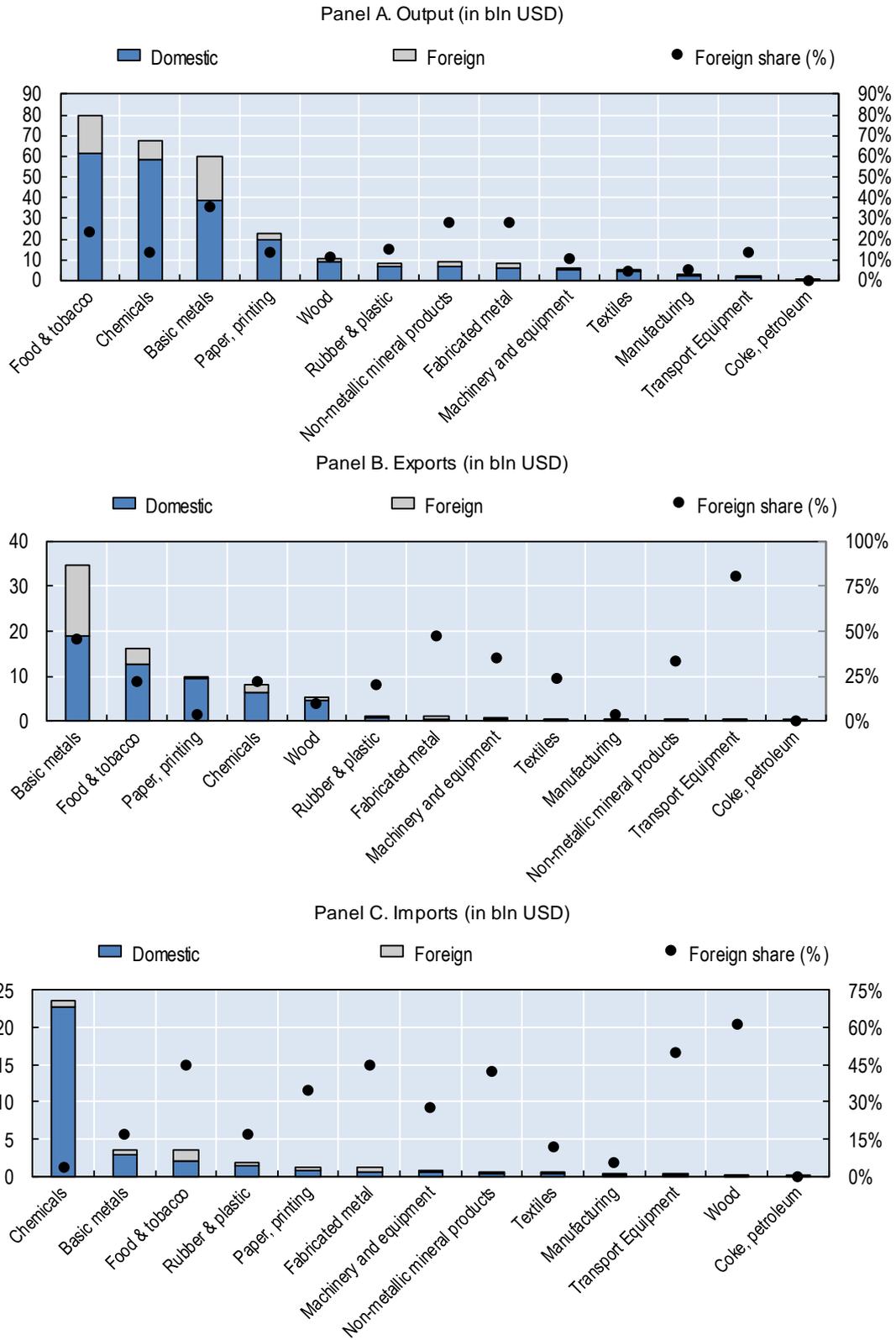
**Figure 3.15. Imports and exports of foreign and domestic firms in Chile by sector, 2000-2012**

In bln USD



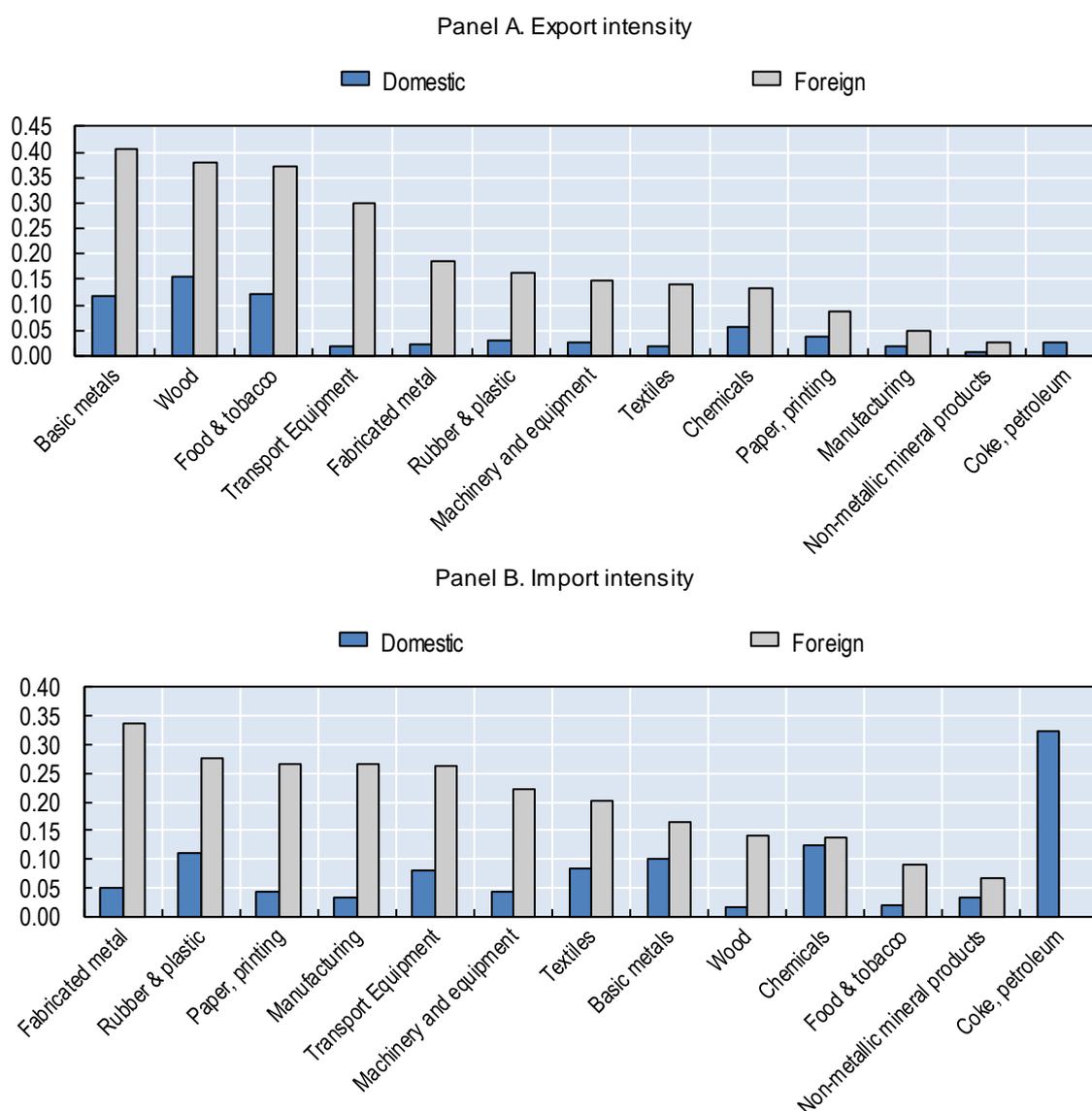
Source: Author's calculations using ENIA.

**Figure 3.16. Total output, exports and imports of foreign and domestic firms in Chile, 2008-2012**



Source: Author's calculations using ENIA.

**Figure 3.17. Export and import intensity by sector by firm type, 2008-2012**



Source: Author's calculations using ENIA.

***How does this differ in other sectors?***

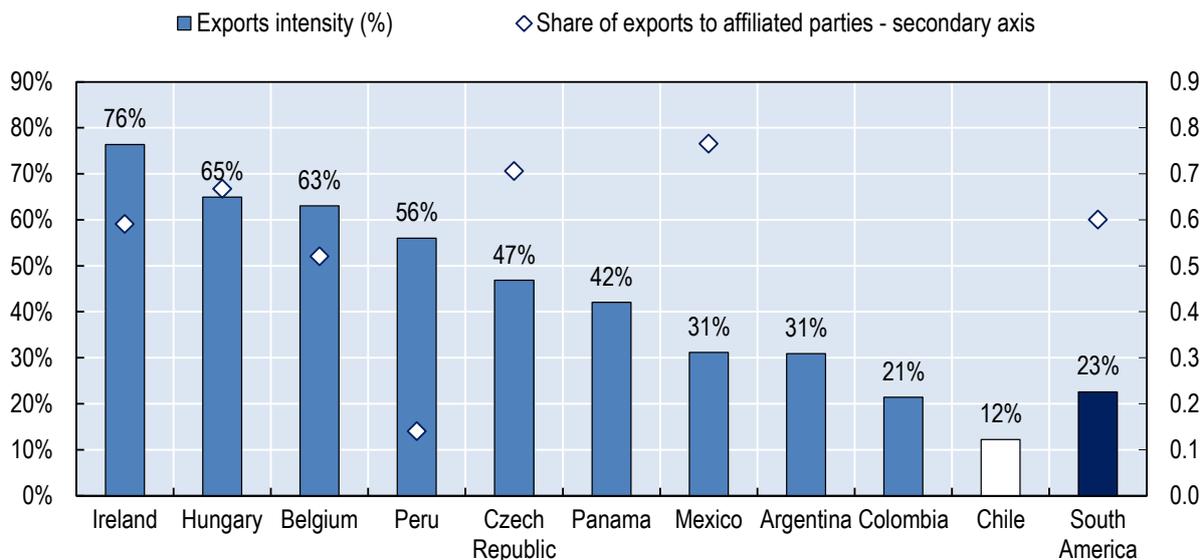
Are these trends limited to the manufacturing sector? In order to answer this question, we use the information on activities of US-owned affiliates operating in Chile as reported by the BEA. While not generalizable to all foreign investors operating in Chile, they reflect on the behaviour of dominant foreign firms in Chile (section 2).

In 2012, there were 151 US-owned foreign affiliates in Chile with total sales of USD 41.1 billion, operating mostly in mining and wholesale and retail trade.<sup>46</sup> That year, they exported, on average, 12% of their sales (or USD 4.4 billion), which means they sold most of their sales locally. About half of these exports went to affiliated parties (i.e. intra-firm trade), most

<sup>46</sup> It is difficult to establish the exact FDI distribution of sales or value-added of US affiliates in Chile as data by sector is often suppressed by BEA for confidentiality reasons. We can, however, estimate the possible upper bounds. Based on this information, the main sectors in terms of value-added would be mining (34% of total VA of US affiliates in Chile, or USD 2.7 billion), and wholesale and retail trade (14%, or USD 1.1 billion).

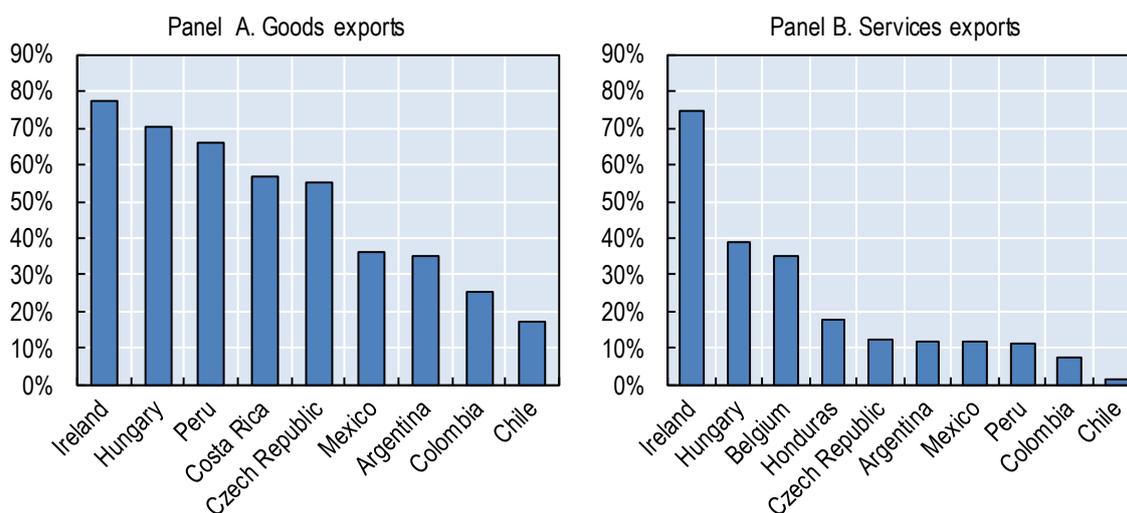
commonly associated with GVC trade, and half to non-affiliated parties. Overall, US affiliates appear to rely less on exports in Chile (including via intra-firm trade) than they do elsewhere in the world (see Figure 3.18 for a comparison with other South American countries and OECD economies with a similar size).<sup>47</sup> This may be related to the sectoral distribution of US investors, which have a large presence in the retail sector that does not export directly. The export intensity of US affiliates in goods in Chile is higher than in services (17% vs. 1%) albeit still lower than in other OECD or Latin American countries (Figure 3.19). These trends suggest that US firms rely relatively little on direct exports for their GVC participation and may instead use indirect exports or foreign affiliate sales for their expansion from Chile into the region<sup>48</sup>.

**Figure 3.18. Export intensity of US owned affiliates operating in Chile, 2012**



Source: BEA, U.S. MNE Activities: Revised 2012 Statistics, Majority-Owned Foreign Affiliates.

**Figure 3.19. Export intensity of US owned affiliates by type of export, 2013**



Source: BEA, U.S. MNE Activities: Revised 2012 Statistics, Majority-Owned Foreign Affiliates.

<sup>47</sup> In their global operations, US affiliates export 40% of their sales and 60% of these exports go to affiliated parties.

<sup>48</sup> We do not observe indirect exports via other parties.

### *Are foreign firms more productive and knowledge-intensive than domestic firms in Chile?*

Besides the directly observable differences in trade patterns, there may also be other differences between foreign and domestic firms that impact indirectly their opportunities for GVC participation. For example, the theoretical literature predicts that, due to the fixed cost of investing abroad, foreign affiliates tend to be larger and more productive than purely domestic firms.<sup>49</sup> Indeed, looking specifically at vertically integrated affiliates operating in manufacturing in Chile, Blyde et al. (2014) found that they compare more favourably to other manufacturing firms: being on average larger, employing 27 % more workers, including 16% more skilled workers, and having a 42 % higher total factor productivity (TFP). Being interested in behaviour of different foreign affiliates operating in Chile, not just vertically integrated foreign firms, we find similar findings (see Table 3.1).

Overall, foreign manufacturing firms were generally larger, more capital-intensive and more productive than domestic firms in Chile in 2008-2012: they employed on average 161 more workers and generated five times more value-added per worker than purely domestic firms. They also paid higher wages (USD 25 801 as compared to USD 7 320), with the wage premium being higher for skilled workers. When we control for firm size and sector and year fixed effects, the impact of foreign ownership and exports, wages, skilled labour share and TFP remains positive (Table 3.A1.3 in Annex). It is also noteworthy that the positive impact of foreign ownership on exports remains robust when we control for access to imported intermediate inputs. Therefore, foreign firms performed better than comparable domestic firms in Chile.<sup>50</sup>

**Table 3.1 Differences between foreign and domestic firms in Chile, comparative statistics, 2008-2012**

	Domestic owned	Foreign owned
Sales (in mln USD)	13.03	58.21
Exports (in mln USD)	3.21	22.03
Imports (in mln USD)	1.90	5.10
Labour	80	241
Export intensity (%)	6	26
Intermediate inputs import intensity (%)	5	18
Services inputs intensity (%)	18	17
Labour intensity (%)	50	34
Capital intensity (%)	50	66
Skilled workers (% of total number of workers)	43	44
Labour productivity	34 622	186 644
Average wage	7 320	25 801
Average wage - skilled workers	8 199	38 239
Average wage - unskilled workers	4 781	11 736

Source: Author's calculations using ENIA.

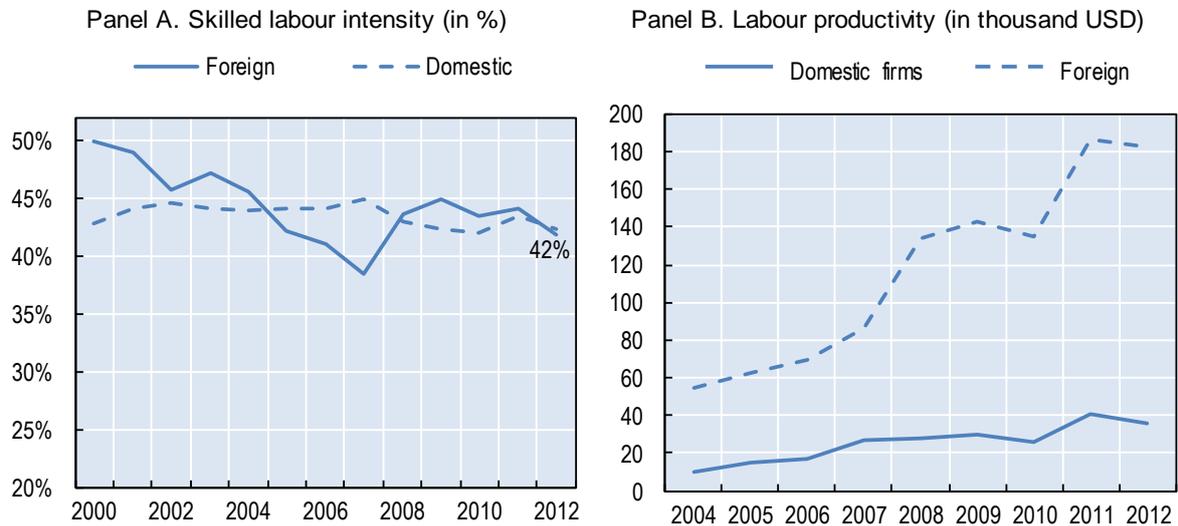
One caveat is that the difference in skill intensity between foreign and domestic firms is not large—when we control for firm size and sector and time fixed effects, foreign firms employ on average less than 1 percentage point more skilled labour than domestic owned firms (Table 3.A1.3). This is partly related to the sectoral concentration of foreign firms in Chile. While machinery and equipment as well as transport equipment are the most skilled-labour intensive sectors in Chile, foreign firms are relatively less present in these sectors (Figure 3.21). In addition, in the sectors in which foreign firms do operate—such as basic metals, food and tobacco, paper and printing or fabricated metals, foreign-owned firms are not always more skill-intensive than domestic firms. For example, while in basic, foreign firms employ more skilled workers than domestic firms (Figure

<sup>49</sup> See, for example, Melitz (2003), Helpman et al. (2004).

<sup>50</sup> Our findings are consistent with previous studies on the subject that considered earlier periods (e.g. Alvarez, 2002; Ramondo, 2009; Fernandez and Paunov, 2012)

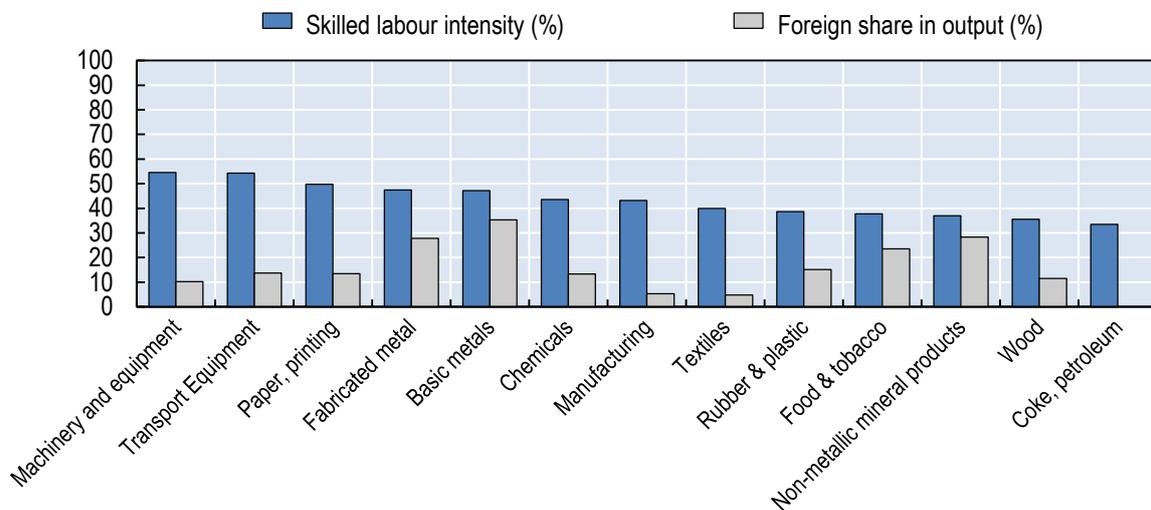
3.22), in fabricated metals, food and tobacco, and wood, domestic-owned firms tend to employ relatively more skilled labour than foreign firms. This may suggest that Chile's labour force is not competitive enough to attract global players to locate their skilled-labour intensive activities in these sectors, but also that domestic-owned firms may be exploiting better more skill-intensive opportunities in these sectors.

**Figure 3.20. Skilled labour intensity and labour productivity by firm type in Chile, 2000-2012**



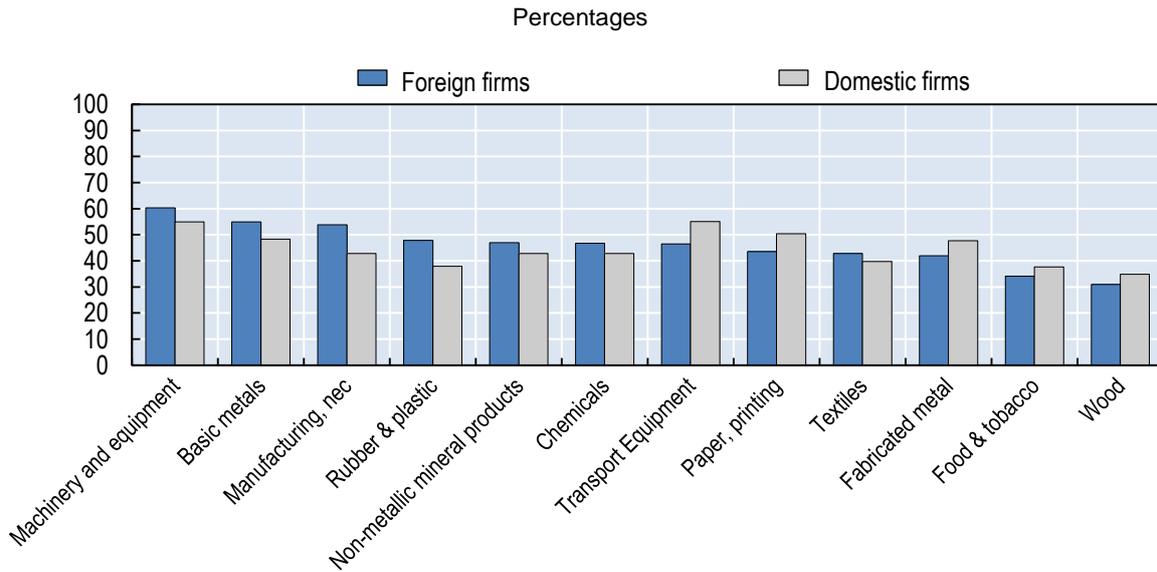
Source: Author's calculations using ENIA.

**Figure 3.21. Skilled labour intensity and foreign participation in output, by sector, average 2008-2012**



Source: Author's calculations using ENIA.

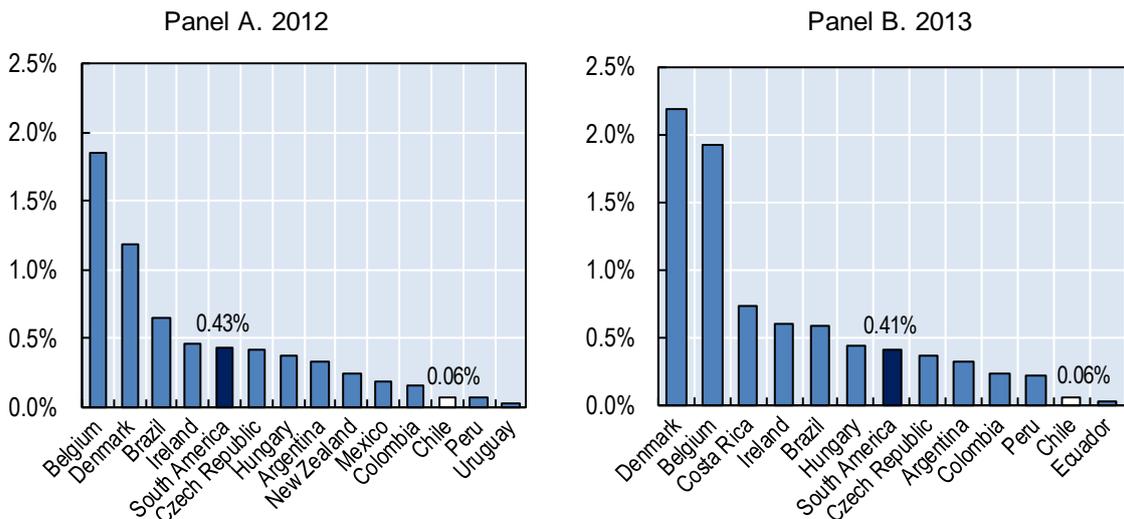
**Figure 3.22. Skilled labour intensity by sector and firm type, average 2008-2012**



Source: Author's calculations using ENIA.

To gauge these findings we also look at the R&D spending patterns of US firms operating in Chile, for which such data are available (as mentioned earlier, US is the dominant source of FDI in Chile). Here we observe that US affiliates spent relatively low shares of their sales on R&D in Chile – 0.06% of their sales in 2012 (or USD 23 million) (Figure 3.23). This share did not change in 2013, and is lower than the average R&D intensity of US firms operating elsewhere in South America (0.43%) or in other OECD countries with a similar per capita income as Chile, such as Czech Republic or Hungary. The comparison with Costa Rica is particularly striking as US firms invested over three times more in R&D there in 2013 than they did in Chile (USD 80 million or 0.73% of their sales). In the case of Costa Rica, such outcome has been to a large extent driven by the presence of *Intel* – a large US technology company that started its local operations in the country in early 2000s, partly thanks to an active investment promotion undertaken by the Government to attract R&D intensive FDI (Box 3.3).

**Figure 3.23. R&D intensity of US owned foreign affiliates in Chile and selected comparator countries, 2012-2013**



Source: BEA, U.S. MNE Activities: Revised 2012 Statistics, Majority-Owned Foreign Affiliates.

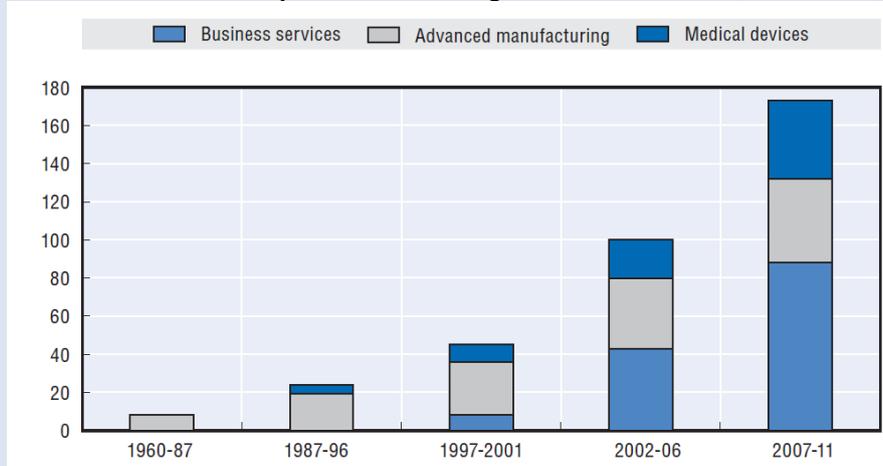
In order to assess the general contribution of foreign affiliates present in Chile to total R&D expenditure, we additionally draw on the Chilean R&D survey. We find that overall foreign firms accounted for one quarter of total business R&D expenditure (BERD) in Chile. In some small open economies, such as Ireland, Israel or Czech Republic, R&D expenditure by foreign affiliates accounts for larger shares of total business R&D (Figure 3.24). There is nevertheless a high heterogeneity among OECD countries, both in regards to the business contribution to total R&D spending and foreign business expenditure within the private sector R&D spending (Figure 3.24-3.26). This suggests that while FDI attraction policy can be a useful complimentary policy to support the development of local knowledge-intensive business activities in some cases – for example, in Ireland, foreign enterprises account for over two thirds of BERD (at 1.14% of GDP in 2013), the OECD countries rely in different ways on local foreign affiliates operations to support domestic R&D capacity. For example, while Finland, Japan, Sweden and Austria all have high shares of BERD to GDP (above 2%), foreign affiliates account for less than one quarter of that expenditure in case of the former two countries, and about 40-50% in case of the latter two.

To conclude, there are certain regularities that emerge in relation to the characteristics of foreign firms in Chile. First, even though they trade more intensively than domestic firms, they appear to be primarily oriented towards the domestic market. Second, they are larger, more-capital intensive and productive than foreign firms, and the effect is robust to controls for firm size as well as sector and year fixed effects. When it comes to knowledge-intensity, foreign manufacturing firms employ only a slightly higher share of skilled workers than domestic firms (less than one percentage point difference once we control for the difference in size and sector and year fixed effects), and the data on R&D intensity of the dominant investors in Chile, i.e. US owned affiliates, show that they devote only a small share of their local sales to R&D in Chile (0.06%). Finally comparisons with other small OECD economies show that those that have increased the overall private sector expenditure on R&D tend to attract relatively more foreign R&D than Chile currently does.

### Box 3.2. Costa Rica and the policy of attracting knowledge-intensive FDI

Costa Rica is often quoted as an example of possible effect of an active investment attraction policy, primarily due to the ability of the Government to attract Intel, the world’s largest semiconductor manufacturer (see e.g. OECD, 2012a; Moran, 2014; Marín-Odio, 2014). In the late 1990s, Intel began constructing an assembly and testing plant in Costa Rica. After several expansions and new plant additions, Intel made a significant investment in Costa Rica with a workforce of over 3 500 people, including an engineering and design centre with 300 employees. According to the authorities, besides its direct economic impact, the arrival of Intel acted as a “pull factor” for other multinational companies (MNEs) in related sectors, by establishing Costa Rica on investors’ mental map. After 1997, Costa Rica registered an increase in the number of companies operating in sectors considered to be knowledge-intensive, such as business services, advanced manufacturing and medical devices (Box Figure 3.2.1).

Box Figure 3.2.1. Number of companies in knowledge-intensive activities, Costa Rica, 1960-2011



Source: CINDE, April 2012.

The decision to localise this investment in Costa Rica was a result of a negotiation process between the Costa Rican Investment Promotion Agency (CINDE) and Intel's headquarters (spanning 19 negotiation sessions over the course of a year). Besides the provision of detailed information about economic conditions, investment laws, and regulatory regimes by CINDE to Intel negotiators, the Government also provided concrete reassurances about how the local operations can be integrated into the company's global production network. Such measures included renovation of the national airport with special facilities for Intel freight, plus a new power substation on the electrical grid dedicated to the prospective Intel semiconductor plant, among others. The Government also formed a public-private partnership in which the national Technological Institute worked with Intel to co-design a training program for IT workers, supervisors, engineers, and managers to ensure the development of local skills that can serve the company's needs as well as other economic sectors.

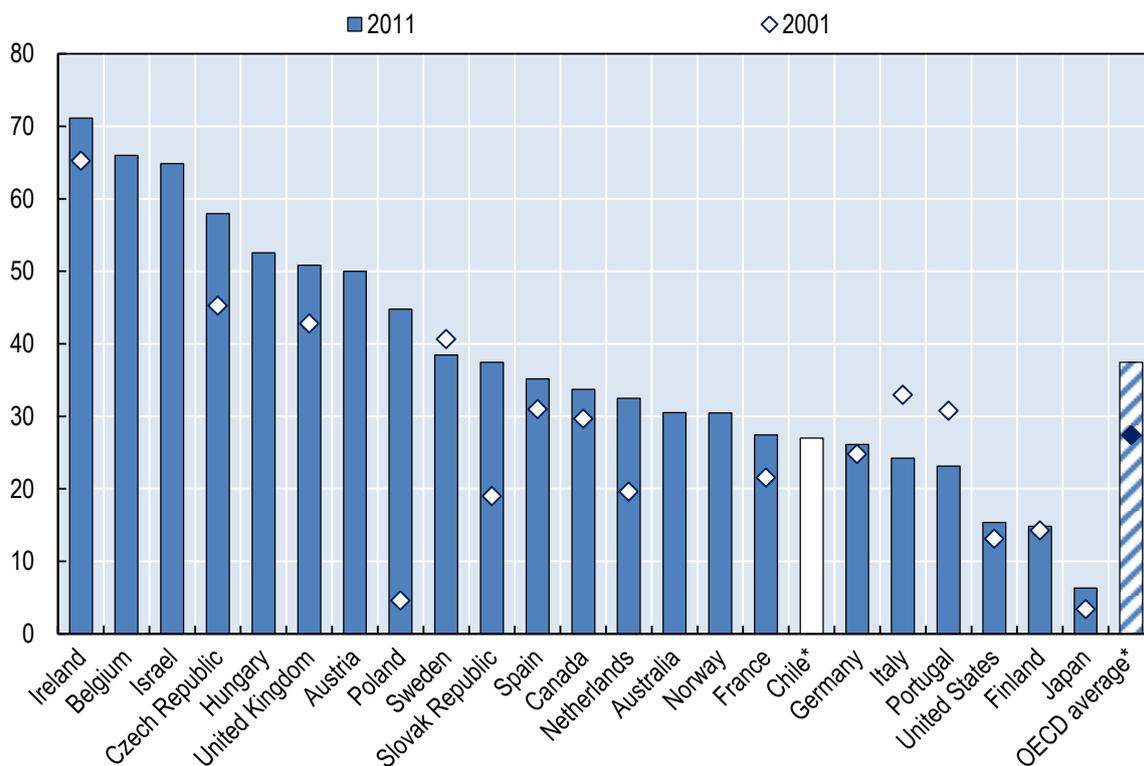
The effect of the policy was not only seen in the manufacturing sector but also in the services sector, where increasingly more MNEs located their operations in Costa Rica— first at the level of entry-level functions (e.g. call centres) and then increasingly for more complex back-office operations (Marín-Odio, 2014). Equifax, one of the US's largest credit reporting agencies, was the first one to invest, establishing a call centre to offer data entry service in English to many of the biggest retail vendors in the US and Canada. Call centres success encouraged further investments in shared services, software support, 'back office' services, medical tourism, and publicity services. While in 2005 there were 33 multinational corporations operating in services in Costa Rica (employing about 11 thousand people and exporting about USD 390 million), this figure tripled by 2011 with close to 100 offshore services MNEs operating in the country, employing over 33 thousand workers and exporting US\$ 1.4 billion (Gereffi et al., 2013; ; Marín-Odio, 2014). This is in line with a trend observed elsewhere in the Latin American region, which saw a progressive move towards services-based participation in GVCs (ECLAC, 2014).

There is some empirical evidence of knowledge transfers and economic spillovers associated with the presences of MNEs in the Costa Rican economy, notably through labour turnover. An estimated 32% of ex-workers of FTZ multinationals (where most of the offshoring services industry is located) were hired by local companies. Similarly, 47% of the domestic ICT firms examined have at least one owner who previously worked for a foreign firm in Costa Rica. Finally, more than half of domestic ICT firms have multinationals as clients in Costa Rica and 27.6% of local suppliers of multinationals have at least one owner who previously worked for a multinational company (WEF, 2011).

Most recently, the shut-downs of some parts of Intel's operations in Costa Rica (notably those related to production) announced in 2014, have brought to the fore the risks associated with changes in global sourcing strategies of MNEs. Meanwhile, other MNEs operating locally – such as Equifax – expanded their knowledge-intensive operations in the country. Knowing what the net impact of any given firm's presence on the local economy is or has been would require a systematic impact assessment of the resources invested in the attraction policy, their spillover effects to the economy at large, and direct and indirect economic effects of the firm's operations in the short and long run. If Intel's presence as well as all that of other companies that followed to form a local high-tech cluster (e.g. Infosys, Hewlett Packard.) has led to the development of local skills that can be then used in other sectors in Costa Rica, for which there is some empirical evidence (e.g. WEF, 2011), the knowledge-intensive activities are likely to grow even once certain companies leave in search of other locations for certain stages of their supply chains.

*Source:* Moran, T H (2014), "Foreign Investment and Supply Chains in Emerging Markets: Recurring Problems and Demonstrated Solutions", Washington, DC: Peterson Institute for International Economics. Working Paper 14-1; OECD (2012a); and Larrain, F.B., L.F. Lopez-Calva and A. Rodriguez-Clare (2000), "Intel: A Case Study of Foreign Direct Investment in Latin America", CID Working Paper, No. 58, CID/Harvard University, Cambridge, MA; Marín-Odio, A. (2014). Global Value Chains: A Case Study on Costa Rica. International Trade Centre Technical Paper, Geneva; Gereffi et al. (2013). Costa Rica in Global Value Chains: An Upgrading Analysis. Centre on Globalization, Governance & Competitiveness, Duke University. World Bank (2006) The Impact of Intel in Costa Rica, Nine Years After the Decision to Invest; World Economic Forum (2011). Costa Rica's Efforts Toward an Innovation-Driven Economy: The Role of the ICT Sector, The Global Information Technology Report 2010–2011; ECLAC (2014), Latin America's emerge in global services: A new driver of structural change in the region? Santiago, Chile.

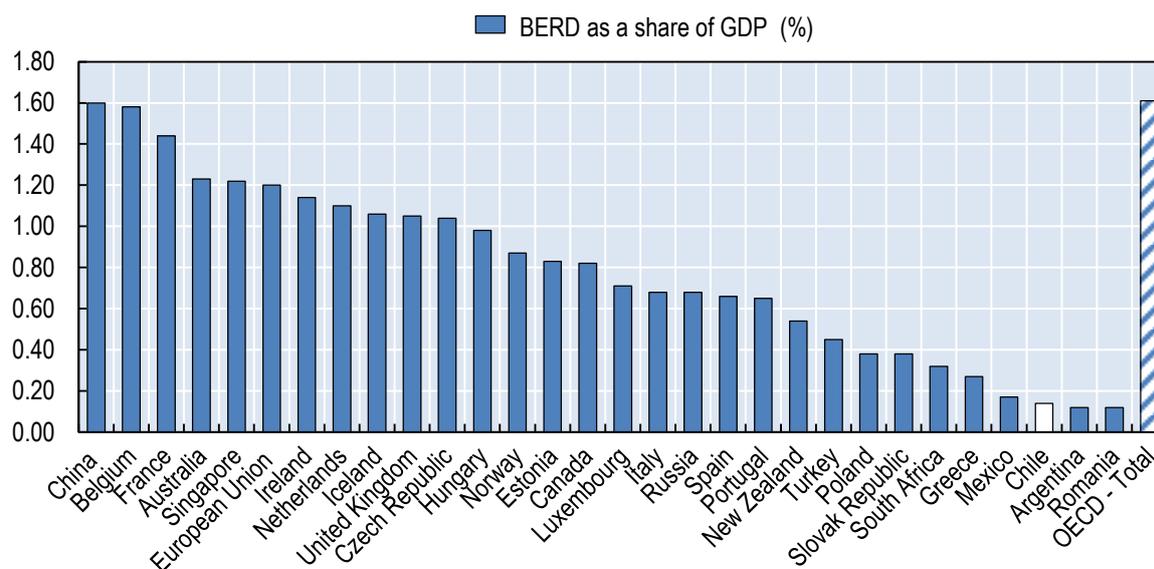
Figure 3.24. R&D expenditures by foreign-controlled affiliates, 2001-2011



Note: Data for Chile come from Chile's R&D Survey; data for Czech Republic and Hungary come from 2009, Japan from 2010, and Norway, Portugal and Slovakia from 2007. OECD average is for the following selected countries: Ireland, Belgium, Israel, Czech Republic, Hungary, United Kingdom, Austria, Poland, Sweden, Slovak Republic, Spain, Canada, Netherlands, Australia, Norway, France, Chile, Germany, Italy, Portugal, United States, Finland, Japan.

Source: OECD, Main Science and Technology Indicators and author's calculations using Chile's R&D Survey.

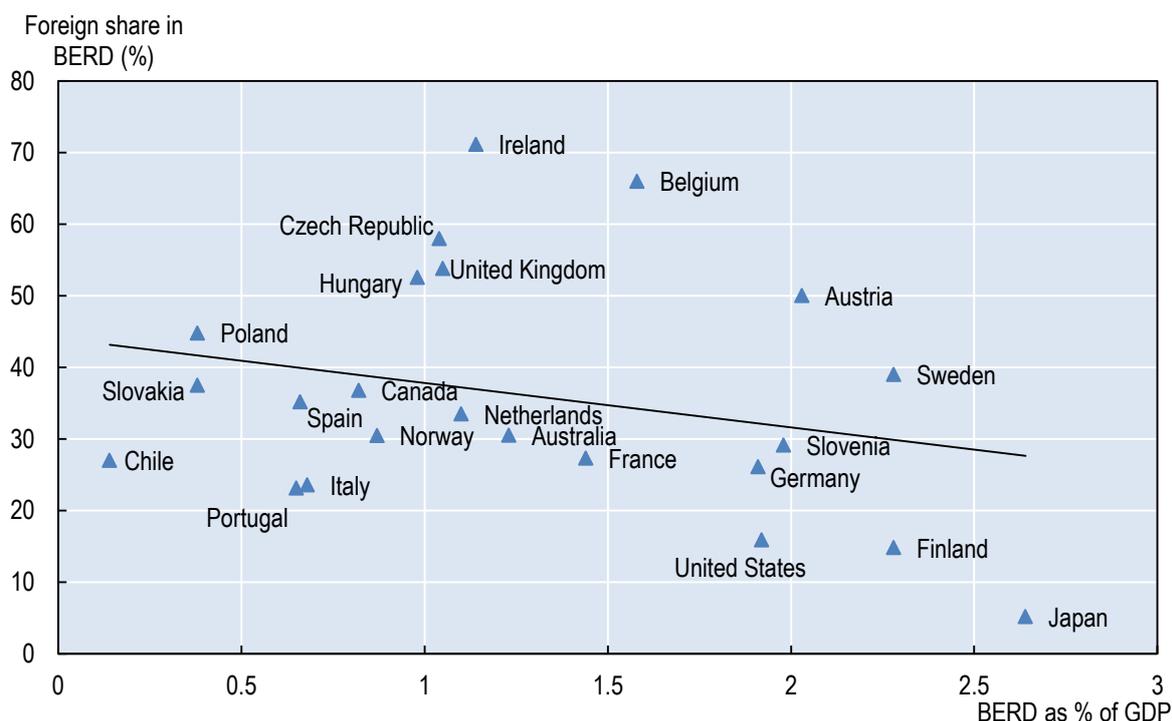
Figure 3.25. Business enterprise expenditure on R&D, 2013



Note: Data for Belgium, Luxemburg, Chile and Argentina come from 2012 and for Israel and Ireland from 2011.

Source: OECD, Main Science and Technology Indicators and author's calculations using Chile's R&D Survey.

**Figure 3.26. The share of R&D expenditure by foreign affiliates in total business R&D expenditure (BERD) and the share of BERD in GDP (%)**



Source: Author elaboration using the OECD, Main Science and Technology Indicators.

### 3.4. The changing investment policy framework in Chile

Previous sections of this report have traced the evolution of foreign investment in Chile and described the broad differences in behaviour of foreign and domestic firms. Overall, it can be seen that foreign investors locate primarily in the mining, retail and financial services sectors as well as basic metals within the manufacturing industry. Partially due to that distribution, foreign firms do not appear to engage intensely in R&D in Chile nor employ particularly high shares of skilled labour locally. They also appear to sell primarily to the domestic market, and do not engage extensively in GVCs via trade. To the extent that investment-related policies influence market entry conditions of different firms in different sectors, they can be an important factor influencing the distribution and characteristics of FDI in the host economy, with implications for the GVC participation and upgrading opportunities for local firms.<sup>51</sup> Therefore, the following section traces the characteristics of the investment policy framework in Chile using the *OECD Policy Framework for Investment*, which is the OECD's primary tool for assessing countries' investment climate (Box 3.3). In particular, recognising that the Chilean Government has recently adopted a new Foreign Investment Law and is soon planning to develop a new Foreign Investment Promotion strategy— in line with the recommendations of an earlier OECD report on the subject (OECD, 2015j), the following sections identify broad policy considerations that the Government could keep in mind during the reform process in this area.

<sup>51</sup> Firms' international investment location decisions are influenced by a number of factors, some of which lie outside of the scope of national policies (see OECD, 2008a; OECD, 2008b; Faeth, 2009 for an overview).

### Box 3.3. The Policy Framework for Investment

The *Policy Framework for Investment* (PFI) is a tool to assess and improve countries' investment climate. It was developed within the OECD by the representatives of nearly 60 countries, and poses a list of key questions that should be examined by governments seeking to create a favourable investment climate. The principal objective of the PFI is to create a conducive environment for private investment, both domestic and foreign, in support of countries' broader economic and social goals, such as supporting productivity growth or reducing poverty.

The PFI is a flexible instrument that allows countries to evaluate their progress and identify priorities for action in various policy areas affecting the investment climate: (i) investment policy, (ii) investment promotion and facilitation, (iii) trade policy, (iv) competition policy, (v) tax policy, (vi) corporate governance, (vii) policies for promoting responsible business conduct, (viii) human resource development, (ix) infrastructure, (x) financial sector development, (xi) policies to promote green investment, and (xii) public governance. Core governance principles, such as policy coherence, transparency in policy formulation and implementation, and regular evaluation of the impact of existing and proposed policies, apply in all these policy areas.

The PFI has been used as a base for Investment Policy Reviews (IPRs) of over 56 different countries. In addition, by encouraging a structured process for formulating and implementing policies at all levels of government, the PFI can be used for self-evaluations, peer reviews, regional co-operation, and multilateral discussions, among others.

Source: OECD, for more information consult: [www.oecd.org/investment/pfi.htm](http://www.oecd.org/investment/pfi.htm)

### *Foreign investment regime in Chile to-date*

As documented in a number of previous policy reviews, Chile has, overall, an open investment regime and solid macroeconomic fundamentals (see WTO, 2015; OECD, 2015j; OECD, 2014 for most recent examples). The principle of national treatment is incorporated in Chile's Constitution, and it is enshrined in a large body of Bilateral Investment Treaties (BITs) and Free Trade Agreements (FTAs) that the country is a party to (see Table 3.A1.4 in Annex 1 for a full list). Specific legislation imposes restrictions on national treatment or market access in a limited number of sectors, discussed in more detail below. The openness of Chilean foreign investment regime is reflected in Chile's ranking on the OECD *FDI Regulatory Restrictiveness Index* (see Box 3.4) where it scores below the OECD average (Figure 26). The few sectors that are subject to restrictions on national treatment in Chile include transport, media, fishing, financial services (other than banks and insurance), and auditing services (Figure 3.28).<sup>52</sup> It is worth noting that Chile does not impose any specific restrictions on market entry in manufacturing, which suggests that statutory FDI barriers cannot be the reason explaining the relatively low FDI share in that sector. Finally, some investment projects, regardless whether domestic or foreign, require a prior authorisation from a relevant regulatory agency for the investment to take place.<sup>53</sup>

<sup>52</sup> A full list of exceptions to national treatment in Chile is available in OECD (2013b) and OECD (2013c).

<sup>53</sup> For example, the authorization of the Chilean Commission of Copper is required for investments in mining. Similarly, the consent of the Banks and Financial Institutions Regulatory Agency is required for investments in the banking sector and that of the Securities and Exchange Commission for the insurance industry and investment funds. Finally, a project's potential environmental impact is assessed through the Environmental Impact Evaluation System managed by the National Environment Commission.

### Box 3.4. The OECD FDI Regulatory Restrictiveness Index

The OECD *FDI Regulatory Restrictiveness Index (FDI Index)* is an in-house OECD tool to measure statutory restrictions on foreign direct investment in 58 countries, including all OECD and G20 countries. It covers 22 sectors, including agriculture, mining, electricity, manufacturing and main services sectors (i.e. transport, construction, distribution, electricity, communications, real estate, financial and professional services), and is currently available for the following years: 1997, 2003, and 2006-2014. Restrictions are evaluated on a 0 (open) to 1 (closed) scale. The overall restrictiveness index is a weighted average of individual sectoral scores.

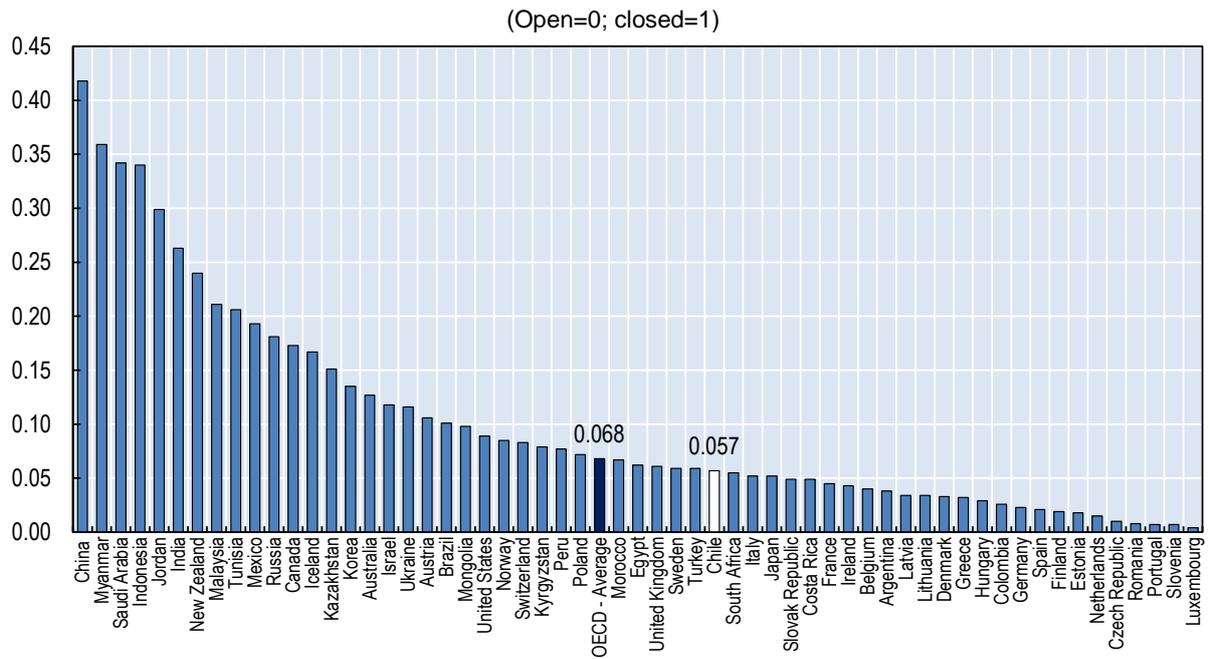
For each sector, the scoring is based on the following elements:

- the level of foreign equity ownership permitted;
- the screening and approval procedures applied to inward foreign direct investment;
- restrictions on key foreign personnel; and
- other restrictions such as on land ownership, corporate organisation (e.g. branching).

The measures taken into account by the index are limited to statutory regulatory restrictions on FDI, typically listed in countries' lists of reservations under FTAs or, for OECD countries, under the list of exceptions to national treatment. The *FDI Index* does not assess actual enforcement. The discriminatory nature of measures, i.e. when they apply to foreign investors only, is the central criterion for scoring a measure. State ownership and state monopolies, to the extent they are not discriminatory towards foreigners, are not scored.

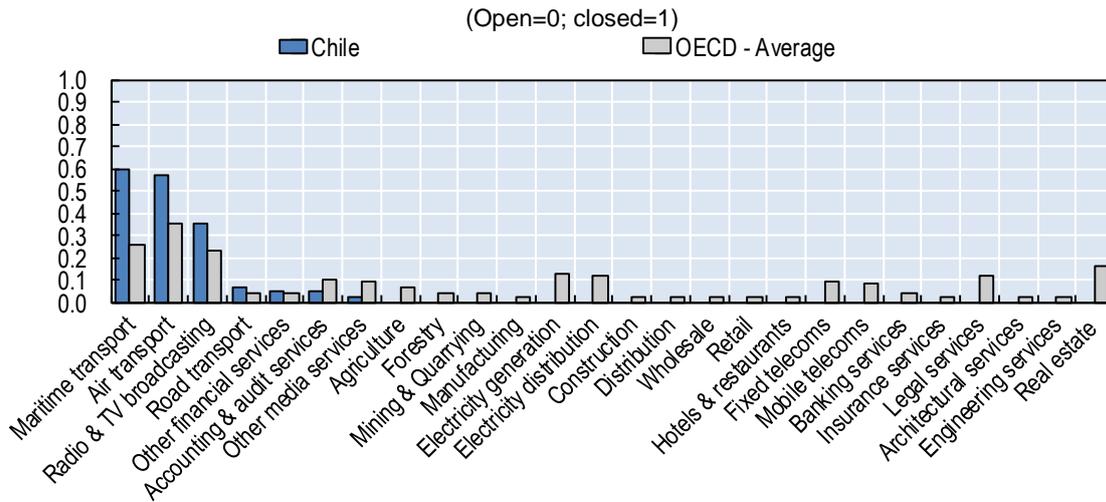
*Note:* For the latest scores, see [www.oecd.org/investment/index](http://www.oecd.org/investment/index)

**Figure 3.27. Chile's score on the OECD FDI Regulatory Restrictiveness Index relative to other economies, 2014**



Source: OECD FDI Regulatory Restrictiveness Index ([www.oecd.org/investment/index](http://www.oecd.org/investment/index)).

**Figure 3.28 Chile's FDI restrictions according to the OECD FDI Regulatory Restrictiveness Index, by sector, 2014**



Source: OECD FDI Regulatory Restrictiveness Index (www.oecd.org/investment/index).

Several commentators noted Chile's relatively high level of restrictiveness in certain services sectors, such as maritime transport, air transport and courier services, which are important enablers of GVC activity (e.g. OECD 2015d, forthcoming; OECD, 2011c; Moreira and Blyde, 2006). Indeed, in the maritime and air transport sector Chile scores higher than the OECD average on the *OECD FDI Regulatory Restrictiveness Index* (Figure 3.28). In maritime transport, this is primarily due to the use of maximum foreign equity limits (of 49%) and the existence of restrictions on key foreign personnel.<sup>54</sup> The cabotage market is also reserved for Chilean vessels only.<sup>55</sup> The restrictions on foreign personnel are also present in airport transport, whereas Chile does not apply any foreign equity limits in that sector (unlike many other OECD countries).<sup>56</sup> Given Chile's long coastline and high reliance on exports of copper by sea from different national ports, the Government could consider removing some of the remaining restrictions. For example, while common elsewhere in the OECD countries, the restrictions on cabotage *de facto* block the development of an internal shipping market in Chile (see e.g. Merk, 2013), which some foreign investors present locally already expressed an interest in developing.<sup>57</sup>

More generally, as Chile removed most of the statutory restrictions on FDI in its various sectors, other behind-the-border barriers and ensuring *de facto* high level of competition has become more important. For example, Chile's scores on the *OECD Services Trade Restrictiveness Index*<sup>58</sup> show that

<sup>54</sup> The majority on the Board of Directors and the manager of a shipping company must be Chilean nationals [Decreto Ley 2222 (Navigation Law), Article 11(a)]. Chilean pilots must be used by all ships that navigate through inter-coastal waterways or the Straits of Magellan, or perform any manoeuvres in Chilean ports or in proximity thereof, except under the circumstances listed in the law. [Decreto Supremo (M) 397 (Regulation of Pilotage and Piloting), Article 1] Tugging activities in Chilean harbours may only be performed by Chilean tugboats; foreign flagged tug boats may only be used when a special authorization is obtained [Decreto Ley 2222 (the Navigation Law), Articles 39-41].

<sup>55</sup> Several OECD countries apply similar level of equity restrictions (e.g. New Zealand, Australia) and reserve the cabotage market for national vessels only, but restrictions on foreign personnel are less common (Geloso Grosso et al., 2014).

<sup>56</sup> Ley 18.916 Código Aeronáutico (Law 18.916 Aeronautical Code), Art. 38, available at [www.leychile.cl/Navegar?idNorma=30287](http://www.leychile.cl/Navegar?idNorma=30287);

<sup>57</sup> The Danish shipping company (Maersk) declared its interest in investing in the coastal shipping in Chile, should the Government wish to ease the market entry conditions for foreign firms. Source: <http://papeldigital.info/negocios/2014/10/05/01/paginas/020.pdf>

<sup>58</sup> Besides traditional restrictions on FDI such as foreign equity limits, screening and approval mechanisms and foreign personnel restrictions, the *OECD Services Trade Restrictiveness Index* takes into account all

regulations relating to competition are a relatively more important barrier to trade and investment in its certain key backbone services sectors, such as courier services, telecommunications, air transport or rail (Figure 3.29). This could explain the high market concentration and mark-ups in the country—except for mining, price-cost margins are higher in Chile than in Australia, Canada and New Zealand in all sectors, and the largest differences are found in transport and telecommunications (Figure 3.A1.2 in Annex). While Chile’s relatively small size may naturally inhibit competition, there is also scope for further strengthening of competition policy, notably in the area of monitoring of mergers and acquisitions (Box 3.5). Chilean authorities are aware of these challenges, and several steps were undertaken to improve the efficiency of Government actions, as testified by the recently submitted draft competition bill (OECD, 2015a), the attempts to improve regulations in the banking sector to avoid the *de facto* formation of cartels (WTO, 2015) and the recent high-level enforcement actions in the transport sector, involving both domestic and foreign firms.<sup>59</sup>

**Box 3.5. Existing lacuna in Chile’s merger control**

The OECD study of Chile’s competition framework for merger control identifies and assesses the main issues arising from Chile’s current merger control regime and proposes a series of recommendations for improvement. The main finding of this Report is that Chile’s current merger control regime lacks transparency, legal certainty and predictability due to the absence of specific legal provisions on merger control, the lack of clear merger control jurisdictional criteria, the reliance on general antitrust procedures which were not designed for merger control purposes, and the absence of streamlined merger review powers between the Competition Authority (FNE) and the Competition Tribunal (TDLC).

The report recommends in particular:

- The establishment of a merger control regime by law;
- The delineation of merger control jurisdiction through the definition of mergers, the selection a merger notification mechanism and the determination of notification thresholds;
- The establishment of a transparent, effective and timely merger review procedure, and corresponding merger review powers with the FNE and/or the TDLC;
- The provision of a consistent substantive test to assess mergers’ impact on competition;
- The enforceability of merger control rules through adequate enforcement tools and sanctions.

Source: OECD (2014), Assessment of merger control in Chile, [www.oecd.org/daf/competition/chile-merger-control-2014-en.pdf](http://www.oecd.org/daf/competition/chile-merger-control-2014-en.pdf)

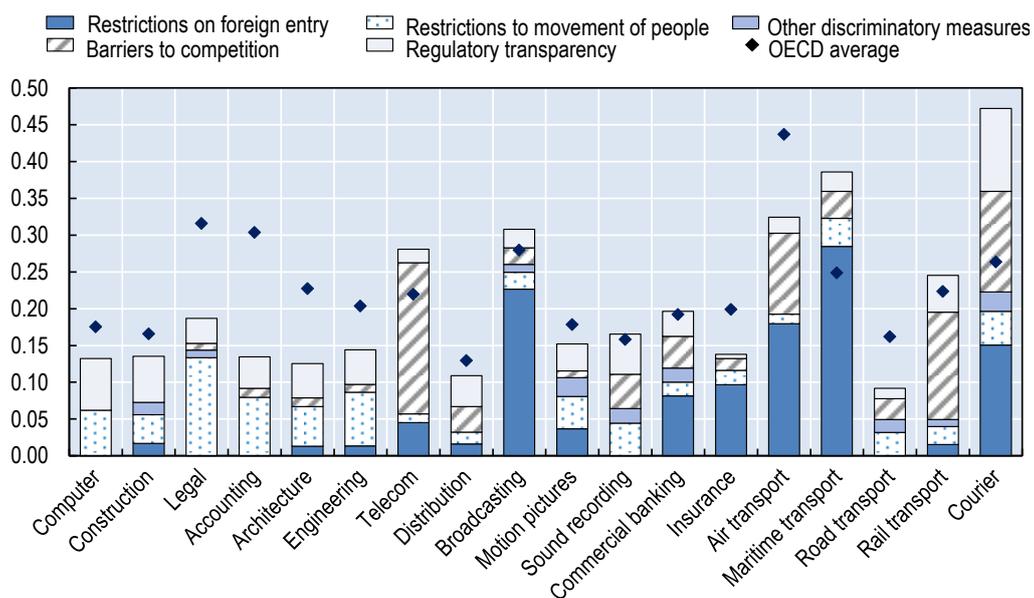
Overall, bearing in mind the country’s remote location and the ambition to connect to GVCs, Chile should aim to mobilise all the resources it can, both domestic and foreign, to ensure competitiveness of its key backbone services. For example, logistics account for about one fifth of total product value in the manufacturing sector in Chile, which is over two times higher than the OECD average (OECD , 2013a). As a result, a reduction in transport costs is estimated to have a much larger impact on the total manufacturing output in Chile than further reductions in tariffs, for example (IADB, 2010). The availability and affordability of energy, water and transport services are also key considerations for the future growth of the mining sector in Chile (CSIRO, 2014). Besides the reduction of remaining restrictions and pro-competitive regulatory framework (described above), improved performance in these areas will inevitably require resources— both public and private, and strategic planning. This also applies to the “soft” infrastructure for doing business in Chile, such as the availability of skilled labour force, which still appears to be a problem holding back a stronger take-up of knowledge intensive activities and GVC upgrading of local firms (OECD, 2013a; OECD, 2015d). Recognition of these needs appears to underlie some of the Government’s recent efforts to increase public revenue, fund educational reforms, and mobilise strategic investments, including through the revised Foreign Investment Law, discussed next.

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sectoral regulations that may have incidence on trade and investment, including competition and transparency-related provisions. For more information, see: <http://oe.cd/stri>.

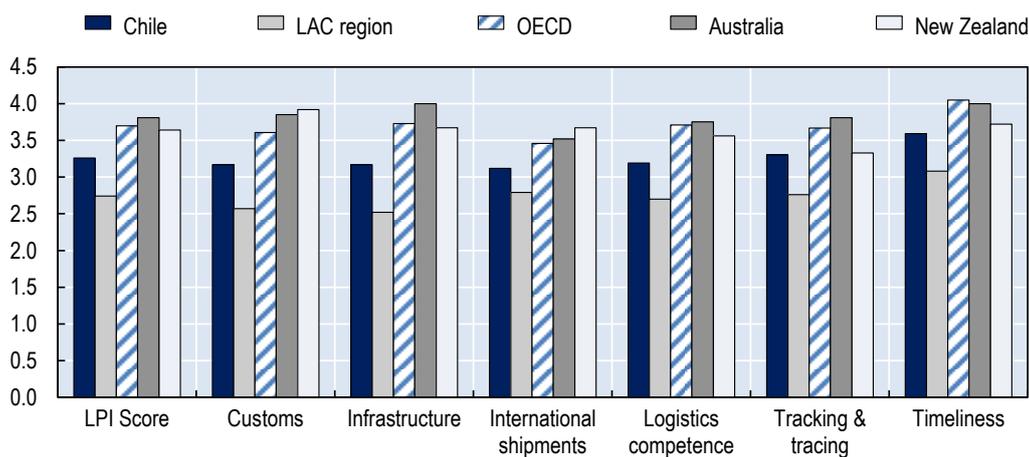
<sup>59</sup> In January 2015, Chile’s competition authority (FNE) filed for a fine of six shipping companies, including foreign, for price fixing that lasted about 12 years. More information on the FNE’s website: [www.fne.gob.cl](http://www.fne.gob.cl)

**Figure 3.29. Chile's scores on the OECD Services Trade Restrictiveness Index, by sector, 2014**



Source: OECD Services Trade Restrictiveness Index.

**Figure 3.30. Logistics performance in Chile, LAC and selected OECD countries, 2014**



Note: The Logistics Performance Index (LPI) has a scale of 1 to 5, where 5 represents the best logistics performance

Source: World Bank Logistics Performance Index.

### ***Recent regulatory changes with impact on foreign investment***

Over 2014-2015, the Government undertook several reforms with implications for investors, including foreign. For example, the tax regime has been reformed in 2014 to increase the total public revenue and to fund the on-going educational reforms (see Box 3.6 for an overview), the amendments to the Labour Code were submitted to the Congress at end 2014, and – last but not least, a new Foreign Investment Law was passed in 2015, introducing a new framework for international investment promotion in Chile. The latter reform marks a qualitative change in the Government’s approach to international investment, which has hitherto relied on liberalisation and ensuring a stable macroeconomic framework to attract investors, without a pro-active attraction policy in place.

Until the adoption of a new Foreign Investment Law in June 2015<sup>60</sup>, Chile did not have a dedicated law for foreign investment. To bring capital into Chile, investors could choose between two instruments: *i*) a simple registration with the Central Bank (via Chapter XIV of the Central Bank's Compendium of Foreign Exchange Regulations) or *ii*) the Foreign Investment Statute (the so-called DL600)<sup>61</sup>. Entering the market via DL600 involved signing of a contract between the investor and the Chilean State, and offered investors a series of tax and judicial guarantees (Box 3.7). Since its introduction in 1974, the DL600 was the dominant instrument for bringing capital into Chile, with most investment materialised in the mining sector as well as electricity, gas and water and financial services sector (Figures 3.31-3.32). Wishing to attract investment into other sectors and being able to support particular kind of investment activities, the Government repealed DL600 and introduced a new framework for investment promotion and established a new Investment Promotion Agency (IPA) in the new Foreign Investment Law. This has been the principal novelty of the Law, together with changes in tax options available to investors, as other guarantees enshrined in DL600 are reflected in the new law and elsewhere in the Chilean legal system (Box 3.7).

### Box 3.6. The 2014 Tax reform in Chile

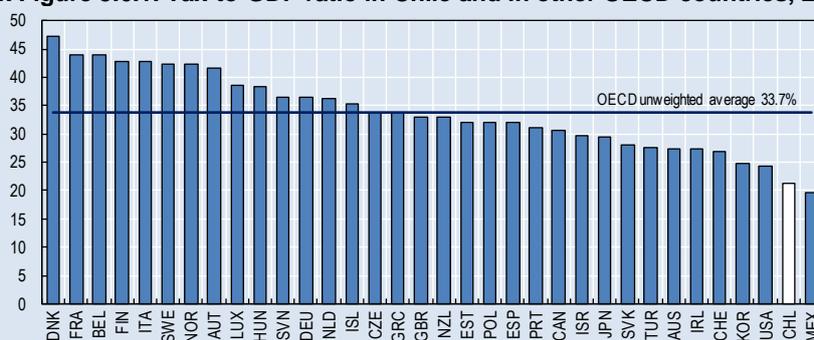
In 2014, the Chilean Government passed a tax reform (Law 20.780), introducing a dual tax system starting from 2017 and gradually increasing corporate income tax (from 20% in 2013 to the max. of 27% in 2017, depending on which system the firm chooses). The pronounced objective of the reform is to raise government revenue (by 3% of GDP) for the purposes of financing an education reform, to reduce distortions present in the system, and decrease opportunities for tax avoidance. A new carbon tax was also introduced, set to start in 2018, which will apply to the emissions of the power sector at USD 5 per tonne of CO<sub>2</sub> to gradually cover all sectors.

In addition, the tax bill repealed the Foreign Investment Statute (DL600), under which foreign investors could opt for tax invariability on income (at 42%) for up to ten years of their investment, starting from January 2016. Still, investors can enter new agreements under DL600 during the four years after the enactment of the new Foreign Investment Law and opt for tax invariability (at 44.45%) for up to ten years. In addition, the agreements entered by investors before January 2016 remain in force.

To assess whether the reform has achieved its announced objectives and its impact on public revenue and private investment, the Government should consider undertaking a formal impact assessment. Besides being a potent tool to assess, monitor and improve policy design, impact assessments can also serve as a useful communication tool on the effectiveness of a given reform (or its potential lacuna), and facilitate public debate. Finally, given that the administrative implementation of the reform is pending, to help mitigate any potential negative effects on investment, it will be important that it is undertaken in as transparent and predictable manner as possible.

Overall, Chile has one of the lowest tax-to-GDP ratios in the OECD – equal to 21.4% in 2013 (Box Figure 3.6.1). Even when the 2014 tax reform is fully in place, tax collection over GDP is expected to still be significantly lower than the OECD average (34.1%). In addition, the system is skewed towards indirect taxation on purchases of goods and services (50% of total tax revenue as compared to 33% in the OECD), with less revenue being collected through personal income tax (1.4% of GDP versus 8.6% of GDP in the OECD) and social security contributions (1.4% of GDP versus 9.0% of GDP in the OECD).

Box Figure 3.6.1. Tax-to-GDP ratio in Chile and in other OECD countries, 2012<sup>a</sup>



Note: a) 2012 is the latest year for which tax revenue data is available for all OECD countries.

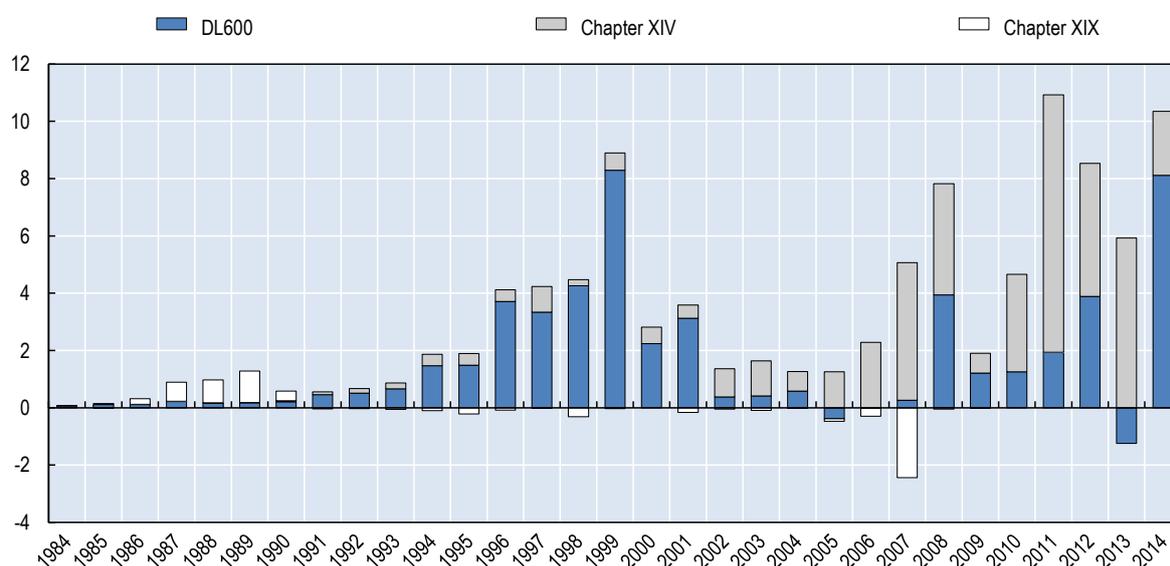
Source: OECD Revenue Statistics 2014. Law 20.278, OECD Revenue Statistics (2014), Deloitte Tax Alert (2014), Ernest Young Global Tax Alert (2015).

<sup>60</sup> Law 20.848, available at: [www.leychile.cl/Navegar?idNorma=1078789](http://www.leychile.cl/Navegar?idNorma=1078789)

<sup>61</sup> Decree Law No. 600 (DL600), available at: [www.ciechile.gob.cl/wp-content/uploads/2010/10/DL600\\_English.pdf](http://www.ciechile.gob.cl/wp-content/uploads/2010/10/DL600_English.pdf)

Until the adoption of a new Foreign Investment Law in June 2015<sup>62</sup>, Chile did not have a dedicated law for foreign investment. To bring capital into Chile, investors could choose between two instruments: *i*) a simple registration with the Central Bank (via Chapter XIV of the Central Bank's Compendium of Foreign Exchange Regulations) or *ii*) the Foreign Investment Statute (the so-called DL600)<sup>63</sup>. Entering the market via DL600 involved signing of a contract between the investor and the Chilean State, and offered investors a series of tax and judicial guarantees (Box 3.7). Since its introduction in 1974, the DL600 was the dominant instrument for bringing capital into Chile, with most investment materialised in the mining sector as well as electricity, gas and water and financial services sector (Figures 3.31-3.32). Wishing to attract investment into other sectors and being able to support particular kind of investment activities, the Government repealed DL600 and introduced a new framework for investment promotion and established a new Investment Promotion Agency (IPA) in the new Foreign Investment Law. This has been the principal novelty of the Law, together with changes in tax options available to investors, as other guarantees enshrined in DL600 are reflected in the new law and elsewhere in the Chilean legal system (Box 3.7).

**Figure 3.31. Annual FDI inflows into Chile according to the legal mode of entry, in billion USD, 1984-2014**



Source: Central Bank of Chile.

<sup>62</sup> Law 20.848, available at: [www.leychile.cl/Navegar?idNorma=1078789](http://www.leychile.cl/Navegar?idNorma=1078789)

<sup>63</sup> Decree Law No. 600 (DL600), available at: [www.ciechile.gob.cl/wp-content/uploads/2010/10/DL600\\_English.pdf](http://www.ciechile.gob.cl/wp-content/uploads/2010/10/DL600_English.pdf)

### Box 3.7 Foreign Investment Statute (DL600)

Since 1974, any foreign individual or legal entity, as well as Chileans with residence abroad, could invest in Chile through the Foreign Investment Statute (Decree Law No. 600 of 1974, hereinafter DL600). Under this mechanism, investors enter into a legally binding contract with the Chilean State, which cannot be modified unilaterally by the State or by subsequent changes in the law. Investors may in turn request at any time an amendment of the contract to increase the amount of the investment, change its purpose or assign its rights to another foreign investor.

DL600 offered investors three types of guarantees:

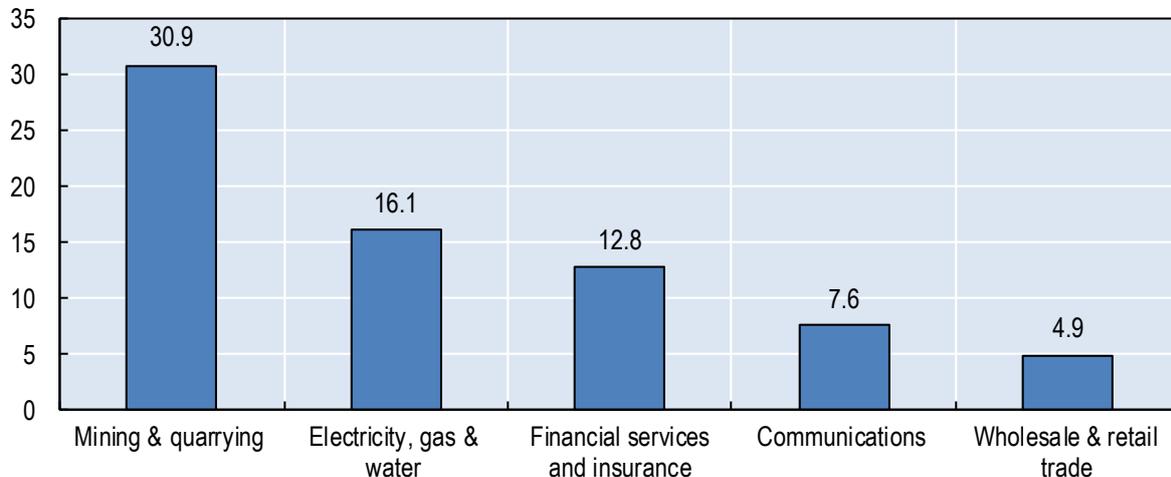
- i) freedom to repatriate capital and profits as well as the right to access the exchange market, once all tax obligations have been fulfilled;
- ii) judicial guarantees against arbitrary or discriminatory treatment;
- iii) guarantees of tax invariability on income (fixed at 42%) as well as on value-added and import tariffs for capital goods needed for the project (fixed at the rate at the date of the investment).

With the adoption of the new Foreign Investment Law in Chile in June 2015 (Law number 20,848), the DL600 has been repealed. Most provisions enshrined in DL600 are reflected in the new Foreign Investment Law and elsewhere in the Chilean legal system. For example, Article 5 of the new law reaffirms the freedom to repatriate profits abroad, once all tax obligations have been fulfilled; while Article 6 stipulates the conditions of access to the formal exchange market. Judicial protection against arbitrary and discriminatory treatment is enshrined in the Chilean constitution, and protected by a dense net of BITs and investment chapters of the FTAs.

The principal novelty of the new law is hence the introduction of a new framework for investment promotion in the country, including the creation of a new Investment Promotion Agency (IPA), and the repeal of tax invariability options open to investors. Still, investors can still enter new contract with the state under DL600 for four years after the enactment of the new law (with certain changes, including a higher rate for guarantees income tax of 44.45%) and the agreements entered before January 2016 remain in force.

Source: OECD (2015j), WTO (2015), (OECD, 2010)

Figure 3.32. Top five sectors in terms of materialised investment under DL600, in billion USD, 1974-2012



Source: Foreign Investment Committee.

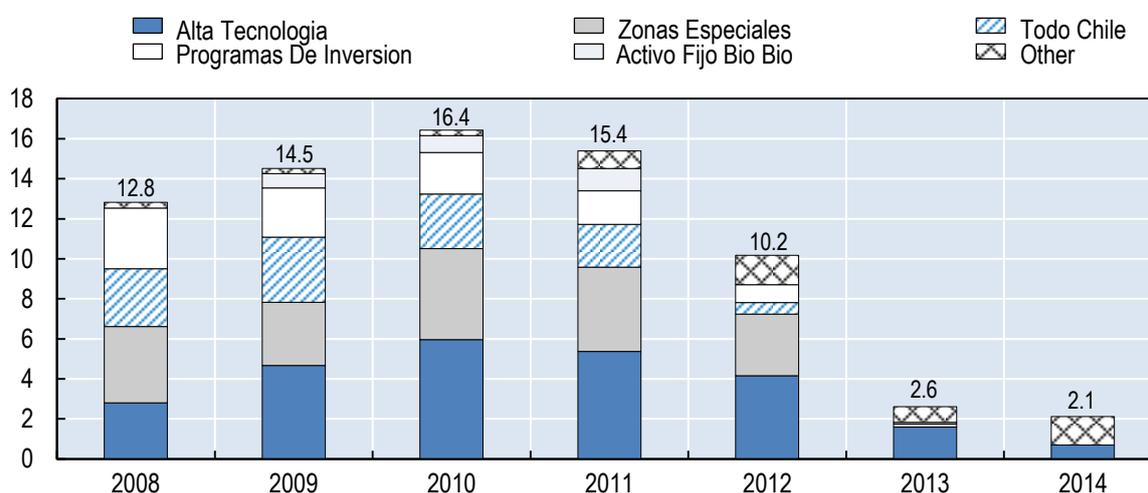
The adoption of the new Foreign Investment Law and the establishment of a new IPA have been undertaken in line with the recommendations included in the previous OECD report on the subject (OECD, 2015j). In particular, besides the guidelines on the possible institutional design of the newly created IPA, the report recommended that the Chilean authorities adopt a whole-of-the-government approach to investment promotion, which can be facilitated by a preparation of a national investment promotion strategy, embedded in the country's wider economic objectives. It is therefore encouraging that the creation of Chile's IPA has been a part of the National Agenda for Productivity, Innovation

and Growth in Chile<sup>64</sup>, and that the Government is currently working on the preparation of a national investment promotion strategy, as required by the new Foreign Investment Law.<sup>65</sup>

Until now, there has been no national-level investment promotion strategy in Chile, which meant that each institution considered somewhat different sectors as strategic<sup>66</sup> and run separate programmes to support their development<sup>67</sup> (see Zahler et al., 2014 for a recent review). See Table 3.3 for an overview of funds distributed under various investment promotion programmes administered by the Chilean Development Agency (CORFO). The development of a new strategy can hence be a helpful opportunity to review pre-existing strategic documents and investment promotion programmes, develop a unifying vision for all relevant actors involved, and communicate clearly the intended policy goals. To assist the Government in the preparation of the strategy, the following section builds on previous OECD report and other relevant OECD work on investment promotion (OECD, 2015j; OECD, 2011; OECD, 2009; OECD, 2008b-d) and presents broad policy considerations to bear in mind and relevant best-practices. Given that the pronounced Government objective is the attraction of knowledge-intensive FDI and facilitating GVC participation of local firms, we devote particular attention to these two issues.

**Figure 3.33. Distributed funds under investment promotion programmes administered by CORFO, 2008-2014**

In million USD



Source: CORFO.

<sup>64</sup> Measure 46; the Agenda is available at the Government's website: [www.agendaproductividad.cl](http://www.agendaproductividad.cl)

<sup>65</sup> Article 10 of the Law stipulates that the President will adopt an investment promotion and facilitation strategy and Article 12 that the strategy should be prepared by the Council of Ministers for Investment Promotion, presided by the Minister of Economy, Economic Development and Tourism.

<sup>66</sup> For example, Chile's Economic Development Agency (CORFO), the National Council for Innovation and Competitiveness (CNIC) and the Foreign Investment Committee (CIE), which is now Chile's IPA, support somewhat different sectors and activities that they consider strategic. Information based on OECD Secretariat's discussions with high-level officials at CORFO, CNIC, CIE and DIRECON.

<sup>67</sup> These include the regional cluster programmes and regional public-private collaboration roundtables overseen by CORFO; national cluster policy supervised by CNIC; technological consortia led by CONICYT, and individual investment promotion programmes such as *ChileInnova*, *InvestChile*, etc.

## *The emerging investment promotion policy in Chile – do’s and don’ts*

### *What to promote, why and how – and do GVCs change anything?*

Most IPAs globally target some sectors or activities over others, and such prioritisation is considered to be a best-practice by investment promotion professionals.<sup>68</sup> Most OECD countries also have active investment promotion policies in place (OECD, 2009b). While there is no common approach to deciding “what to promote” and “why”, generally successful promoters use as much as possible the available market and company intelligence to support activities in which the country has a competitive niche (OECD, 2011), and prioritise activities where social returns are high and the information asymmetries may be strong to ensure the adequacy of government intervention. This has led many countries to support sectors that are considered knowledge-intensive or sectors that are key platforms for the development of other economic activities, such as green energy or key infrastructure.

Indeed, most OECD countries support different knowledge-intensive industries and activities (e.g. advanced manufacturing or R&D) as well as some backbone services and cross-sectoral economic activities (such as green energies, infrastructure, and ICT) (see Table 3.2 for an overview). The idea behind targeting advanced manufacturing is based on the evidence that within GVCs firms tend to co-locate their R&D activities as well as distribution and logistics with their production facilities, while the reverse appears not to be true—most service activities (except R&D) do not attract production activities with them (Defever, 2006; Py and Hatem, 2009). Surveys conducted by UNCTAD confirm that developing countries also increasingly reorient their promotion activities from low- and medium-level manufacturing towards more knowledge-intensive activities to benefit from the global fragmentation of knowledge-creation associated with GVCs (UNCTAD, 2005).

There is some evidence that attraction of foreign R&D capacities can bring direct and indirect benefits in the host economy, including easier access to global knowledge networks, upgrading of the local productive capacity, and creation of jobs for skilled workers (OECD, 2008d; OECD, 2011).<sup>69</sup> But, R&D activities of foreign affiliates may also lead to crowding out of domestic R&D, for example when talent is attracted away from local research institutions, or when local R&D centres are closed by the acquiring foreign firm as part of group-wide optimisation efforts (OECD, 2008a and OECD, 2008d). Therefore, while FDI attraction policy can be a useful complement to the domestic innovation efforts, it rarely supplants the general reforms aiming to improve the quality of the domestic education and innovation system (discussed in more detail in Chapter 4). This also holds for other sectors and activities—such as infrastructure—where countries have experienced mixed results in terms of their ability to attract investors without wider reforms, relating to pricing or licensing requirements for example (UNCTAD, 2008a).

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<sup>68</sup> See, e.g. UNCTAD (2008), World Bank (2005), Loewendahl (2001), Proksch (2004).

<sup>69</sup> These may accrue through sub-contracting, technology licensing, staff turnover or other interactions between foreign and local firms (see Cantwell and Piscitello, 2000; Carlsson, 2006; Santangelo 2005).

**Table 3.2. Promotion priorities for international investment in selected OECD economies**

<b>Australia</b>	“Austrade” targets foreign inward investment in five priority sectors: agribusiness and food; resources and energy; major infrastructure; tourism infrastructure; advanced manufacturing, services and technologies.
<b>Austria</b>	R&D, automotive, mechanical engineering, medical technology, biotechnology, ICTs.
<b>Czech Republic</b>	Automotive, electronics, microelectronics, telecoms, engineering ( to a lesser extent nanotech and life sciences, software, eco-energies, marketing, training centres, consulting, sourcing)
<b>France</b>	<ul style="list-style-type: none"> <li>• Focus on innovation-related activities, high-tech manufacturing and high added value services.</li> <li>• ‘Invest in France’ agency puts a special focus on its promotion policy on 15 activity niches with high growth potential, most of which are innovation-intensive. Since 2003, a global attractiveness policy has been set up with the attraction of talents, skills and expertise being its major goal.</li> </ul>
<b>Ireland</b>	<ul style="list-style-type: none"> <li>• Promotion based on the concepts of ‘areas of convergence’ and ‘platform technologies’ rather than on traditional industry classification (to take into account ‘technological and industry convergence’).</li> <li>• Targeted promotion priorities: global services, high-tech manufacturing, R&amp;D and innovation, life sciences, pharmaceuticals and medical devices, ICT, financial services, content industries, consumer and business services, diversified industries, clean technologies.</li> </ul>
<b>Korea</b>	The strategic aim of ‘Invest in Korea’ is to promote the country as a regional hub in North-East Asia, acting as a link between Pacific and continental economies; high value-added activities are considered as a priority.
<b>Netherlands</b>	A new promotion strategy has been implemented in 2006, focusing on innovation-related activities where the Netherlands enjoy a comparative advantage. At the same time, the Netherlands puts more focus on after-care to retain existing activities.
<b>Sweden</b>	Focus on some key sectors mainly related to innovation: R&D centres, life sciences and health, ICT, mobile communication, material sciences, automotive, high added value services (logistics, headquarters), green solutions, wood products, tourism.
<b>United Kingdom</b>	Low carbon economy; renewable energies; engineering technologies; creativity and innovation (movies, music, design); financial services ; ICT; Life sciences, pharmaceuticals.

Source: OECD (2011), OECD (2009) and investment promotion agencies annual reports.

Besides the choice of sectors and business activities to be targeted, Governments also face a dilemma regarding the type of activities that the IPA should primarily devote its time and resources to given the implicit trade-offs. As explained in the OECD (2015j) report, promoting and facilitating investment are two different types of activities. While investment promotion involves a series of activities that aim to promote the image of a country as a potential investment destination, investment facilitation reunites activities that make it easier for investors to either start a new or expand an existing business. This can include pre-investment support, for example through the establishment of so-called “one-stop shops” (see Box 3.8) and the assistance in obtaining local sites, suppliers or clients; facilitating expansion and otherwise supporting existing investors (i.e. after-care services) or, last but not least, supporting broader investment-related reforms, such as easing of licensing requirements or streamlining of excessively burdensome administrative procedures (see Table 3.3 provides an overview of possible IPA functions). Given that licensing requirements appear to still be a problem for doing business in Chile, as illustrated by high scores on the OECD *Product Market Regulations* indicators (Figure 3.33), further investment facilitation through the IPA activities and broader reform may be beneficial for both existing and new firms. As bureaucratic procedures tend to affect large and complex projects more, progress in this area could support to goal of facilitating upgrading in GVCs, and increasing investment in large infrastructure projects.<sup>70</sup>

<sup>70</sup> For example, the direct engagement of the President in facilitating the permitting process in the renewable energy sector appears to be an important factor behind the take-up of several large-scale renewable energy projects in Chile in recent months (of strategic importance to the competitiveness of mining).

**Table 3.3. Possible activities of an investment promotion agency**

	<b>Function</b>	<b>Objective</b>	<b>Activities</b>
Investment promotion	Image building	To create a positive image of the country as an attractive site for international investment	<ul style="list-style-type: none"> <li>• Advertising</li> <li>• PR events</li> <li>• Mass media campaigns abroad</li> <li>• Investor forums</li> <li>• Maintaining relationships with journalists and business partners</li> <li>• Developing the IPA website</li> </ul>
	Investment targeting	To create investment leads that target investment projects in specific sectors, development areas or companies	<ul style="list-style-type: none"> <li>• Identification of potential investors</li> <li>• Matchmaking</li> <li>• Direct mailing, telephone campaigns</li> <li>• Seminars for targeted investors</li> <li>• Provision of investment services</li> </ul>
Investment facilitation	Pre-investment services	To facilitate the international investor's arrival in the country; to assist in analysing investment decisions	<ul style="list-style-type: none"> <li>• Information provision</li> <li>• 'One-stop shop' registration/approval service</li> <li>• Sectoral analyses</li> <li>• Assistance in obtaining sites, suppliers, etc.</li> </ul>
	Post-investment services (aftercare)	To assist the international investor in maintaining his business, facilitating re-investment decisions in the future	<ul style="list-style-type: none"> <li>• Legal or advisory support to ongoing foreign investment projects</li> <li>• Dealing with bureaucracy</li> </ul>
	Policy advocacy	To improve investment climate by establishing effective feedback between the investor and the government	<ul style="list-style-type: none"> <li>• Surveys of the business sector</li> <li>• Participation in task forces</li> <li>• Policy and legal proposals to authorities</li> <li>• Lobbying</li> </ul>

Source: UNCTAD (2008), Piontkivska and Segura (2003); Wells and Wint (2000).

**Box 3.8. One-stop-shops, example of the Singapore Economic Development Board**

Investors looking to establish themselves in a new location are faced with a multitude of administrative procedures relating to registering and opening a business. From visas to licenses, clearances, permits and registration with tax authorities, investors must typically interact with and obtain documents and approvals from government agencies across the board before starting a project. These steps easily become costly and time-consuming, and can constitute significant investor irritants.

**What are one-stop-shops?**

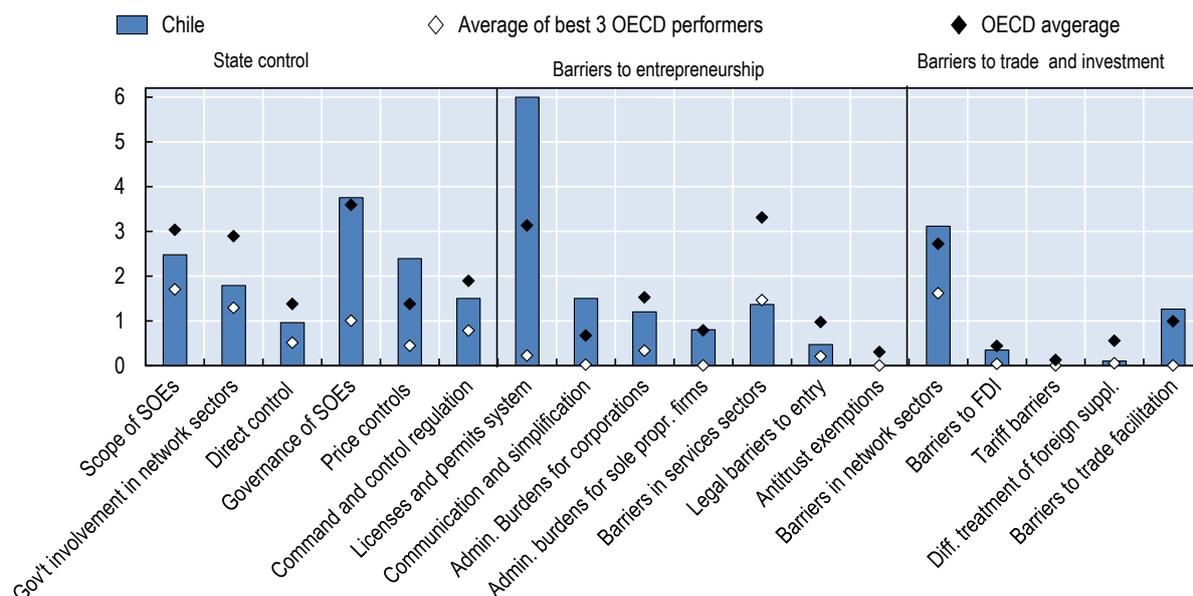
Many governments have thus considered the concept of "one-stop-shops" for investors, uniting all administrative procedures in one organisation. This can prove a difficult task, as it requires the agency in question to concentrate relevant expertise and authority for these procedures, or to coordinate effectively between different government bodies and departments that may have very different procedures and requirements. Even where the one-stop-shop has a mandate of coordination only, this may lead to conflicts of competencies and turn the one-stop-shop into an additional step in the process. Hence, as stressed in OECD (2015j), establishing and operating a one-stop-shop is only one possible approach to investor facilitation whose success relies on a series of other elements (notably professional and knowledgeable staff, regular provision of information to investors, and site visits). Finally, an establishment of one-stop shop often leads to inter-agency tensions and may be even more challenging to implement by a new IPA, as is the case in Chile. The example of the Singapore Economic Development Board below shows that embedding the one stop shop in a wider investment facilitation strategy is critical to its success.

**The Economic Development Board of Singapore**

The Singapore Economic Development Board (EDB), established in 1961, functions as a one-stop-shop both for investors setting up business in Singapore and for improving the business climate and policy context for investment. It is one of the most functional examples of a one-stop-shop, capable of providing investors with a major share of the approvals needed to establish themselves and become operational. The EDB was established as part of a broader strategy for Singapore's economic development and benefited from strong high-level support from the outset. It allowed the agency to take over control over various clearance and approval processes while maintaining good relationships with relevant parts of government, allowing it to coordinate effectively with other departments and bodies to respond to investor needs. The EDB's coordination role is facilitated by the overall business-friendly cultural and policy environment in the country. Indeed, Singapore has ranked first in the World Bank's Doing Business Index for several consecutive years.

Source: OECD (2015j), Sader (2006) Do one-stop-shops work?, World Bank; Singapore EDB; World Bank *Doing Business Index* 2014.

**Figure 3.34. Product market regulations in Chile and the OECD, 2014**



Source: OECD Product Market Regulations database.

In addition, OECD countries that are already significant FDI recipients typically focus on activities that contribute to further embedding the investor in the national economy (such as investment facilitation, aftercare services and policy advocacy) rather than attracting new investors through generic investment promotion (OECD, 2015j). This is because, at least in developed economies, firms engage in more complex or high-value added activities such as R&D after having operated in the host economy for a longer period of time (OECD, 2008d), and set-up their R&D activities through extensions of *existing* investments rather than greenfield FDI (e.g. Erken et al, 2005; Mudambi and Mudambi, 2005). In that context, given that foreign investors present in Chile engage relatively little in R&D (see section 3), there could be a particular benefit in consulting the existing firms on the underlying drivers of their decisions and, wherever appropriate, offering relevant support—be it through targeted after-care services of an IPA or a wider reform. In general, to ensure that the IPA orients its actions well from the start and investment promotion strategy reflects the business reality and national priorities, consultations with investors—both existing and potential ones—and other stakeholders, should serve as key inputs into the formulation of the new strategy along with data on FDI trends and sectoral studies as well as information from past investment promotion efforts gathered by other agencies. With MNEs strategies evolving rapidly over time, obtaining reliable information on market trends and firm behaviour becomes particularly important and should be a key task of an IPA aiming to support local firms in benefitting from the opportunities created by GVCs.

*Regular evaluation and monitoring may be even more important in GVCs*

As highlighted in the PFI, and made explicit in the OECD report on investment promotion in Chile (OECD, 2015j), clear evaluation criteria and performance indicators as well as periodic impact assessment reviews help ensure that investment promotion initiatives achieve their intended purpose, and that public resources are not mismanaged. In the context of GVC, the cost of lack of regular evaluation and policy readjustment may be even higher given the complex inter-linkages between the various market segments and the dynamic changes in the global competitive environment.

In the meantime, the past private sector development programmes in Chile appear to have lacked systematic evaluation mechanisms, let alone formal cost-benefit analysis, which had implications on their quality, coherence and continuity.<sup>71</sup> It will therefore be important that systematic evaluation is

<sup>71</sup> See Zahler et al. (2014) for a recent review.

programmed into Chile's burgeoning foreign investment promotion. In particular, if the IPA is to administer any fiscal incentives due ex ante and ex post impact assessments should be undertaken in line with the recommendations enshrined in the PFI (see Box 3.9 for an overview of best practices in evaluating the costs and benefits of fiscal incentives). Overall, it is encouraging that Article 10.5 of the new law specifically equips the Council of Ministers for Foreign investment Promotion with the mandate to evaluate the implementation of the investment promotion strategy, and Article 14 allows it to request the information on impact assessment of the undertaken actions from the IPA.

### Box 3.9. Good practices in evaluating costs and benefits of fiscal incentives

If a tax incentives programme is to contribute to a country's economic welfare, its benefits should exceed its costs. It is therefore, important that decision makers have a capacity to distinguish between beneficial and wasteful tax incentives programmes. Cost-benefit analysis tools allow differentiating between policies that work, and those that do not, and enable policy makers adapt the policy design accordingly. The *Policy Framework for Investment* specifically mentioned what factors should be taken into account when a cost benefit analysis of fiscal incentives is undertaken. They involve both direct as well as indirect impacts and are listed below.

An evaluation of the economic **benefits** of fiscal incentives should take into account:

- (a) direct impact by the incentives-motivated investment;
- (b) indirect and induced impact due to inter-industry transactions and changes in income and consumption;
- (c) positive externalities, such as technology and know-how transfers by incentives-induced FDI; and
- (d) social and environmental benefits where tax incentives serve to correct market imperfections.

The **costs** that should be considered include:

- (a) primary revenue foregone due to tax incentives;
- (b) revenue leakages due to unintended and unforeseen tax-planning opportunities;
- (c) costs incurred by taxpayers in order to comply with a given tax incentives regime;
- (d) the administrative costs from running the tax incentives programmes due to the complexity introduced to the legislative and regulatory framework; and
- (e) the costs to the economy of creating an "uneven playing field" where domestic firms are not entitled to the same tax incentives as their foreign competitors.

Finally, tax incentives, depending on their type and design, may create unintended consequences. Policy makers must recognise that all taxpayers will analyse the targeting criteria and attempt to benefit from the incentive. For example, experience shows that a non-qualifying (medium or large) firm may reorganise itself into two or more new business entities to attempt to access tax relief conditional on firm size. Similarly, companies will attempt to characterise or re-characterise certain activities so that they fall within the boundaries of qualifying business activities (to qualify for R&D tax incentives, for example). Tax holidays or partial profit exemptions offered to "new" firms inevitably incentivise old firms to reconstitute themselves as new towards the end of the holiday period. Finally, partial or full profit exemptions allow transfer pricing opportunities to artificially shift taxable income from non-qualifying business entities to entities that do qualify (e.g. non-qualifying companies can channel asset purchases through qualifying companies).

Inevitably, the government can come under pressure to extend tax incentive relief to taxpayers/activities that were not initially targeted. Ex ante and ex poste evaluations help minimise that risk, and ensure that, if needed, policies' design can be improved over time.

*Source:* The OECD Policy Framework for Investment.

The principle of having clear evaluation criteria and performance monitoring applies not only to the specific support programmes managed by an IPA (or any other relevant agency), but also the overall operations of the IPA itself. In order to ensure that the IPA is fulfilling its mandate and to monitor its activities, many countries use so-called Key Performance Indicators (KPIs), tied to the strategic promotion objectives. KPIs are usually different types of metrics that try to quantify IPA's achievements. They typically include the number and amount of new investment projects (committed or completed) for a given year, as well as the number of jobs created and/or safeguarded; but at times include more advanced metrics related to the quality of investment attracted by the IPA. Given that Chile is interested in attracting more knowledge-intensive investment and otherwise improving the quality of inward FDI, it could follow the example of agencies such as IDA Ireland that incorporate more advanced measures of the investment impact, including investment in priority regions, R&D expenditure, instead of focusing on the sheer volume of investment generated thanks to its activity (see Box 3.10).

In the medium run, assessment of the effectiveness of IPAs actions will need to rely on a series of evaluation tools and market intelligence instruments, without relying solely on the PKIs (see Table 3.A1.5 in the Annex for an overview). In the context of GVCs and MNEs constantly reevaluating the optimal location of the various segments of their supply chains, regular feedback is becoming ever more essential to ensure the adequacy of state intervention and IPA's services. This can take form of periodic surveys companies, both those that used the IPA's services and those that did not, as well as general screening of the competitive environment (through tracking of FDI trends and analysing the global dynamics in particular sectors). In particular, gathering information and analysing the case of failed investment, i.e. cases where an investor was interested in Chile as a potential location (e.g. approached the IPA or announces its investment plans), but eventually chose an alternative destination, could provide particularly important information, including on Chile's direct competitors, the decisive location factors, and the type of actions that may need to be considered by the IPA and the Government in the future.

### Box 3.10. IDA Ireland's Key Performance Indicators

In order to monitor the impact of its activity and ensure their alignment of its operations with the agency's strategic objectives, the Irish investment promotion agency (*IDA Ireland*) uses a set of "Key Performance Indicators" (KPI). KPIs are linked directly to the agency's strategic objectives as outlined in *Horizon 2020: IDA Ireland Strategy* (2010), which include: the aim to attract high quality, knowledge and skills-based FDI to Ireland; to achieve a better, more equitable regional balance in investment across Ireland; and to encourage companies to move towards more advanced technological processes with a greater focus on R&D, among others. Each objective is accompanied with the corresponding indicator – listed below.

#### IDA Ireland indicators

- Total number of investments approved
- Number of Greenfield projects
- Number of expansion projects
- Number of research, development and innovation projects
- Investment in research, development and innovation projects
- Percentage of investments located outside Dublin and Cork
- Percentage of jobs approved outside Dublin and Cork
- Percentage of jobs approved with salaries in excess of EUR 35 000
- Average salary in new investments
- Annual corporate tax payments of IDA client companies
- Total R&D in-house expenditure

In addition, the agency monitors the direct economic impact of its client companies, including through the generation of exports, total direct expenditure in the Irish economy, and annual corporate tax payments.

Source: IDA Ireland (2014), Annual Report and Accounts 2013, Dublin; IDA Ireland (2010), *Horizon 2020: IDA Ireland Strategy*.

#### *Aligning (or not) the function of trade and investment promotion to benefit from GVCs*

Last but not least, as the lines between trade and investment decisions become blurred with the spread of GVCs, there are increasing pressures on the trade and investment promotion bodies to cooperate more effectively. Companies base their investment decisions on the attractiveness of particular value-chains, which is influenced by trade and investment policies affecting its various segments and, hence, cuts through the traditional institutional divide. As Chile is developing its investment promotion policy, it is also likely to face a dilemma as to how to coordinate it with its trade promotion activities.

Indeed, several arguments, related primarily to resource and information-sharing, suggest that investment and trade promotion agencies could benefit from closer cooperation. For example, there may be synergies in such activities as overseas promotion and country branding or savings to be made through office-space sharing and other resource-pooling arrangements. When a country seeks to

attract export-oriented FDI, the case for coordination between investment and trade promotion bodies is even stronger. For example, trade analysis can be useful for designing export-oriented investment targeting campaigns (UNCTAD, 2013a). There may be also common goals (for example, trade promotion assistance to local affiliates or linkage programmes between domestic firms and foreign-owned firms that aim to increase exports) as well as joint services that be attractive to common clients, such as common one stop solutions for export-oriented investors (UNCTAD, 2002).

Still, investment and trade promotion are very different activities, targeted at different audiences and requiring a different skill-set among staff. For example, while export promotion agency's main clients are local firms and lower-level management abroad that makes routine decisions about purchases of goods and services, investment promotion usually targets the top management of MNEs, frequently with time-consuming visits, presentations, provision of information, and involvement of high-level policy-makers in order to secure large transaction with strategic implications for the host country and the MNE (Wells, 2000; Sader, 2002). When the two functions are joined, the effectiveness of one could potentially be compromised over another (UNCTAD 2013a; UNCTAD, 2009).

Indeed, experience has shown that combining different, but apparently related functions of investment and trade in a single organization is far from simple. Joint investment and trade promotion does not result in automatic synergies or savings. In fact, over the years there seem to have been as many agency mandate splits (e.g., Costa Rica and Ireland) as mergers (e.g., Germany, New Zealand and the United Kingdom). Overall, the number of joint agencies has tended to remain stable over time, hovering around 25% between 2008 and 2012 (UNCTAD, 2003). In the case of successful joint trade and investment promotion bodies, a common ingredient appears to be the ability to set strategic priorities and explore synergies in technical areas first (such as shared business intelligence, overseas activities or image-building campaigns), before agreeing on the right institutional set-up (UNCTAD, 2013a). With the signing of a memorandum of understanding between Chile's IPA and ProChile, and the common use of offices abroad, this pragmatic approach appears to be currently taken by the IPA.<sup>72</sup> As it matures in its functions, and if it decides to focus on export-oriented FDI attraction, it could draw inspirations from agencies from the OECD countries that decided to join the two functions, such as New Zealand, Australia, the UK or Sweden. Effective cooperation between the new IPA and other agencies that deal with investors in Chile (e.g. CORFO, CNIC) or influence the image of the country abroad (such as *ProChile* or *Fundación Imagen de Chile*) will be an important element of its success.

Overall, it becomes evident that the Chilean Government faces many choices as it develops its new investment promotion strategy. While the verdict about the effectiveness of various investment promotion activities is yet inconclusive, there is some evidence that well-implemented investment promotion can help increase FDI flows, in particular in countries with higher bureaucratic burdens and where information asymmetries are higher (Harding and Javorcik, 2011; Harding and Javorcik, 2010, Charlton and Davis, 2007). With the adoption of the principle of selectivity in the Government's investment promotion efforts, other best-practices become particularly important – notably the need to adopt a whole-of- government approach and ensure policy coherence (facilitated through strategic agenda-setting); greater transparency and more rigorous evaluations of various support programmes, and finally the use of clear performance indicators and regular market monitoring. In particular as the IPA is brand new, and the Government is still establishing the most useful means to support investment, foreign and domestic, it should allocate due time to dialogue with existing and potential investors and internal consultations and coordination to build on past experiences and adopt a coherent approach going forward.

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<sup>72</sup> The memorandum is available here: <http://transparencia.inversionextranjera.cl/2014/463.pdf>.

## ANNEX 3.A1. TABLES AND FIGURES

**Table 3.A1.1 Overview of empirical studies on FDI productivity spillovers**

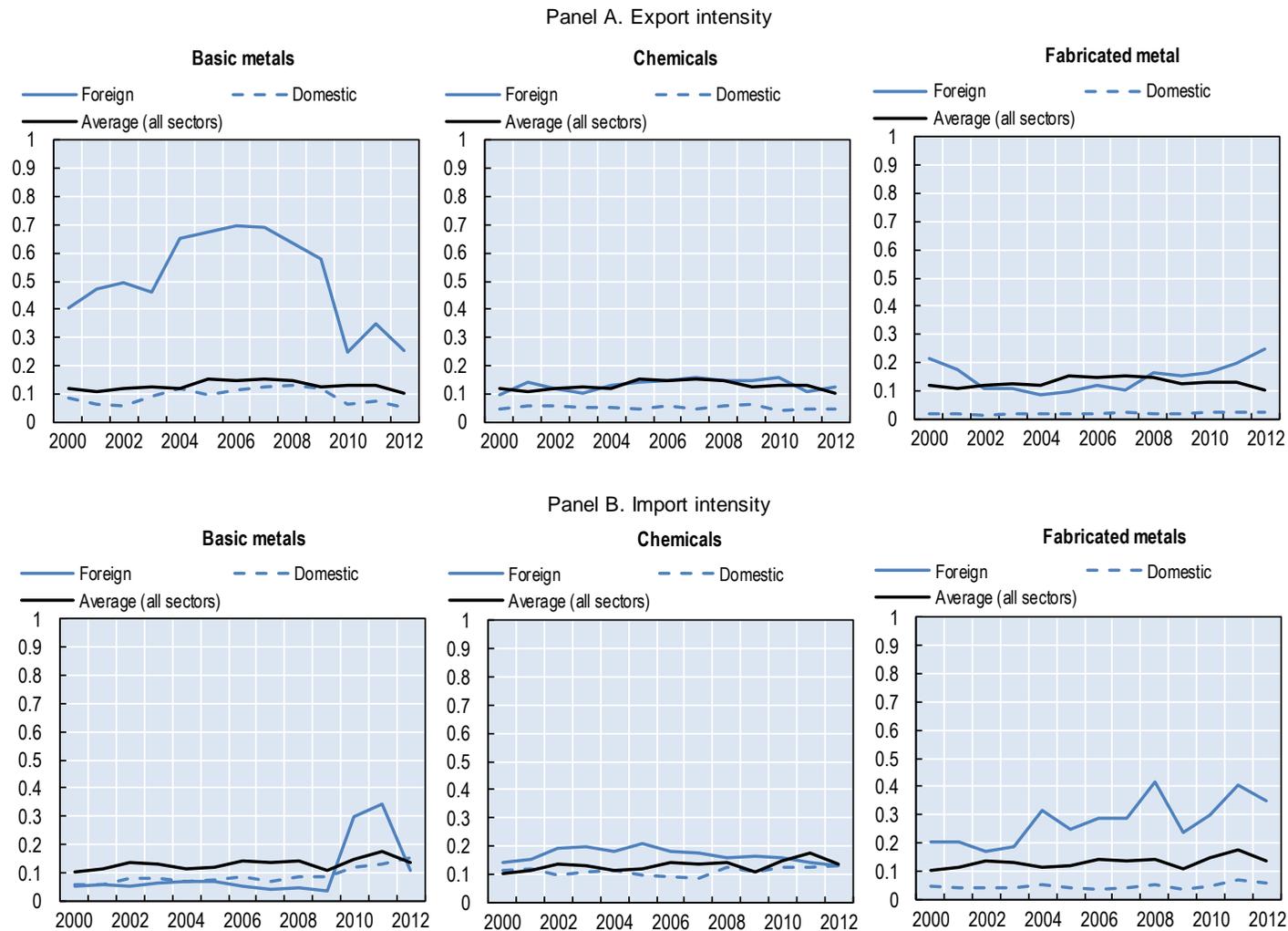
Study	Coverage	Data and methodology	Effect
<i>In Chile</i>			
Alvarez (2002)	1990-1996 Chile	Firm-level panel data analysis using the Chilean manufacturing survey (ENIA)	Small positive effect on the level and growth rate of productivity of domestic firms
Alvarez and Crespi (2007)	Chile 1979-1998	<i>id.</i>	Positive
Navarette and Sossdor (2008)	Chile 1979-1998	<i>id.</i>	Negligible horizontal and positive vertical spillover effects
Ramondo (2009)	Chile 1995–2001	<i>id.</i>	Mixed evidence on spillover effects from foreign to domestic plants but evidence of reallocation of market shares from less productive domestic to more productive foreign plants.
Fernandez and Paunov (2012)	Chile 1995-2004	<i>id.</i>	Positive vertical spillovers from FDI in services on manufacturing firms
<i>In other countries</i>			
Aitken and Harrison (1999)	1976-1999 Venezuela	Firm-level panel data	Negligible impact (and negative for domestic firms in the same industry)
Haddad and Harrison (1993)	1985-1989 Morocco	Firm-level panel data	No impact on the productivity growth rate of domestic firms
Javorcik (2002)	1996-2000 Lithuania	Firm-level panel data	Positive
Haskel, Pereira and Slaughter (2002)	1973-1992 UK	Firm-level panel data analysis	Positive
Keller and Yeaple (2009)	1987-1996 United States	Firm-level panel data	Positive
<i>Recent meta-studies on the subject</i>			
Demena (2014)	<ul style="list-style-type: none"> <li>• 31 countries</li> <li>• 74 studies; 1,545 spillover estimates</li> </ul>	Meta-analysis	Small to moderate spillover effects in developing countries
Havránek and Iršová (2013)	<ul style="list-style-type: none"> <li>• 45 countries</li> <li>• 52 studies; 1,205 spillover estimates</li> </ul>	Meta-analysis	<ul style="list-style-type: none"> <li>• Negligible horizontal spillover effects</li> <li>• Strongest positive effect for joint ventures (JV) with foreign firms, investors from countries with moderate difference in technological level and high domestic absorptive capacity</li> </ul>
Havránek and Iršová (2010)	<ul style="list-style-type: none"> <li>• 47 countries</li> <li>• 57 studies; 3626 spillover estimates</li> </ul>	Meta-analysis	<ul style="list-style-type: none"> <li>• Positive backward spillovers (knowledge transfer from foreign investors to domestic firms in supplier sectors) and small forward spillovers (effect on firms in customer sectors)</li> <li>• Greater spillovers occur in countries open to international and with underdeveloped financial systems; and are generated by foreign investors that enter JVs, come from distant countries and have a slight technological edge over local firms</li> </ul>

**Table 3.A1.2 Top 20 largest firms in Chile, 2013**

Rank	Company	Sector	Ownership type	Country	Sales (in bln USD)
1	EMPRESA COPEC	Multisector	Domestic private	Chile	22.77
2	CENCOSUD	Trade	Domestic private	Chile	19.12
3	CODELCO	Mining	Domestic, SOE	Chile	15.86
4	ENERSIS	Electricity	Joint Venture	Chile	13.08
5	ENAP	Oil and gas	Domestic, SOE	Chile	11.61
6	FALABELLA	Trade	Domestic private	Chile	11.47
7	LATAM AIRLINES	Transport and logistics	Domestic private	Chile	9.72
8	ESCONDIDA	Mining	Foreign-owned	UK/Australia	8.82
9	COPEC COMBUSTIBLES	Oil and gas	Domestic private	Chile	8.19
10	ANTOFAGASTA PLC (25)	Mining	Domestic private	Chile	6.74
11	D&S (WALMART)	Trade	Foreign-owned	USA	6.04
12	CGE	Electricity	Domestic private	Chile	4.84
13	ENDESA	Electricity	Foreign-owned	Spain	4.81
14	EMP. CMPC	Forestry and paper	Domestic private	Chile	4.76
15	MALL PLAZA	Trade	Domestic private	Chile	4.36
16	QUIÑENCO	Multisector	Domestic private	Chile	3.46
17	CÍA. SUDAMERICANA DE VAPORES	Transport and logistics	Domestic private	Chile	3.43
18	SODIMAC	Trade	Domestic private	Chile	3.31
19	ANGLO AMERICAN SUR	Mining	Foreign	UK	3.19
20	ENTEL	Telecommunications	Joint Venture	Chile	2.99

Source: América Economía.

**Figure 3.A1.1 Export and import intensity of foreign and domestic firms in mining-related manufacturing sectors in Chile, 2000-2012**



Source: Author's calculations using ENIA.

**Table 3.A1.3 Impact of foreign ownership on firm performance: regressions results**

	(1) Exports (log)	(2) Imported intermediates (log)	(3) Average wage (log)	(4) Skilled labour share (%)	(5) Labour productivity (log)
Foreign ownership	0.222** (0.0706)	0.323*** (0.0651)	0.222*** (0.0217)	0.0432*** (0.00964)	0.435*** (0.0466)
Size	0.721*** (0.0433)	0.766*** (0.0341)	-0.0434** (0.0132)	-0.0794*** (0.00287)	-0.0277 (0.0150)
Constant	10.12*** (0.211)	8.346*** (0.190)	7.842*** (0.0460)	0.663*** (0.0114)	8.422*** (0.0584)
Observations	8385	8398	42180	42187	39605
Year fixed effects	YES	YES	YES	YES	YES
Sector fixed effects	YES	YES	YES	YES	YES

Standard errors in parentheses

=\*\* p<0.05

\*\* p<0.01

\*\*\* p<0.001"

Note: Dependent variables are for plant *l* in year *t* and industry *k*. All regressions with year and industry fixed effects. Robust standard errors reported in square brackets, clustered by plant. \* p<0.05 \*\* p<0.01 \*\*\* p<0.001"

Source: Author's calculations using ENIA.

**Table 3.A1.4. List of international investment agreements signed by Chile, 1991-2015**

Panel A. Bilateral Investment Treaties			
Partner country	Status	Date of signature	Date of entry into force
Argentina	In force	02-08-1991	01-01-1995
Spain	In force	02-10-1991	28-03-1994
Germany	In force	21-10-1991	08-05-1999
France	In force	14-07-1992	24-06-1994
Belgium-Luxembourg Economic Union	In force	15-07-1992	05-08-1999
Malaysia	In force	11-11-1992	04-08-1995
Italy	In force	08-03-1993	08-02-1995
Venezuela	In force	02-04-1993	25-05-1995
Sweden	In force	24-05-1993	30-12-1995
Finland	In force	27-05-1993	01-05-1996
Denmark	In force	28-05-1993	03-11-1995
Norway	In force	01-06-1993	07-09-1994
Ecuador	In force	23-10-1993	21-02-1996
Brazil	Signed	22-03-1994	-
China	In force	23-03-1994	01-08-1995
Bolivia	In force	22-09-1994	21-07-1999
Croatia	In force	28-11-1994	15-06-1996
Czech Republic	In force	24-04-1995	05-10-1996
Portugal	In force	28-04-1995	24-02-1998
Romania	In force	04-07-1995	27-07-1997
Poland	In force	05-07-1995	17-01-2000
Paraguay	In force	07-08-1995	17-12-1997
Uruguay	In force	26-10-1995	22-04-1999
Ukraine	In force	30-10-1995	29-08-1997
Philippines	In force	20-11-1995	06-08-1997
United Kingdom	In force	08-01-1996	21-04-1997
Cuba	In force	10-01-1996	30-09-2000
Australia	Terminated	09-07-1996	18-11-1999
Greece	In force	10-07-1996	27-10-2002
Costa Rica	In force	11-07-1996	23-06-2000
South Korea	In force	06-09-1996	16-09-1999
El Salvador	In force	08-11-1996	18-11-1999
Guatemala	In force	08-11-1996	10-12-2001
Nicaragua	In force	08-11-1996	10-01-2001
Panama	In force	08-11-1996	21-12-1999
Honduras	In force	11-11-1996	10-01-2002
Hungary	Signed	10-03-1997	-
Austria	In force	08-09-1997	22-10-2000
Turkey	Signed	21-08-1998	-
Tunisia	Signed	23-10-1998	-
South Africa	Signed	12-11-1998	-
Netherlands	Signed	30-11-1998	-
Indonesia	Signed	07-04-1999	-

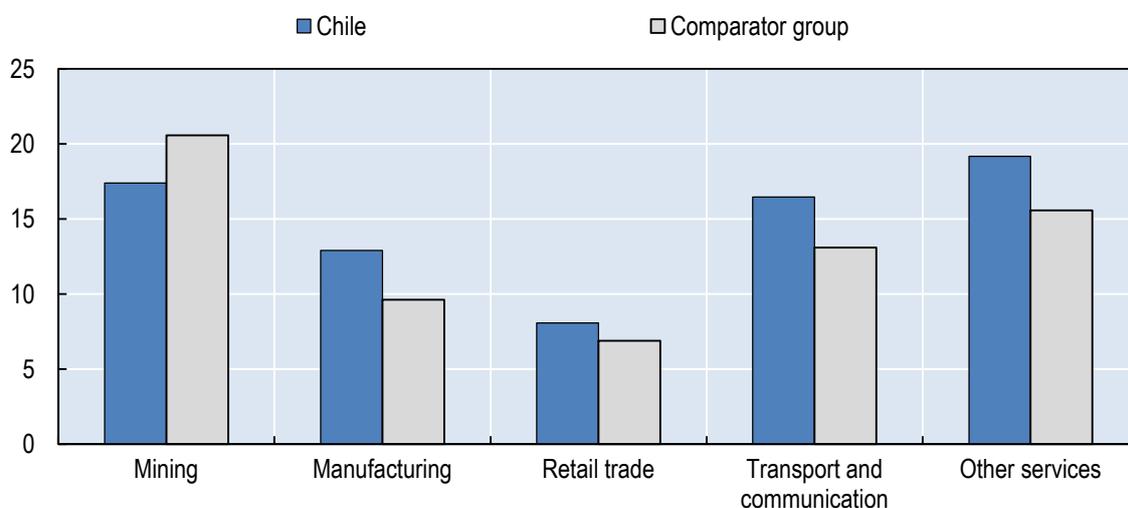
<i>cd.</i>			
New Zealand	Signed	22-07-1999	-
Egypt	Signed	05-08-1999	-
Viet Nam	Signed	16-09-1999	-
Switzerland	In force	24-09-1999	02-05-2002
Lebanon	Signed	03-10-1999	-
Colombia	Signed	25-01-2000	-
Peru	Terminated	02-02-2000	11-08-2001
Dominican Republic	In force	28-11-2000	08-05-2002
Iceland	In force	26-06-2003	12-08-2006
Uruguay	Signed	25-03-2010	-

Panel B. Free Trade Agreements with investment chapters

Name of the agreement	Parties	Status	Date of signature	Date of entry into force
LAIA Treaty	LAIA (Latin American Integration Association);	In force	12-08-1980	18-03-1981
Chile-Venezuela FTA	Chile; Venezuela	In force	02-04-1993	02-04-1993
Bolivia-Chile Economic Agreement	Bolivia; Chile;	In force	06-04-1993	06-04-1993
Chile-Colombia Economic Agreement	Chile; Colombia;	In force	06-12-1993	06-12-1993
Chile-Mercosur Complementation Agreement	Chile; MERCOSUR	In force	25-06-1996	01-10-1996
Canada-Chile FTA	Canada; Chile;	In force	05-12-1996	05-07-1997
Mexico-Chile FTA	Chile; Mexico;	In force	17-04-1998	01-08-1999
Central America-Chile FTA	CACM; Chile;	In force	18-10-1999	19-10-2012
Chile-EC Association Agreement	Chile; EU;	In force	18-11-2002	01-02-2003
Chile-Korea FTA	Chile; South Korea	In force	15-02-2003	01-04-2004
Chile-US FTA	Chile; USA	In force	06-06-2003	01-01-2004
Chile-EFTA FTA	Chile; EFTA;	In force	26-06-2003	01-12-2004
Chile-India Framework Agreement	Chile; India; Brunei Darussalam; Chile; New Zealand;	Signed	20-01-2005	-
TPEcoP	Singapore;	In force	03-06-2005	28-05-2006
Chile-China FTA	Chile; China;	In force	18-11-2005	01-10-2006
Chile-Panama FTA	Chile; Panama;	In force	27-06-2006	07-03-2008
Chile-Peru FTA	Chile; Peru;	In force	22-08-2006	01-03-2009
Chile-Colombia FTA	Chile; Colombia;	In force	27-11-2006	08-05-2009
Chile-Japan EPA	Chile; Japan;	In force	27-03-2007	03-09-2007
Chile-Ecuador Complementation Agreement	Chile; Ecuador;	In force	10-03-2008	25-01-2010
Australia-Chile FTA	Australia; Chile;	In force	30-07-2008	06-03-2009
Chile-Turkey FTA	Chile; Turkey;	In force	14-07-2009	01-03-2011
Chile-Malaysia FTA	Chile; Malaysia;	In force	13-11-2010	18-04-2012
Chile-Viet Nam FTA	Chile; Viet Nam;	Signed	12-11-2011	-
Chile-Hong Kong FTA	Chile; Hong Kong, China SAR;	In force	07-09-2012	09-10-2014
Chile-Thailand FTA	Chile; Thailand;	Signed	04-09-2013	-
Protocol Pacific Alliance	Chile; Colombia; Mexico; Peru;	Signed	10-02-2014	-

Source: UNCTAD.

**Figure 3.A1.2 Price-cost margins in Chile and comparator group, 2000-2008**



Note: Average ratio of operating income to total revenue. The comparator group includes Australia, Canada and New Zealand.

Source: Schweltnus (2010) based on Thomson Financial, Wordscope database.

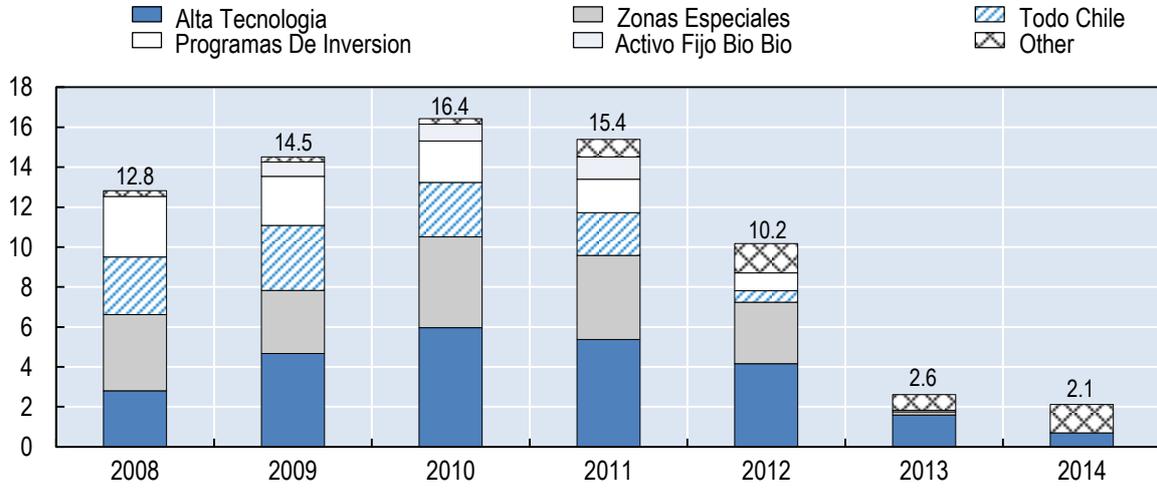
**Table 3.A1.5. Overview of basic tools for IPA evaluation**

Primary objective	Type	Advantages	Disadvantages
<i>Interviews and surveys</i>			
<ul style="list-style-type: none"> <li>• Measuring perceptions</li> <li>• Customer feedback</li> <li>• Non-customer feedback</li> <li>• Obtaining stakeholder views</li> <li>• Salary research</li> <li>• Measuring staff satisfaction</li> <li>• Case studies</li> <li>• Competitor research</li> <li>• Benchmarking</li> </ul>	Face-to-face	Direct feedback, potentially more accurate	Costs in terms of time and funds
	Telephone	Similar to face-to-face interviews, but less costly	Still quite expensive
	Computer-assisted telephone interviewing (CATI)	Relatively inexpensive, possible to reach a wide range of respondents	Interviewers may not have expertise. Not possible to explore subjects beyond the script.
	Web-based surveys	Can be very inexpensive and reach a very wide range of respondents.	Cannot persuade respondents to participate. Risk of misunderstandings
<i>Literature reviews</i>			
<ul style="list-style-type: none"> <li>• Environment assessment</li> <li>• Competitive positioning</li> <li>• Learning about FDI and other trends</li> <li>• Learning about external factors</li> <li>• Competitor research</li> <li>• Benchmarking</li> </ul>	Published reports	Cheaper than commissioning “from scratch”. Often topical and up to date.	Not always contextually relevant. May be expensive.
	Trade magazines	Can be very useful, focused, and up to date. Relatively inexpensive.	May have “partisan views”
	Academic papers	Can be inexpensive and useful. May inspire new ways of thinking	Often not as relevant as they may appear at first
	Press reports	May bring to light points that have been overlooked.	Sometimes biased, inaccurate or incomplete
	Former internal reports	Often provide useful information about issues in the IPA. May help avoid “reinventing the wheel”	Circumstances may have changed. May deal with related yet different issues.
	Public sector reports	Usually free, may be up to date and topical. Tend to provide useful background.	Can be out of date and not contextually relevant.

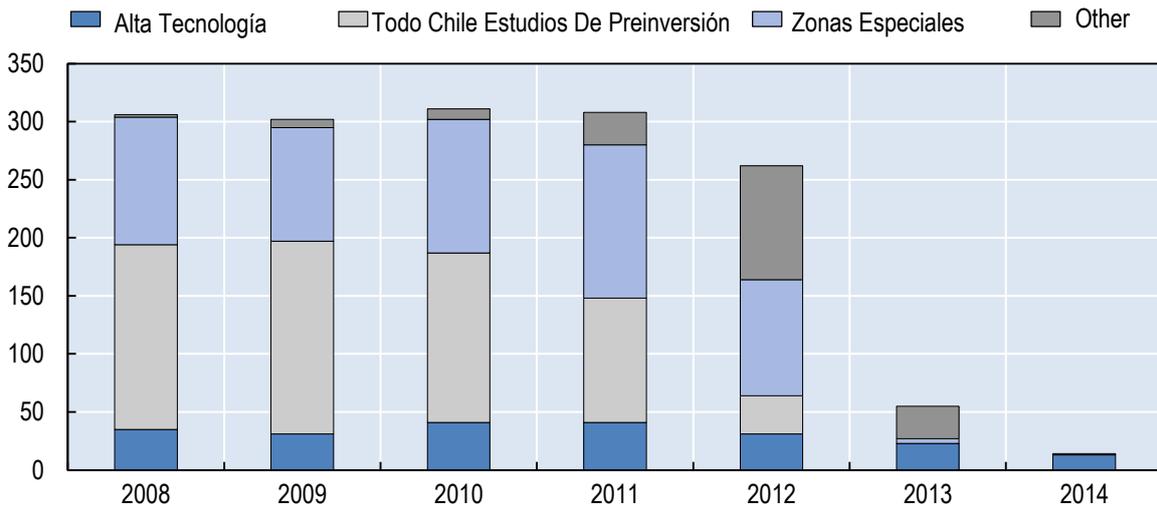
Source: UNCTAD (2008).

**Figure 3.A1.3 Investment promotion programmes administered by CORFO, 2008-2014**

Panel A. Total distributed funds, in million USD



Panel B. Total number of beneficiaries



Source: CORFO.

## ANNEX 3.A2. DEFINITION OF SKILLED LABOUR

The Chilean Manufacturing Survey (ENIA) is compiled by the National Institute of Statistics, INE. The survey covers all manufacturing firms in Chile with more than 10 employees. It is an unbalanced plant level dataset with 5 400 plants per year, on average. The dataset includes detailed information on plant employment, including whether or not a worker is a salaried worker or a contractor, whether it is a female or a male, and, what is its skill level. We use the information on workers skill-level to divide workers into skilled and unskilled labour.

The skilled labour variable includes the following variables and categories of workers:

1. company owners;
2. managers;
3. skilled workers involved in production employed directly by the firm;
4. administrative workers and personal services and security.

The unskilled labour variable includes:

1. unskilled workers involved directly in production;
2. unskilled workers involved indirectly in production;
3. drivers and maintenance.

The breakdown of labour characteristics in different sectors in Chile is provided in the Table 3.A2.1.

**Table 3.A2.1 Labour characteristics in different sectors in Chile according to ENIA**

Sector	Labour	Labour intensity (%)	Skilled workers (%)	Labour productivity	Average wage in USD	Average wage (skilled workers) in USD	Average wage (unskilled workers) in USD
Basic metals	163	37%	48%	279,696	12,386	13,457	7,586
Chemicals	133	47%	44%	89,540	15,605	14,481	6,548
Coke, petroleum	55	47%	33%	45,145	10,508	11,963	6,562
Fabricated metal	63	54%	47%	17,052	6,557	7,929	4,625
Food & tobacco	112	47%	38%	71,019	6,963	8,250	5,194
Machinery and equipment	67	55%	55%	18,629	8,036	9,011	5,334
Manufacturing, nec	63	55%	43%	12,347	4,957	6,440	3,788
Non-metallic mineral products	100	46%	37%	30,231	7,845	10,251	5,138
Paper, printing	81	44%	50%	18,801	9,208	8,522	5,002
Rubber & plastic	66	42%	39%	18,696	7,529	9,771	4,806
Textiles	59	56%	40%	10,973	6,116	6,783	3,698
Transport Equipment	97	55%	55%	19,584	7,369	8,442	5,090
Wood	93	42%	35%	16,462	6,049	7,151	3,805

Source: Authors' calculations using ENIA.

## CHAPTER 4. GVC UPGRADING, DIVERSIFICATION AND INNOVATION

### 4.1. Innovation as a basis for GVC upgrading in Chile

The emergence of GVCs has provided a channel through which economies can rapidly integrate into the global economy thereby contributing to economic development (OECD, 2013a). The experience of China, Mexico, Costa Rica, the Czech Republic for example demonstrates that participation in GVCs can offer a fast track to development and industrialisation. The increasing global engagement of emerging economies through GVCs has contributed to rapid growth in exports, employment and economic growth in a number of countries. However, once integrated in GVCs, the question of upgrading arises. In an effort to further their economic development and to close the gap with developed economies, upgrading their position in global or regional value chains has become a policy priority in many countries. In particular, emerging economies perceive a need for a diversification of their economy in order to upgrade their GVC activities and to draw larger benefits from their participation in GVCs.

Diversification and GVC upgrading are particularly major challenges for resource-based economies like Chile<sup>1</sup>. Countries that derive a large share of their income from the extraction of natural resources run the risk of being afflicted by the “resource curse”, i.e. the potentially negative impact of the exports of natural resources on other sectors of the economy due to the crowding out of productive resources and the appreciation of the exchange rate. Although resource-rich countries have in the past years profited from the rise in revenues from natural resource extraction, the exports of natural resources have negatively impacted on other sectors of the economy. When upgrading their activities in GVCs, natural resource-based countries need to manage a number of tasks including stabilisation through smoothing disposable revenues from raw materials while avoiding the risk of an adverse impact on other sectors of the economy (“Dutch disease”).

While economic success in the past may have been largely based on the exploitation of natural resources, it will increasingly depend in the future on how these resources and associated revenues are managed and how new opportunities complementary with resource extraction are seized. Prices of raw material show a high degree of volatility, as illustrated by the recent fluctuations in the prices of oil, copper, etc. with immediate repercussions to the real economy. In general, it is important to facilitate and foster structural change towards new economic activities through GVC upgrading, to prepare for a future of (potentially) declining revenue from natural resources.

Integration into GVCs is largely determined by border policies like tariffs, duties, trade facilitation, etc.); open borders for the trade of goods, services, capital and people are necessary for countries to be able to participate in GVCs. In contrast, the opportunities of countries for GVC upgrading are to a large extent shaped by so-called ‘behind the border policies’. While government policies can support GVC upgrading in different ways, upgrading and diversification are predominantly driven by the innovation of firms. As such, ‘upgrading’ policies are very similar to policies that stimulate innovation and enhance productivity. In their search for a long-term shift in the sources of growth, factor accumulation needs to be complemented by sustained productivity growth; innovation is a major route to boosting productivity growth.

The OECD Innovation Strategy (2010 and 2015g) has shown the importance of innovation for countries and the rationale for public policy in innovation. As innovation is a broad concept, policies for innovation cross government portfolios and affect a wide range of stakeholders. Examples include providing conditions for product market competition and encouraging market and firm entry; investing in

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<sup>1</sup> Resource-rich countries typically show larger (smaller) forward (backward) participation rates.

education, skills, knowledge-based assets and infrastructure; and providing the framework conditions that support business investments in such areas; and, lowering barriers to international trade and investment to encourage more efficient resource allocation

While R&D and technology are important sources of innovation, GVC upgrading and innovation is more broadly driven by investment in knowledge-based capital (OECD, 2013e, see also Box 4.1). The highest level of value creation in GVCs is often found in certain upstream activities such as new product development, design, R&D or the manufacturing of key parts and components, as well as in downstream activities like marketing, branding or customer service. Such activities involve tacit, non-codified knowledge in areas such as original design, the creation and management of cutting-edge technology and complex systems, as well as managerial and organisational know-how.

Investment in knowledge-based capital not only drives productivity growth, it also determines the extent to which the intermediate and final products in GVCs can be differentiated, thereby increasing the value created within GVCs. OECD (2013a) shows that investment in knowledge-based capital is an important source of competitiveness and plays a major role in GVC upgrading, both at the firm and country level. For example, countries with a larger endowment of knowledge-based capital are more likely to create and capture more value from their exports (OECD, 2013a).

#### **Box 4.1. Defining and measuring innovation**

There is growing recognition that innovation encompasses a wide range of activities in addition to R&D, such as organisational changes, training, testing, marketing and design. The latest (third) edition of the *Oslo Manual* defines innovation as the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations.

By definition, all innovation must contain a degree of novelty. The *Oslo Manual* (OECD-Eurostat, 2005) distinguishes three types of novelty: an innovation can be new to the firm, new to the market or new to the world. The first concept covers the diffusion of an existing innovation to a firm – the innovation may have already been implemented by other firms, but it is new to the firm. Innovations are new to the market when the firm is the first to introduce the innovation on its market. An innovation is new to the world when the firm is the first to introduce the innovation for all markets and industries.

Innovation, thus defined, is clearly a much broader notion than R&D or technological change and is therefore influenced by a wide range of factors, some of which can be influenced by policy. Innovation can occur in any sector of the economy, including government services such as health or education. However, the current measurement framework applies to business innovation, even though innovation is also important for the public sector.

The broad notion of innovation also emerges from the OECD's work on knowledge-based capital (OECD, 2013e), which points to a range of investments that firms can make beyond investment in technology. The three main categories of knowledge-based capital are computerised information (software and databases), innovative property (R&D, patents, trademarks, design) and economic competencies (brand equity, firm-specific human capital and organisational capital).

#### **4.2. The elusive concept of 'moving up the value chain'**

There are different ways for companies and countries to upgrade in GVCs. Conceptually, four types of GVC upgrading have traditionally been identified (e.g. Kaplinsky and Morris, 2002):

*Process upgrading* is achieved when firms can undertake tasks with significantly greater efficiency and lower defect rates, and process more complex orders than rivals.

*Product upgrading* is achieved when firms can supply higher value-added products than rivals owing to their superior technological sophistication and quality and also introduce novel products faster than rivals.

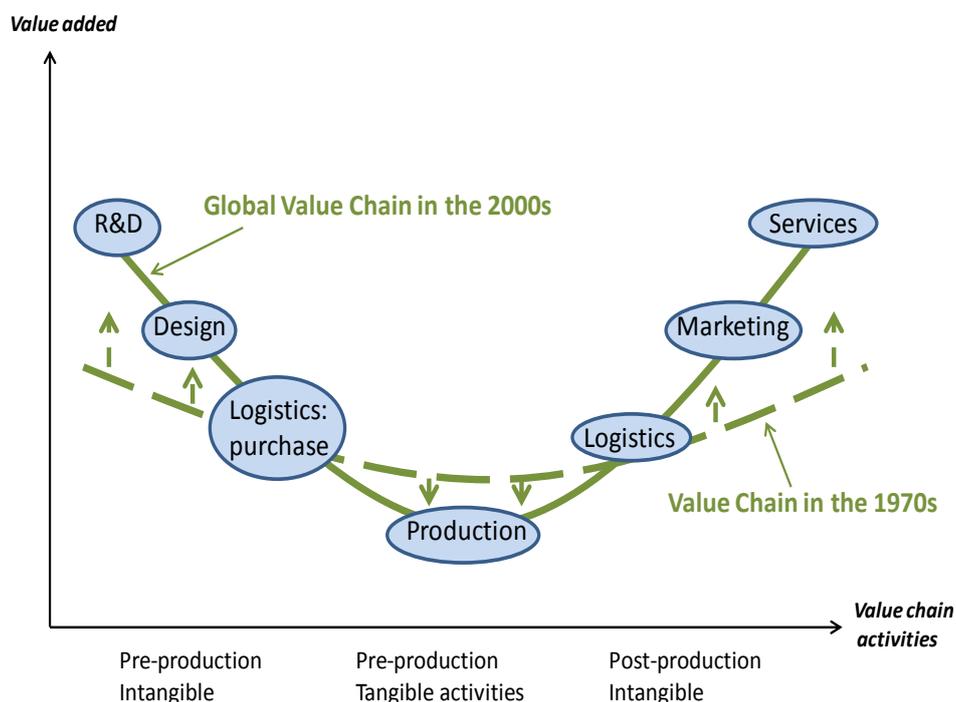
*Functional upgrading* is achieved when firms can provide competitive products or services in new segments or activities of a GVC which are associated with higher value added. For firms previously specialised in production, this means becoming competitive in upstream or downstream activities such as design or marketing.

*Chain upgrading* is achieved when firms are able to participate in new GVCs that produce higher value-added products or services, often leveraging the knowledge and skill acquired in the current chain.

The first three of these relate to the nature and extent of participation within a given GVC, while the latter relates to the capacity to shift to a new GVC in which greater value added can be captured. It is clear that innovation in products, processes, business models, etc. plays an important role in these different upgrading patterns. Process upgrading is often considered to be the first stage in upgrading, as it is based on learning by doing (Gereffi, 1999). Later, as firms build up technological capabilities, they become competitive in more sophisticated products (product upgrading). Functional upgrading is achieved when firms become able to design new products or establish their own brand, within a given GVC. Finally, chain upgrading occurs when firms have sufficient technological background and business know-how to expand their activities to new and more profitable industries.

Policy makers often see *functional upgrading* as the most direct way to increase the benefits they obtain from their participation in GVCs. This perception seems related to the widespread use of the so-called smiley curve to describe the process of moving up the value chain. This “smiling” curve as originally put forward by Acer’s CEO Stan Shih to illustrate the position of Chinese Taipei’s competitive position, graphically described the creation of value along the electronics GVC in a qualitative manner (Figure 4.1). Baldwin (2012) has argued that there has been a tendency in OECD countries for the “smiling” curve to deepen. The underlying idea was later confirmed by the well-known case studies on Apple products (Kraemer et al., 2011) which convincingly showed that China only captured a small portion of the final sales prices through its large manufacturing facilities. Correspondingly GVC functional upgrading is often interpreted as ‘moving up the value chain’ to the tails of the “smiling” curve, i.e. getting as soon as possible out of the low-value assembly/manufacturing stages in search of wealth in up- and downstream activities thereby often going against the patterns of countries’ comparative advantage.

Figure 4.1. The “smiling” curve: value added along the electronics GVC



Source: Based on Shih (1996) and Gereffi (2005).

But being positioned at the bottom of the “smiling” curve is not necessarily bad for a country. One reason is that manufacturing activities typically create a large number of jobs in emerging economies; focusing only on value added (and thus productivity and economic growth) abstracts from another important dimension of economic welfare, i.e. employment. Low and high value added activities do not equal ‘bad’ and ‘good’ activities; as long as a country specialises in an activity, be it high or low value, of which the return on resources applied is higher than their opportunity cost, it is clear that such specialisation is beneficial for the economy in question. The view that countries at both the ends of the “smiling” curve especially benefit from GVCs while countries in the middle suffer in their economic development, is overly simplified.

A second reason is that upgrading relates to the volume of the activity as much, or more, as to the share of the product’s value. For example, a share of 5% of the value of a smartphone for an assembly firm adds up to a relatively large sum given the large volumes typically assembled by these firms. Although those assemblers could have instead launched a new mobile phone to rival the larger smartphone producers (as an alternate business development strategy), thereby seeking to enter the higher end of the smiley curve to capture larger shares of the value of the final product, they would have had to capture a significant market share from the established electronic device producers to succeed. From this perspective, it is therefore important to recognize the economic value that is created by the activities of the assembling or manufacturing firm, and not simply focus on the share that the firm occupies in the value of the final product (World Bank and OECD, 2015g).

Furthermore, the “smiling” curve is not valid for all types of industries; it is typically more applicable in industries characterised by high degrees of modularity (like e.g. electronics) as international standards guarantee that the output of one production stage closely matches the input requirements of the subsequent stage. However, in a large number of industries, the different activities along the GVC are not that clearly divisible and separable, for example because of important feedback effects between R&D, design and

actual manufacturing/assembly (e.g. in the automotive industry, aerospace, pharmaceuticals, etc<sup>2</sup>). In such cases different parts of the curve can not be easily "fragmented".

These close linkages between activities and stages in the value chain also explain why it may be very difficult for newcomers in an industry to target high-value activities from the outset. Moving up the value chain to higher value added activities is often characterised by a large degree of path dependency due to the cumulative nature of manufacturing capabilities and investments; a certain sequence of moving from one production stage to the other may have to be respected in a number of industries. Likewise, forsaking manufacturing activities in order to move up may result in the loss of important capabilities and hence hamper the (future) competitiveness in upstream and downstream activities.

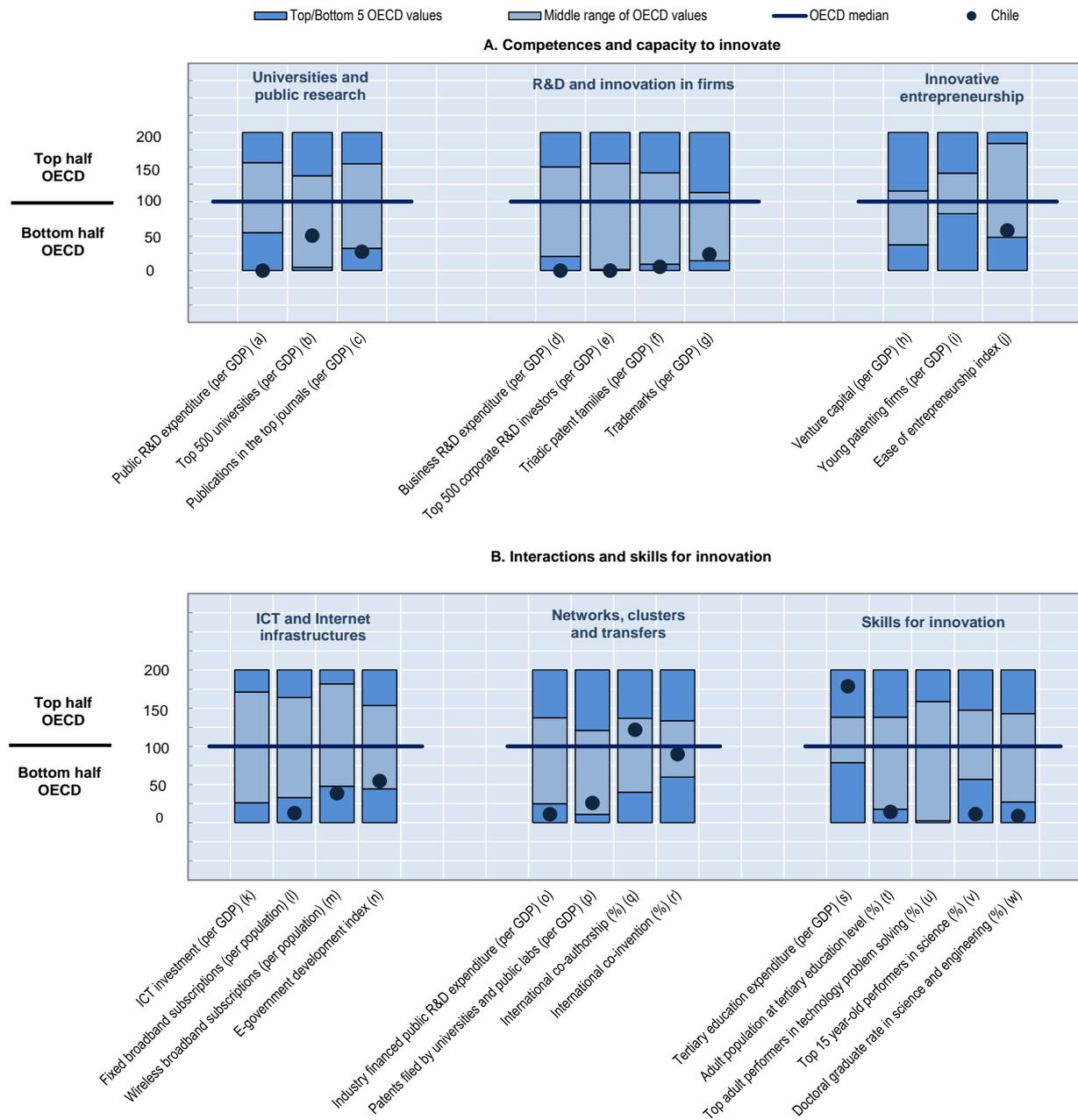
### **4.3. The Chilean innovation landscape in a nutshell**

The OECD Science Technology and Innovation (STI) Outlook (OECD, 2014) provides a concise picture of the innovation landscape in Chile in terms of policies as well as performance (Figure 4.2). In order to identify strengths and weaknesses in Chile's innovation landscape, indicators on the country's national innovation system and performance are benchmarked with respect to: universities and public research, business R&D and innovation, innovative entrepreneurship, information and communication technology (ICT) and Internet infrastructure, networks, clusters and transfers, and skills for innovation. The dot for each indicator positions the country relative to the OECD median and to the top and bottom five OECD countries. All indicators are normalised (by GDP and population cohorts) to take account of the size of the economy and the relevant population cohorts, and are presented as indices (OECD median = 100) for benchmarking purposes.

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<sup>2</sup> Likewise, Lanz et al. (2011) show that companies often find it uneconomical to unbundle specific tasks because of large economies of scope and synergies. Moreover, transactions and co-ordination costs (owing to the importance of tacit information, unforeseen events, contractual problems) would rise significantly if these tasks would be outsourced/offshored.

**Figure 4.2. Chile's innovation performance**



Source: OECD (2014), STI Outlook.

Overall, the innovation performance of Chile is well below the OECD median. Chile's public research system is small in comparison to other OECD countries, while business innovation including in SMEs is rather weak. R&D investments, both in the public and the business sector, are relatively small and innovation outputs such as patents and top scientific publications are low in an international perspective. In addition, ICT and internet infrastructure lags behind other countries, while industry-science links are less developed. With respect to indicators measuring the skills for innovation, PISA results indicate that Chilean students performed considerably below average in problem solving and mathematics. On the other hand, the country has invested heavily in tertiary education in recent years.

The weaker innovation performance of Chile is to a large extent related to its industrial structure and the lower level of development of Chile compared to other OECD countries. Resource intensive countries have overall a smaller manufacturing industry as their stronger currency – due to large exports of natural resources - makes manufacturing exports on international markets more expensive. This is important as manufacturing typically is a major source of innovation: for example, manufacturing accounts for more than three quarters of R&D investments in most OECD economies.

Also the stage of development plays an important role in countries' innovation performance as countries produce and export different types of goods at different stages of development. Low-income countries typically produce a narrow range of (labour-intensive) goods and when countries develop, they diversify their export portfolio until they re-concentrate their activities at higher income levels (Imbs and Wacziarg, 2003). Export growth is first achieved largely along the intensive margin (through the growth of existing trade flows) while growth along the extensive margin (through trade flows of new (increasingly knowledge-intensive) products and/or to new destinations) contributes to the diversification of countries' exports (Cadot et al., 2011). The extent and speed of diversification is strongly determined by the innovation activities of firms across different products and industries.

In discussing the export performance of countries within GVCs, OECD (2012b) showed that export growth occurred mainly at the intensive margin particularly for final goods, while the extensive margin was relatively more important in explaining the growth of exports in intermediate goods. In general, these results suggest that the international fragmentation of production into GVCs has accommodated the emergence of new competitors within the category of intermediate goods. The results for Chile departed somewhat from these general observations which is most likely due to Chile's export portfolio being geared towards copper. More than 80% of Chile's export growth in intermediates (including copper) between 1995 and 2007 resulted from the expansion of existing trade flows (i.e. old/existing products to old/existing destinations). In contrast, notwithstanding the intensive margin is also the main driver for Chile's exports of final goods, Chilean exporters of consumption goods seemed to have been more successful in diversifying their products as well as their destination markets.

In addition to comparing Chile with all other OECD economies including the best performing countries, the benchmarking of the innovation performance and policies for GVC upgrading in Chile would benefit from a more specific comparison with other 'similar' countries like:

- Countries at the same stage of development (measured by GDP/capita) such as: Turkey, Mexico, Poland and Hungary;
- (natural) resource intensive countries such as: Australia, Canada, New Zealand and Norway;
- Countries that are geographically isolated from major markets such as: Australia and New Zealand. OECD (2008) has shown the importance of economic distance for the dispersion in economic performance between OECD countries.

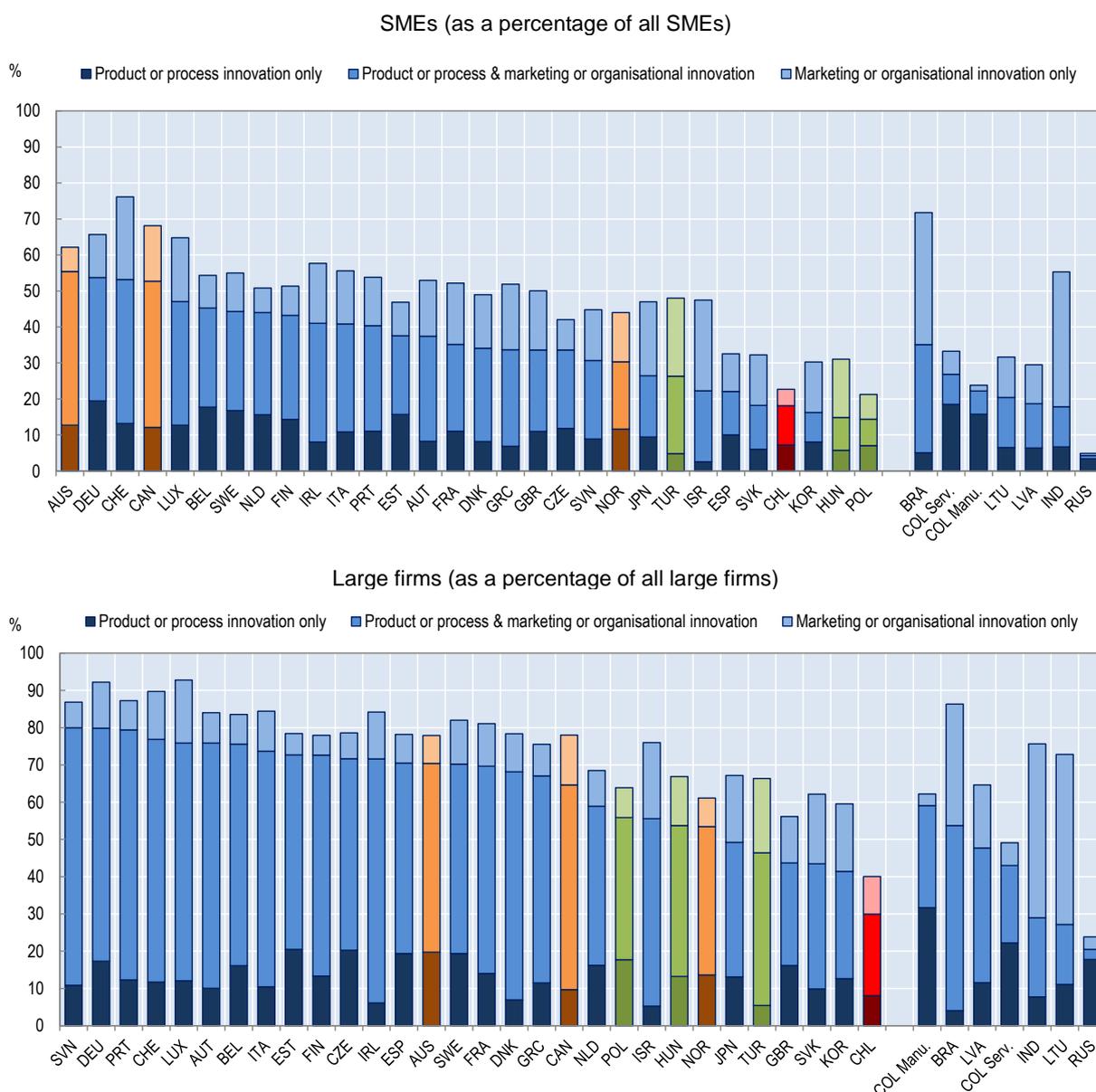
Data availability however limits the benchmarking of Chile's innovation performance and policies as empirical evidence on innovation for Chile is not available for all innovation dimensions. For example data on knowledge-based capital are not available for Chile, hence the discussion necessarily focuses primarily on innovation and R&D activities for GVC upgrading. Different OECD sources are used for this discussion: the STI Scoreboard 2013 and 2015, the STI Outlook 2014 and the revised 2015 Innovation Strategy. In addition, the OECD Innovation Review series analyses the innovation system of individual countries in greater detail, including the different actors, the governance structure, the different policies, etc; an innovation review for Chile was published in 2007. Currently, an OECD review of the research centres programmes in Chile is ongoing commissioned by the Chilean National Council of Innovation for Development (CNID).

#### 4.4. Innovation for GVC upgrading in Chile

##### *A large number of firms/industries do not innovate*

Firms undertake innovation by making substantial adjustments to either their products, processes, marketing or organizational structure (see also Box 4.1). Because these different forms of innovation are often complementary to one another, they are largely undertaken simultaneously by firms in most countries including Chile (Figure 4.3). For example, firms looking to increase their product range through product innovation are also likely to consider new ways to adapt their structure, alter their production process and adjust their marketing strategy. The most innovative firms introduce new marketing or organisational methods alongside product or process innovations since these are often complementary. In fact, new organisational methods may facilitate the introduction of a new production process or vice versa.

**Figure 4.3. Innovation types by firm size, 2010-12**



Source: OECD (2015i), Science, Technology and Innovation Scoreboard.

The results of innovation surveys overall indicate that most firms in Chile have both a low propensity to innovate and an insufficient level of innovativeness. The OECD Innovation Review of Chile (2007) referred to the legacy of a “physiocratic” culture in Chile as the dependence on the exports of natural resources has resulted in pervasive rent-seeking throughout the economy. Technology and innovation were often seen primarily as a tool that could easily be imported to appropriate such rents; in contrast, an innovation culture which viewed technology and knowledge as the main source of sustainable wealth creation was not yet prevalent in the business community and society in general (OECD, 2007)

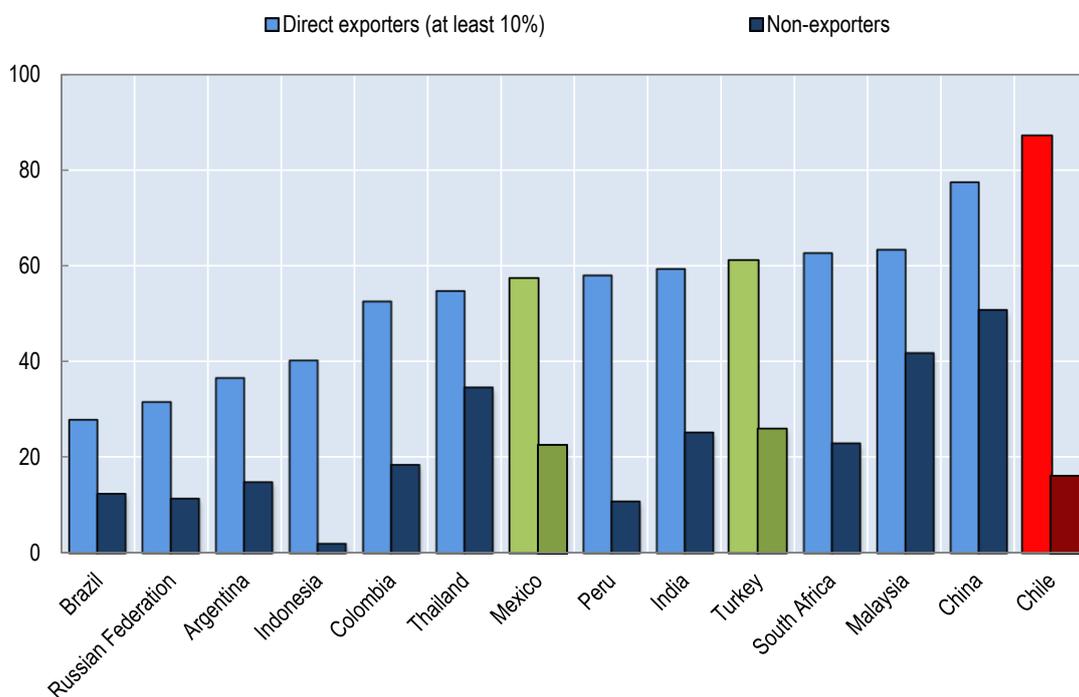
Just like in other countries, larger firms innovate more than smaller firms, but for Chile the lack of innovation in the majority of SMEs is remarkable: only 20% of Chilean SMEs report to have undertaken innovation activities (Figure 4.3). This percentage is significantly lower than in other resource intensive OECD countries and also – albeit less substantially- lower than in countries at the same level of development than Chile.

The limited innovation activities firms in Chile are an important barrier for the GVC upgrading of the Chilean economy as innovation enables firms to advance into new processes, products, tasks, and sectors with higher value added. Recent research for Chile reported a robust relationship between innovation and productivity and showed that Chilean firms have considerable opportunity to improve their global competitiveness by increasing their rates of investment in innovation (Crespi and Zuniga 2010). That innovation is important for firm performance is further illustrated by innovation survey results which show that more than 40% of the sales from product innovators in Chile stems from new and improved products through innovation.

Given that that 99% of all firms in Chile are SMEs, the limited innovation activities of this group of firms require policy attention. In addition to GVC upgrading, GVC densification – i.e. engaging more firms in GVC networks – is equally important to turning GVC participation into sustainable development in emerging economies (World Bank, 2015). The growing linkages between GVCs and domestic firms will maximize the spillovers from GVC participation to the Chilean economy. While local firms like SMEs are typically not able to join GVCs by exporting directly, they can still access GVCs by serving global firms located in Chile (IADB, 2014).

Instead of dealing with the administrative costs of exporting on their own, firms could join global supply chains and take advantage of the increasing international fragmentation of production by becoming upstream suppliers. In order to become suppliers to other (domestic and foreign) firms in GVCs, Chilean firms will however need to upgrade their firm capabilities in order to satisfy the demands of these buying firms. Adhering to (international) standards, obtaining certifications and quality labels, and undertaking innovation – not necessarily technological - are important ways for doing this. While more than 80% of Chilean exporters in manufacturing have obtained international quality certification, this percentage drops below 20% in the group of non-exporting businesses in Chile (Figure 4.4).

**Figure 4.4 Percent of manufacturing firms with international quality certification, by exporting status, selected countries, various years**



Source: Dutz et al. (2015).

When looking at the industry composition of business innovation in Chile, it appears that the energy and mining industries are the most important innovators in Chile with respectively 50% and 45% firms innovating in these industries. The innovation rates in manufacturing and services in Chile are significantly lower; in an OECD perspective, innovation rates in Chile ranks among the lowest countries although the difference with some its peers (i.e. more similar countries) like Hungary and Poland is rather small (Figure 4.5).

**Figure 4.5. Innovation in the manufacturing and services sectors, 2010-12**

Manufacturing (as a percentage of all manufacturing firms)



Services (as a percentage of all services firms)



Source: OECD (2015i), Science, Technology and Innovation Scoreboard.

Innovation in Chile tends to be of an incremental nature and is mostly catch-up rather than frontier innovation: most of the innovations introduced by Chilean firms consist of the commercialisation of adaptive and incremental technologies. Results of the Chilean innovation survey indicate that less than one-fifth of product and process innovations are completely new to the (Chilean) market. Product and process innovations seem to give primarily rise to products and processes that are new to the firm rather than being new to the market. For the vast majority of Chilean companies, purchase of capital goods is the means of technology adoption and many firms in Chile innovate through adaptation of imported technologies. The country is able to acquire technologies through imports and FDI as Chile is relatively open to trade and investment from abroad; in addition, Dutz et al. (2015) report that technology licensing is important for Chile, but relatively more in firms with foreign ownership compared to purely domestic firms.

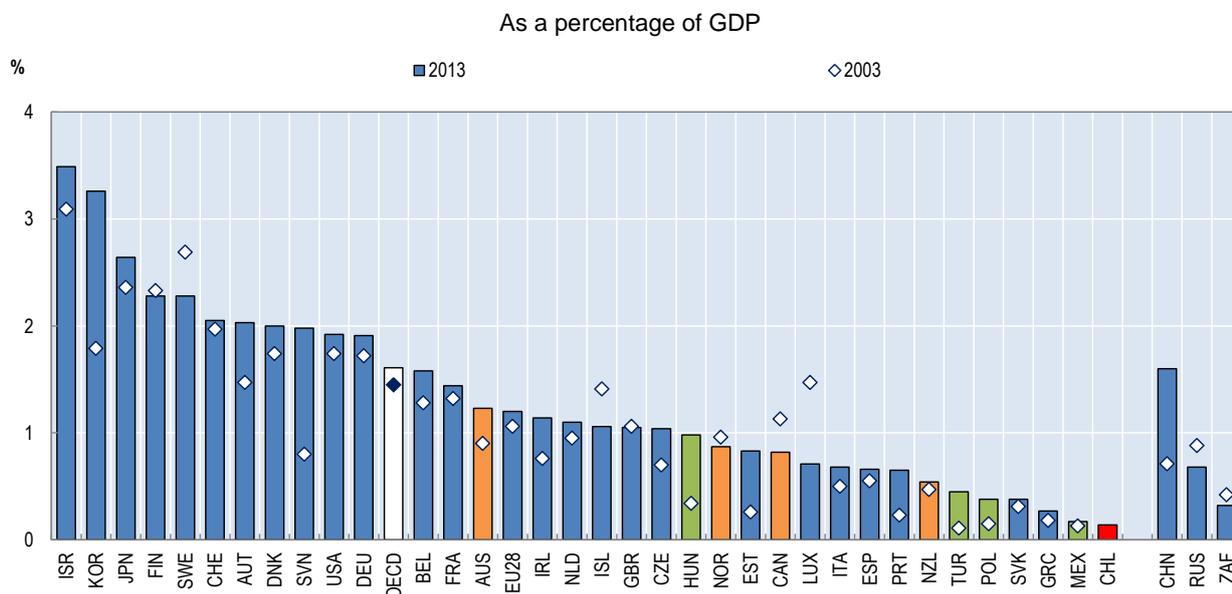
### ***Business R&D investments are strongly concentrated***

Investments in R&D are an important driver of innovation and GVC upgrading; particularly product innovation is to a large extent the result of R&D and technological innovation. R&D investments also enhance the absorptive capacities of firms which allows them more easily to cooperate with other firms in GVCs (cfr. discussion on GVC densification). Likewise, the development of own R&D capacity is needed as technology transfer from abroad requires appropriate absorptive capacity.

Chile's R&D intensity of 0.39 in 2013 is one of the lowest amongst OECD countries; lower than other resource intensive economies such as Canada or Norway but also economies like Turkey, Mexico – i.e. countries on the same level of development as Chile have higher R&D expenditures. Nevertheless, there has been a slight increase in gross R&D expenditure (GERD) in recent years reflecting the government's objective is to increase spending on R&D from to 0.8% of GDP.

The business sector plays a rather limited role in R&D in Chile, accounting for less than 40% of total R&D investments in Chile (the OECD average is two-thirds). The modest role played by the business sector in the financing and performance of R&D is a feature that clearly distinguishes Chile's innovation system from those of more advanced economies (OECD, 2007), but also from more similar countries (Figure 4.6). This is partly due to Chile's specialisation in non-R&D-intensive industries but also to the fact that the vast majority of small and medium-sized enterprises (SMEs) do not engage in R&D and innovation. Business sector participation in R&D is exceptionally low overall, with only around 350 firms stating that they routinely invest in R&D, a figure that has only marginally increased over time. Manufacturing, real estate and mining are the sectors that contribute the most to business R&D, together accounting for almost two-thirds of business R&D in Chile.

**Figure 4.6. Business enterprise expenditure on R&D, 2001 and 2013**



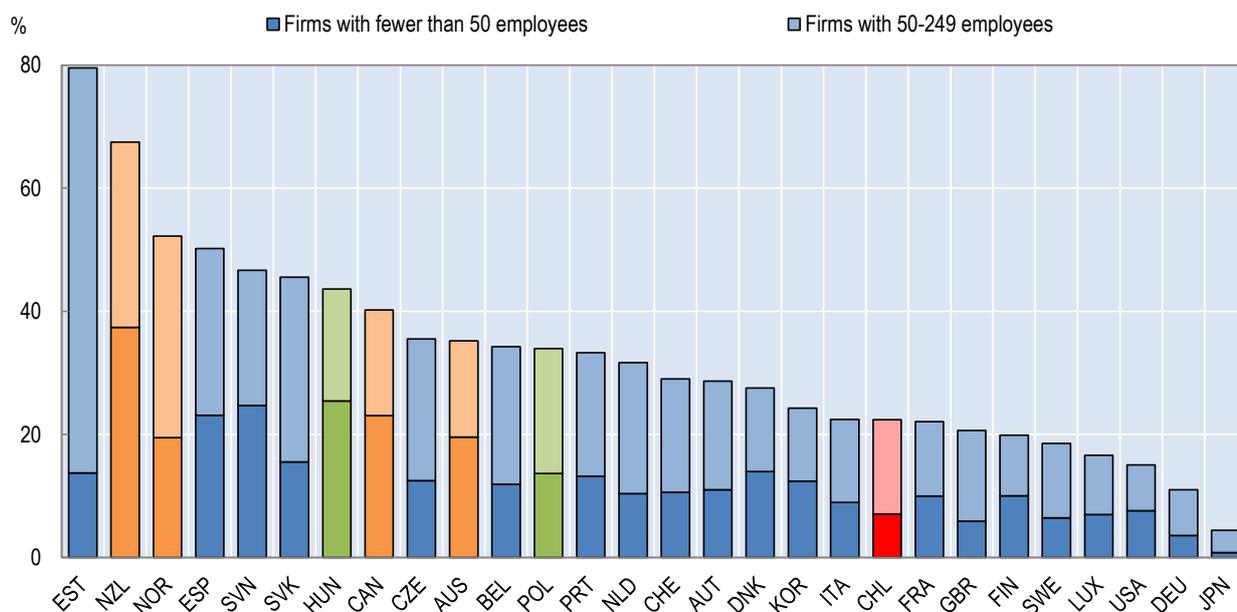
Source: OECD, Main Science, Technology and Innovation database.

Just like in other countries, business R&D in Chile is concentrated in a limited number of firms; almost 80% of business R&D investments in Chile is done in firms with more than 250 employees. Particularly the smallest firms in Chile are under-represented in business R&D investments when comparing across OECD countries and more similar countries (Figure 4.7). Low R&D by private firms may have to do with market failures, as evidence suggests that private rates of return to R&D investment

are generally quite high (Benavente et al., 2006). Uncertainty may be very discouraging for firms to invest in R&D, especially for smaller firms. Especially when there is limited access to financial markets, smaller firms are affected to a larger extent and the investment in R&D results in sub-optimal choices, a problem that is encountered in other economies as well (OECD, 2013g).

**Figure 4.7. Business R&D by size class of firms, 2011**

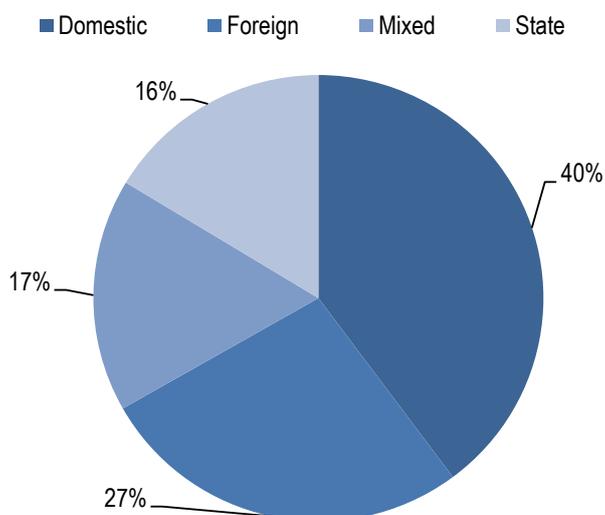
As a percentage of R&D performed in the business sector



Source: OECD (2013i), Science, Technology and Industry Scoreboard.

Looking at firm ownership, domestic (privately-owned) firms in Chile accounted for about 40% of business R&D investments in 2011 (Figure 4.8). State-owned enterprises play an important role in Chilean business R&D with fully and partially stated owned enterprises accounting for about one third of business R&D (particularly in mining). Foreign affiliates represented one quarter of business R&D; in other smaller and open OECD economies like Belgium, Ireland, Hungary, etc., foreign affiliates are often major players in business R&D and accordingly a significant part of business R&D investments are funded from abroad.

**Figure 4.8. Business R&D Expenditure by Ownership, 2011**



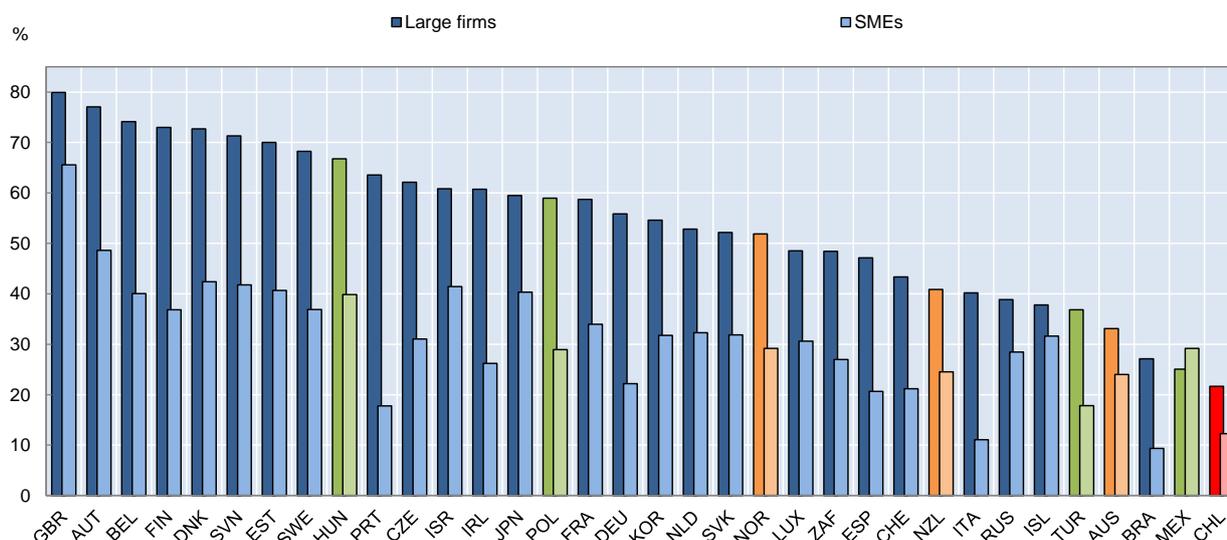
Source: OECD calculations based on R&D Survey in Chile.

### ***Collaboration in innovation is limited***

Collaboration has become increasingly important for innovation since technologies are changing at a rapid pace making it extremely difficult for firms to stay abreast of technological developments. In addition, given the complexity of innovation and the need to source various intermediates from multiple locations, collaboration may allow firms to more cost effectively undertake invention activities (source). Firms may co-develop their innovations with other companies, procure services such as R&D or design, license the rights to others' inventions or simply imitate innovations developed and adopted elsewhere. It can take a variety of forms and levels of interaction, ranging from simple one-way information flows to highly interactive and formal arrangements.

Larger firms are far more likely to collaborate than small and medium-sized enterprises (SMEs); among SMEs, the rate of collaboration is between 20% and 40% of innovative firms in two-thirds of the countries surveyed. For large innovative firms, collaboration rates range from more than 70% in several OECD countries to less than a third in Chile (Figure 4.9). The majority of Chilean firms do not perceive the value of co-operation in innovation; while some innovative clusters have taken shape, e.g. in the food and beverage industries, many others are latent. The mining industry could be the nexus of a broader set of diversified interrelated services and manufacturing activities.

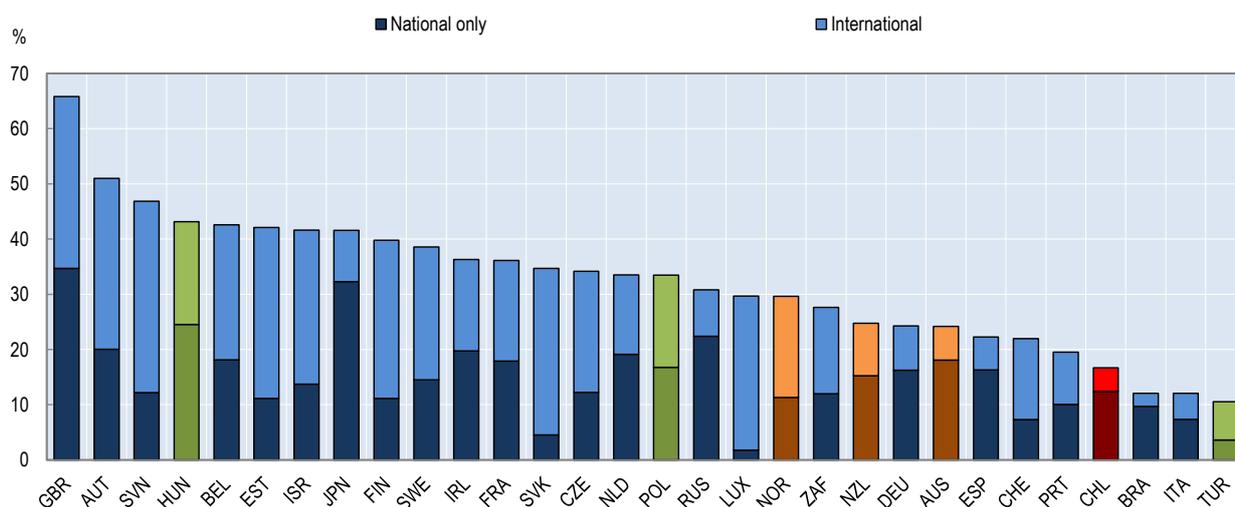
**Figure 4.9. Firms collaborating on innovation activities, by size, 2008-10**



Source: OECD (2013g), Science, Technology and Industry Scoreboard.

Firms cooperate on innovation with domestic and/or foreign partners. Particularly, collaboration with foreign partners may play an important role in the innovation process by allowing firms to gain access to a broader pool of resources and knowledge at lower cost and to share risks. In Chile, cooperation on innovation shows a strong national character, with around 80% of innovation collaboration being within the national borders (Figure 4.10). Again, size appears to be a strong determinant of foreign collaboration: large firms have a much higher propensity to collaborate internationally than SMEs, regardless of the overall rate of international collaboration (OECD, 2013g).

**Figure 4.10. National and international collaboration on innovation by firms, 2008-10**



Source: OECD (2013g), Science, Technology and Industry Scoreboard.

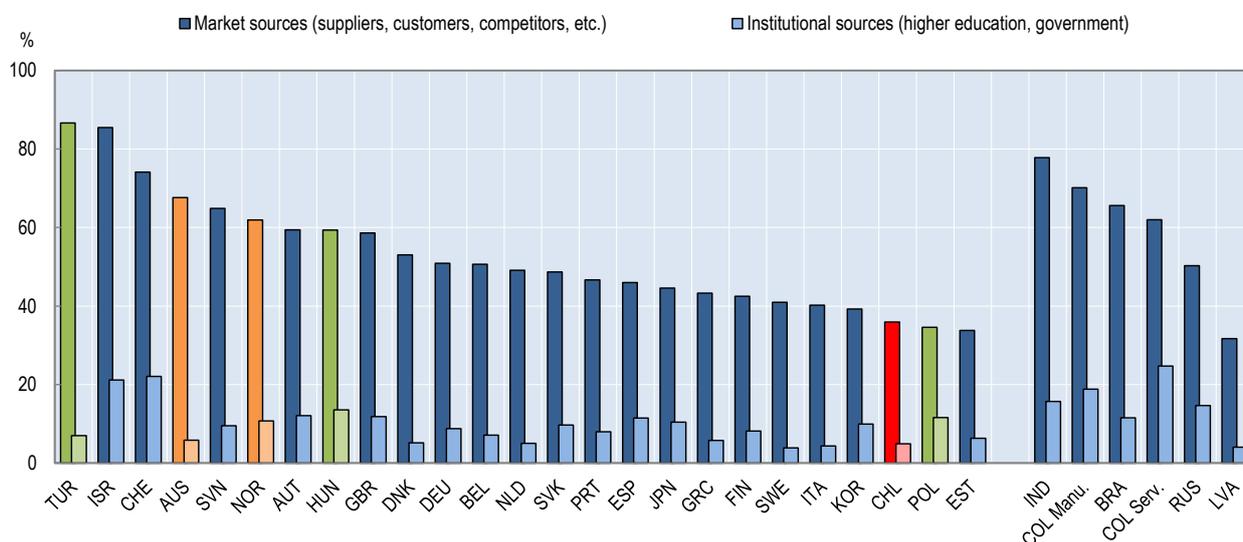
Collaboration with suppliers and customers are typically the predominant forms of cooperation with external partners. Suppliers have become increasingly important for innovation because of the pervasiveness of GVCs thereby creating opportunities for SME to participate in GVCs and at the same time become active in innovation. Innovation collaboration with institutional sources play a much smaller

role across OECD countries; particularly Chile has been characterised by a long-standing disconnect between businesses and universities in innovation (Crespi and Zuñiga, 2012). Different programs have been developed and set-up in recent years but scale and take-up has not been large enough to make substantial impact (OECD, 2013h). In addition, initiatives have been developed to strengthen the links between industry and research centres in Chile; as mentioned above, the OECD is currently assessing the impact of these research centres.

Collaboration with higher education or public research institutions seems to be mainly an important source of knowledge transfer for large firms. In most OECD countries, larger firms are usually two to three times more likely than small and medium-sized enterprises (SMEs) to engage in this type of collaboration. Likewise, cooperation between business and public institutions is limited, particularly for SMEs (Figure 4.11).

**Figure 4.11. External sources of knowledge for innovation, by type, 2010-12**

Percentage of product and/or process innovative firms citing source as "highly important"



Source: OECD (2015i), Science, Technology and Innovation Scoreboard.

#### 4.5. A business environment conducive to innovation and GVC upgrading?

The 2010 and 2015 OECD Innovation Strategy have stressed the importance of sound framework conditions for innovation, including sound macroeconomic policy, competition, well-functioning product and labour markets, openness to international trade and investment, innovation-friendly tax systems, and financial systems that enable resources to flow to innovative activities. While it is not possible to benchmark Chile on all aspects of conditions conducive for innovation and GVC upgrading in this analysis, the most important are discussed in more detail.

##### *Human capital*

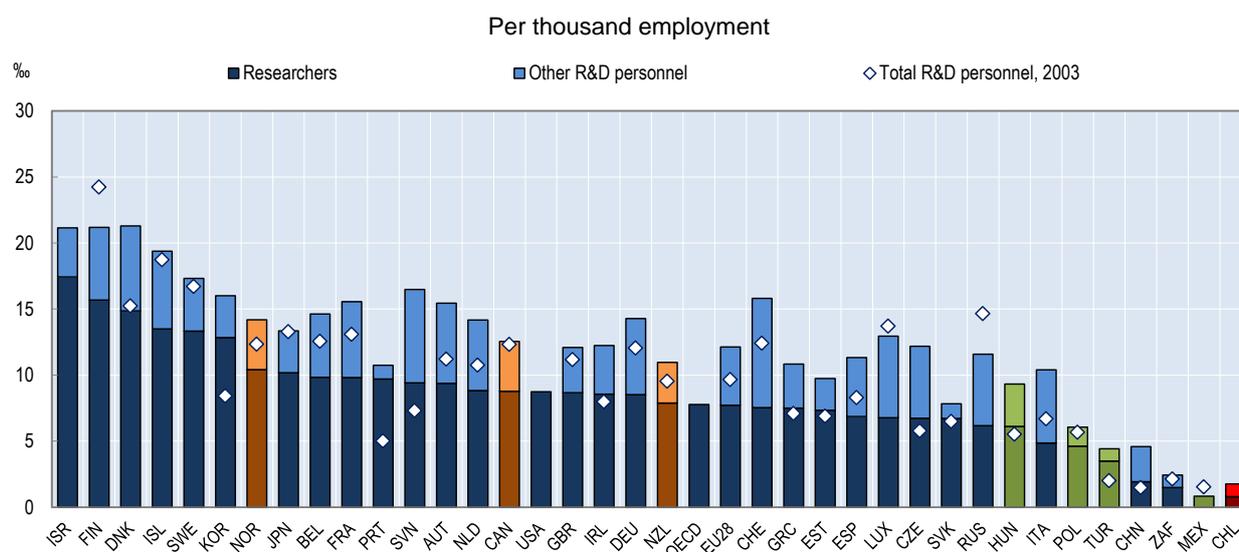
Innovation and human capital are strongly linked as (OECD, 2015g):

- Skilled people generate knowledge that can be used to create and implement innovations;
- having more skills raises the capacity to absorb innovation; skills that aid the adoption of technology are beneficial across the workforce, not just within R&D teams;

- Skills interact synergistically with other inputs to the innovation process, including capital investment. For instance, studies have shown that human capital complements investment in and the use of information and communication technologies (ICT);
- Skills enable entrepreneurship which is often a carrier of innovation and structural change;
- Skilled users and consumers of products and services often provide suppliers with valuable ideas for improvement (Von Hippel et al., 2011).

Innovation and R&D activities are heavily dependent on well-trained workers, especially those with postgraduate qualifications. The very low numbers of R&D personnel and researchers in Chile shows that human capital is a significant bottleneck for R&D and innovation in Chile (Figure 12). OECD (2013g) argued that Chile lack sufficient advanced human capital in key science, technology and engineering management (STEM) fields. Chile has significantly lower entry and graduation rates from tertiary education than other OECD countries, but there are signs that the government is attempting to improve this by investing a substantial share of funds into higher education. As of 2010, Chile was the 4<sup>th</sup> highest in terms of total spending on higher education as a percentage of GDP out of OECD and non-OECD countries. This has resulted in the numbers of PhD and masters students to rise significantly, but the figures are still low compared to other OECD countries.

**Figure 4.12. R&D personnel, 2003 and 2013**

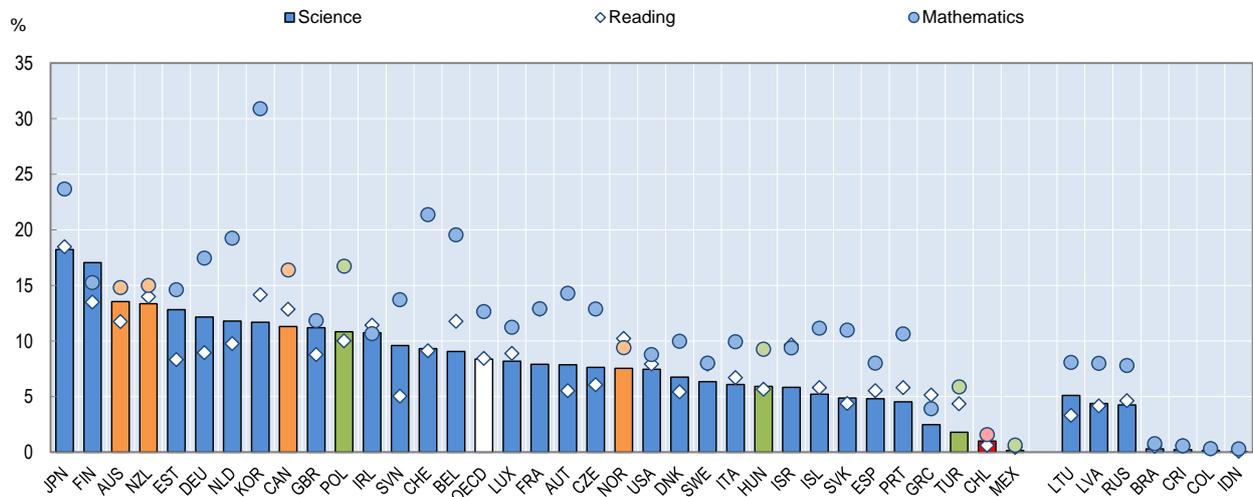


Source: OECD (2015i), Science, Technology and Innovation Scoreboard.

One way to examine future depth of a countries talent pool for innovation is to measure the proportion of top performing students (age 15) on science, reading and mathematical proficiency tests. OECD PISA (2012) results show that Chile has amongst the lowest proportions of top performers in all three subjects. In science, reading and mathematics, the rate of top performers in Chile was only 1.0%, 0.6% and 1.6% respectively; these percentages are substantially below the OECD averages of 8.4%, 8.4%, and 12.6% (Figure 4.13).

**Figure 4.13. Science, reading and mathematics proficiency at age 15, 2012**

Percentage of top performers



Source: OECD Programme for International Student Assessment (PISA).

Given that innovation is a broad and complex process, the skills set contributing to innovation is also large. Generic skills - such as reading, writing and problem solving – as well as technical, managerial, design and interpersonal skills, such as multicultural openness and leadership, all affect innovation. In the widest interpretation, the skills that support innovation could be any ability, proficiency or attribute that contributes to creating and implementing new products, processes, marketing methods or organisational arrangements in the workplace. Even if these skills are narrowed to only those that are teachable in the education and training system, the set remains large.

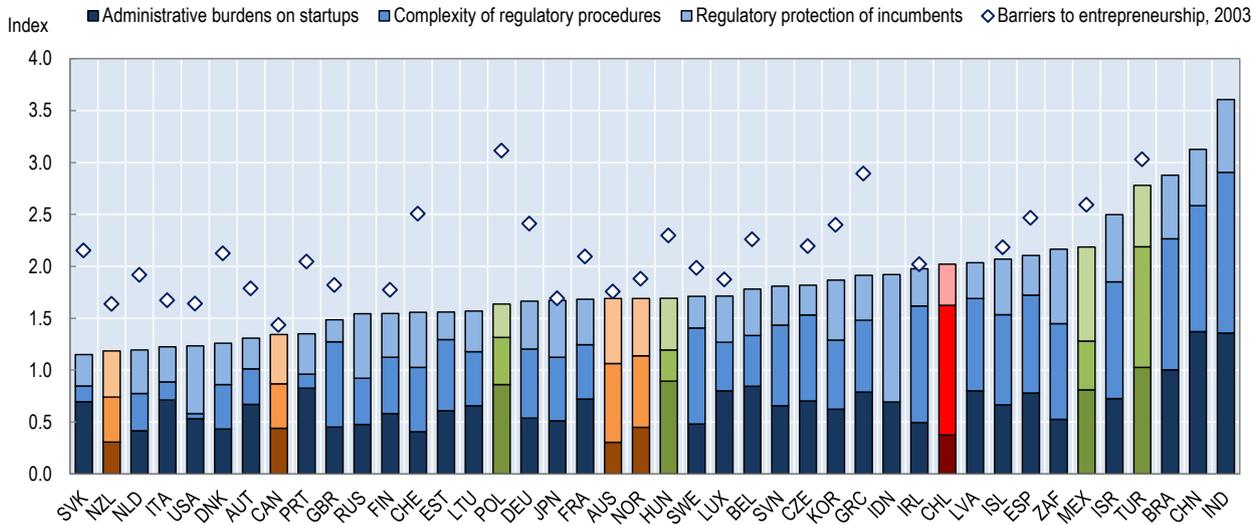
### ***Entrepreneurship***

Entrepreneurship and innovation are highly interdependent as new and young firms are often the vehicle through which (radical) innovations enter the market. Innovation in products, business models, etc. is a prerequisite for firms to become/stay competitive and grow. At the economy level, the birth of new firms, the growth of more productive firms and the death of non-viable ones are essential to an economy’s experimentation and creative destruction. The reallocation of productive resources to the most productive (and innovative) firms generates growth, employment and value added; this largely occurs through the introduction of incremental innovations, disruptive technologies, new business models or other forms of knowledge-based capital (e.g. new marketing strategies).

The rate of this reallocation is shaped by framework conditions such as access to credit, employment protection legislation, bankruptcy law and administrative red tape. Policy settings which affect firm entry/exit and the growth of young firms provide incentives for this dynamic reallocation to happen on a continuous basis. An international comparison of various barriers to entrepreneurship (including administrative burdens to create a new firm, regulatory and administrative opacity such as licences permits and the ease of processes, and barriers to competition (legal restrictions, antitrust exemptions, and obstacles to network sectors), shows that Chile particularly the complexity of regulatory procedures are still a problem (Figure 4.14).

**Figure 4.14. Barriers to entrepreneurship, 2013**

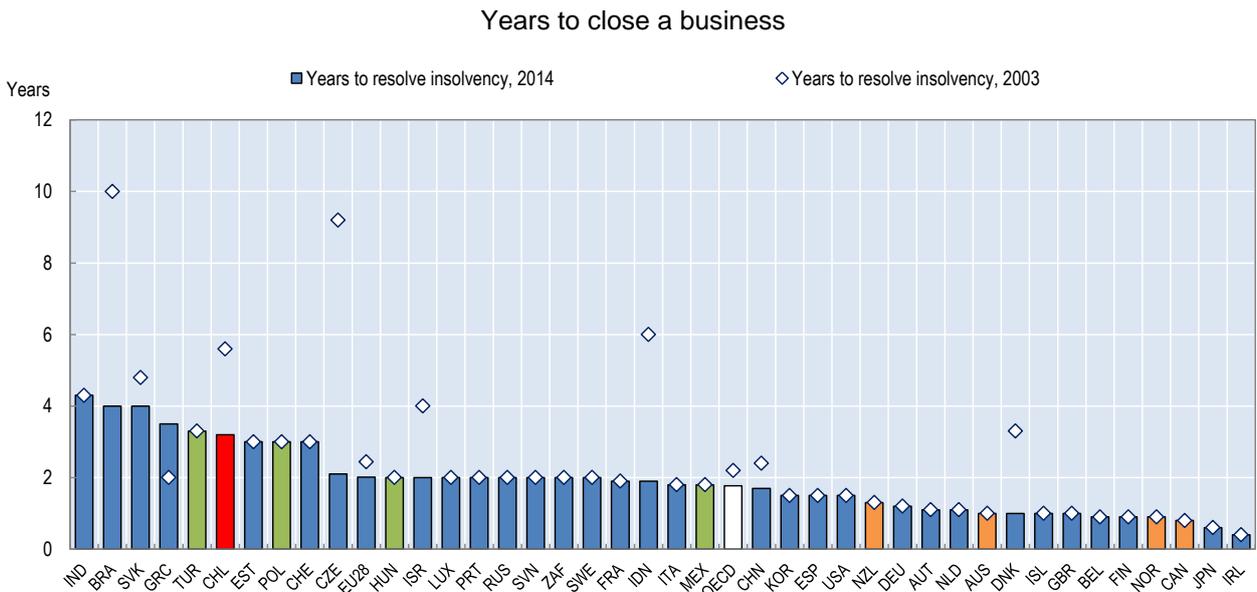
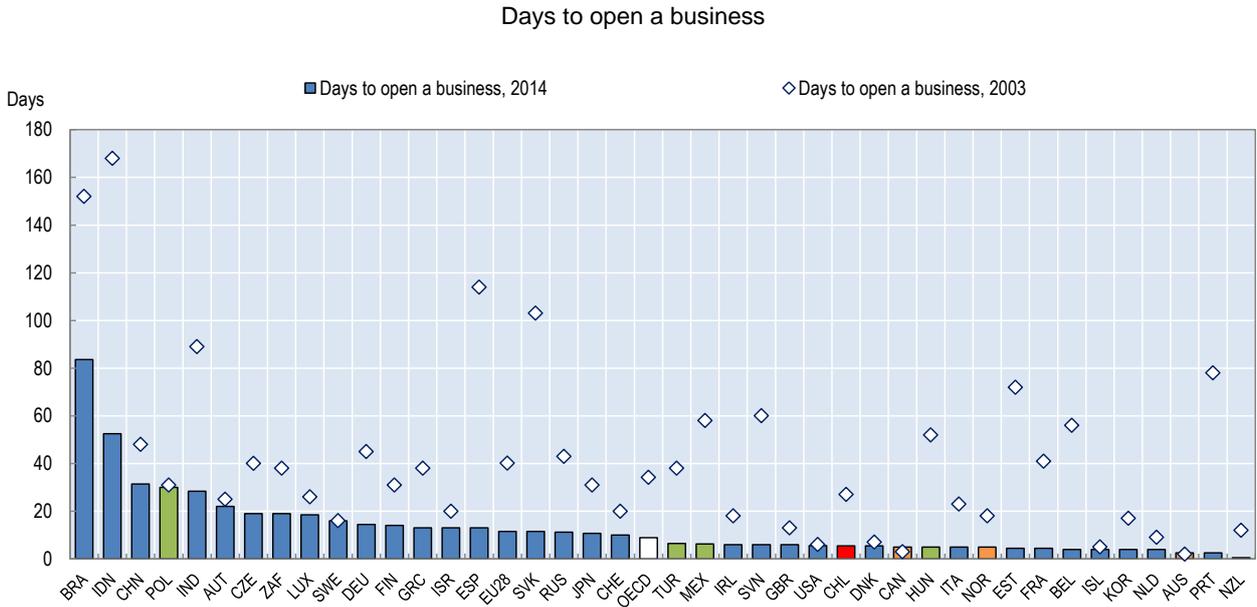
Scale from 0 to 6 from least to most restrictive



Source: OECD Product Market Regulation database.

Chile has made substantial improvement with respect to its entry and exit regulation in recent years, resulting in less time needed to open and close a business in Chile (Figure 4.15). While the time needed to open a business fell from 27 to 8 days in 2012, another new law went into effect in May 2013 (Law No. 20.659) that eases requirements further, allowing a firm to be created in just one day and reducing the cost substantially. In addition, a new bankruptcy law - introduced in 2014 (Law No. 20.720) - reduces the bankruptcy procedure time to a maximum of 14 months (7 months for smaller firms), which is similar to the average time to close a business in OECD countries. It follows best practices, including setting time limits on those procedures to accelerate the liquidation, and includes procedures that avoid the delays in payment to creditors, thus expediting the return of productive assets to the market.

**Figure 4.15 Time needed to open and close a business, 2003 and 2014**



Source: World Bank Doing Business database.

**Finance**

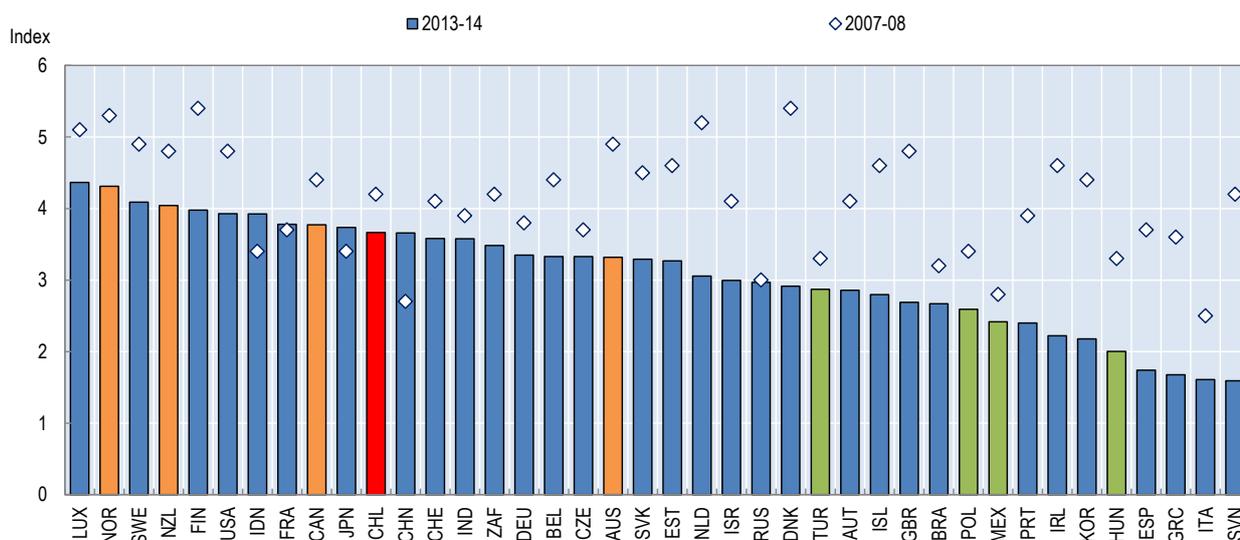
Access to finance is a key challenge for innovative enterprises. External financing is especially important when innovative firms, particularly young firms, begin to grow, at which point financing requirements become too large to be met by family and friends. Traditional debt finance generates moderate returns for lenders and is therefore more appropriate for established businesses with a low-to-moderate risk profile. Furthermore, for innovative ventures with new technologies or untested business models, the problem of asymmetric information between entrepreneurs and financiers is especially severe. This is particularly so for seed and early-stage firms as well as for SMEs, which typically lack a track record and collateral and are often more opaque than large companies. Financing constraints can also be

severe for firms reliant on intangible assets, which can be highly firm-specific and difficult to use as collateral in traditional debt relationships (OECD, 2013e).

In a cross country comparison regarding the ease of access to loans (World Economic Forum 2015 – the ease of obtaining a loan from a bank having just a good business strategy and no collateral), Chile performs relatively well (Figure 4.16). In comparison to other emerging economies, such as Mexico and Turkey, Chilean firms can more easily obtain a bank loan.

**Figure 4.16. Ease of access to loans, 2007-08 and 2013-14**

Scale from 1 to 6 from hardest to easiest, weighted averages

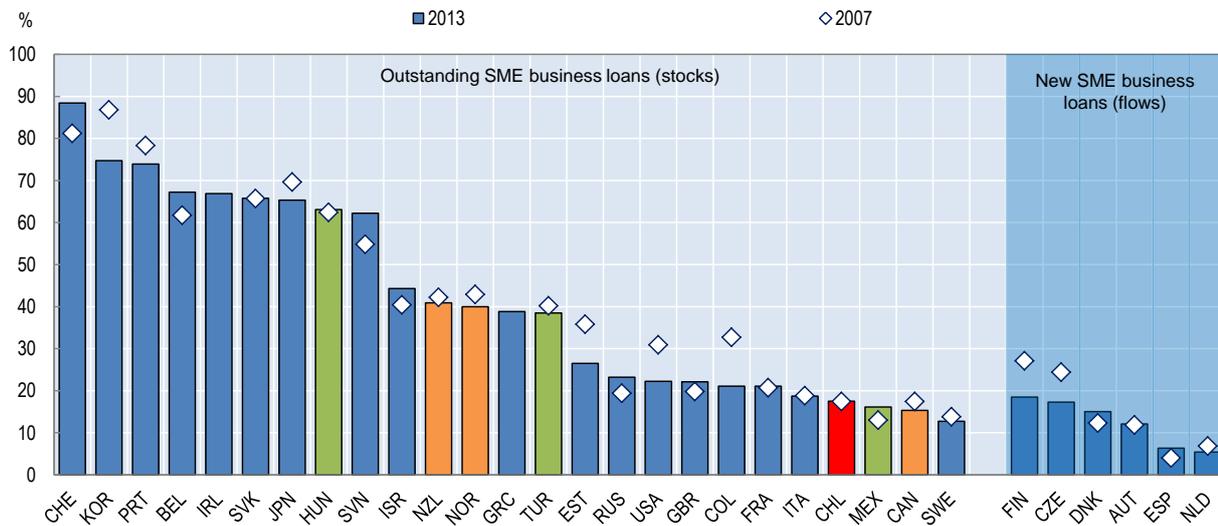


Source: OECD (2015b), Financing SMEs and Entrepreneurs 2015: An OECD Scoreboard.

Access to finance is particularly difficult for SMEs; data on debt finance reveal that this is also a major problem in Chile with 99% of all Chilean firms being SMEs. Chile has one of the lowest rates of SME loans in the sample of countries for which data are available; further on, in most countries including Chile, SME lending deteriorated in most recent years particularly as a result of higher interest rates and greater demand for collateral (Figure 4.17). OECD (2015b) reports that close to 60% of SME loans were short-term in 2013, indicating that most loans were used to resolve cash flow imbalances.

**Figure 4.17. SME loans, 2007 and 2013**

As a percentage of total business loans



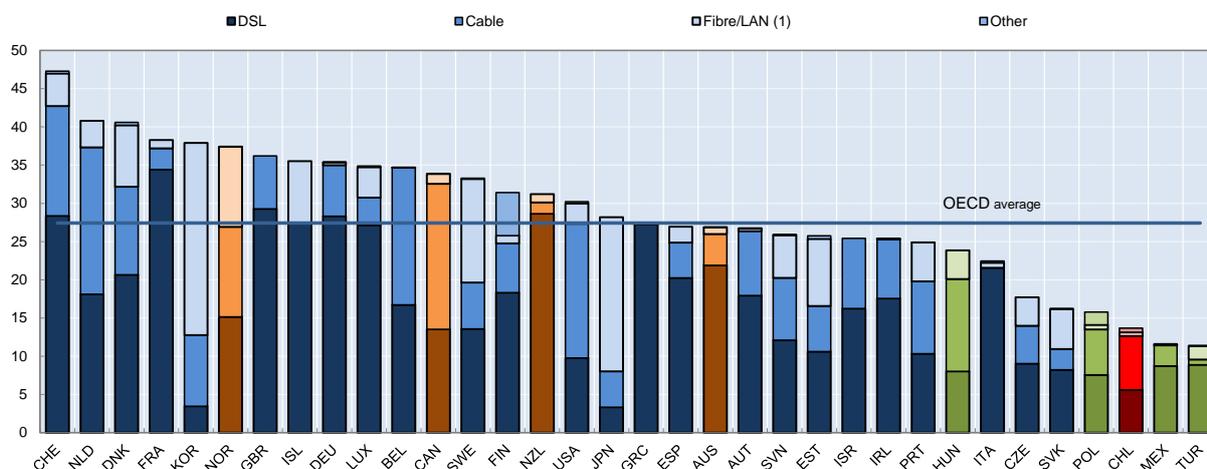
Source: OECD (2015b), Financing SMEs and Entrepreneurs 2015: An OECD Scoreboard.

Several policies to broaden finance possibilities for (innovative) firms have been implemented in Chile during recent years; all of these new measures contribute to the policy priority of the Chilean government to stimulate entrepreneurship and innovation. For example, the *Innova Chile* Programme provides funding on an up-front basis without requiring that applicants secure bank guarantees. In order to encourage private investment in small and medium enterprises, CORFO (i.e. the national economic development agency under the Ministry of Economy) has fostered the development of venture capital industry in Chile and the participation of private investors in mutual funds (Benavente et al., 2005). In general, Chile’s recent policies for venture capital have been assessed positively (LAVCA, 2013; Echeopar et al., 2013).

### ***Information and Communication Technologies (ICT)***

ICT has become a major driver of innovation within the growing digital economy; for example, many emerging technologies of today rely on innovations in ICTs. A particular form of ICT, broadband, represents a vital facet of the economy and is thought to significantly impact the economy and society, as it allows for the communication across various forms of ICT. Gains from broadband are an increase of product and process innovation, improved information communication, increases organizational change, productivity gains as well as employment growth and occupational change (OECD, 2008). Maintaining and well-developed broadband infrastructure in order to increase broadband penetration and data transfer speeds is an important component for a competitive economy. As of 2014, Chile had one of the lowest penetration levels with just 13.7 subscriptions per 100 inhabitants (Figure 4.18).

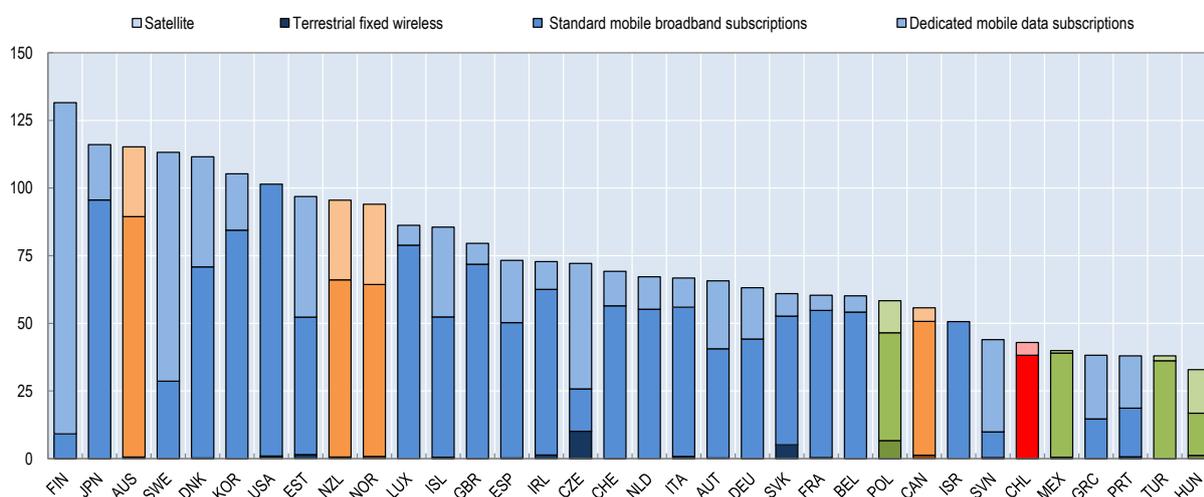
**Figure 4.18. OECD Fixed (wired) broadband subscriptions per 100 inhabitants, by technology, June 2014**



Source: OECD (2015f), Digital Economy Outlook

However, given Chile’s rugged terrain, fixed broadband connections outside of urban areas can be very expensive to rollout. Many countries have used wireless broadband in order to bridge the digital divide between urban affluent and wired regions and more rural remote locations. The penetration rate of wireless broadband in Chile of 42.9 per 100 subscribers is also lower than most other OECD countries (Figure 4.19). Although Chile has increased wireless broadband penetration rapidly, it still requires further progress in the installation of this technology to converge towards the average of OECD members.

**Figure 4.19. OECD wireless broadband subscriptions per 100 inhabitants, by technology, June 2014**

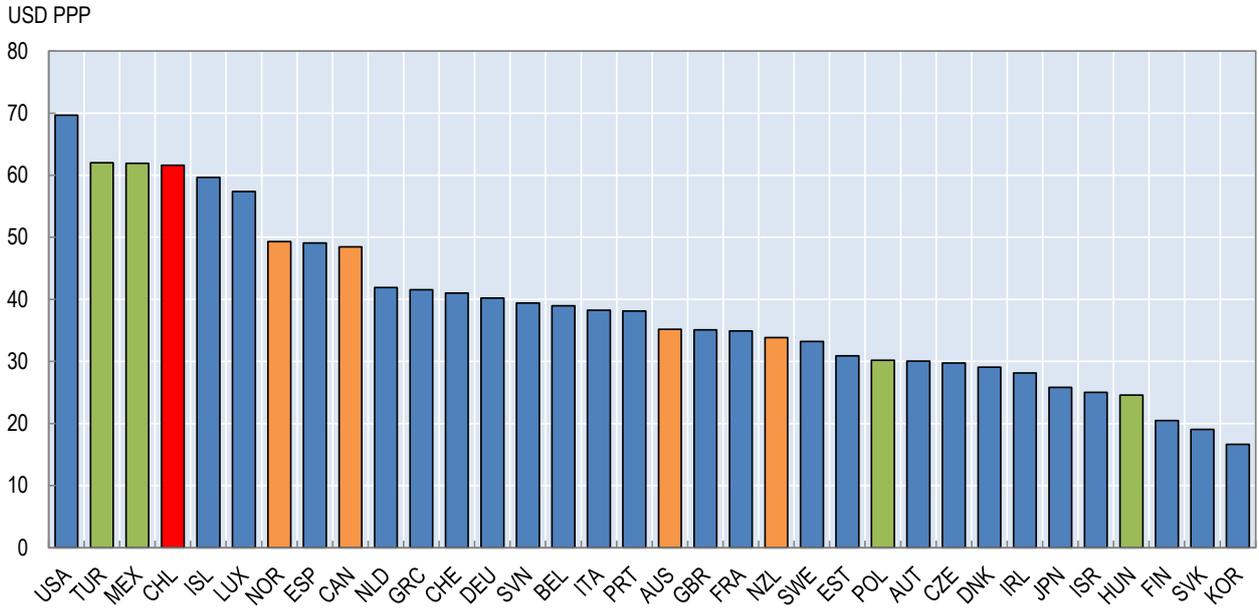


Source: OECD (2015f), Digital Economy Outlook

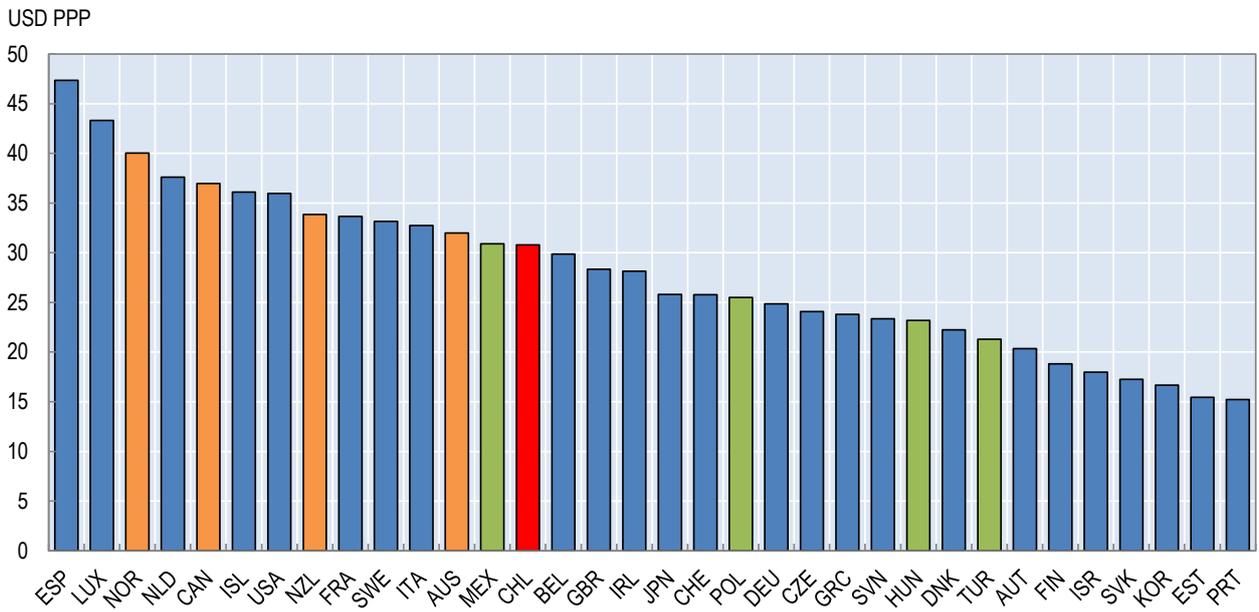
But even if broadband is readily available to all firms and household within countries, the demand and usage for such product will crucially depend on the cost of the service. An international comparison of standard baskets reveals that prices for broadband service in Chile are relatively high (Figure 4.20). Since broadband is an integral aspect of both domestic and global economies, high costs to broadband subscriptions mean higher entry and operating fixed costs for firms; therefore expensive broadband fees could hinder innovation and resource allocation efficiency gains.

**Figure 4.20. Prices of fixed broadband basket, June 2014**

Fixed broadband basket, high use, >25/30 Mbit/s



Fixed broadband basket, low use, >1.5/2 Mbps



Source: OECD (2015f), Digital Economy Outlook.

#### 4.6. Government policy in Chile supportive for innovation and GVC upgrading?

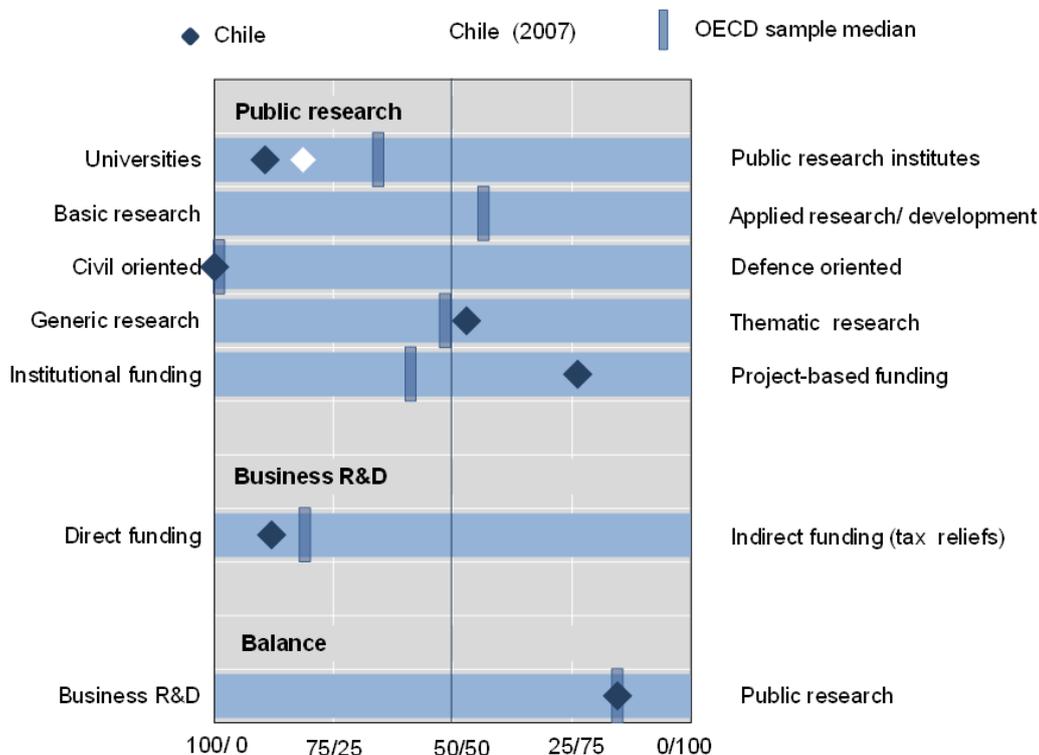
##### *An innovation policy mix largely geared towards public research*

Reflecting the broad character and different dimensions of innovation, most countries have a wide range of policies in place to support innovation and address specific barriers to innovation. The optimal balance and the appropriate mix of innovation policies is dependent on a multitude of factors like the economic structure of the economy, the stage of developments, its location, etc. hence there are no ‘one size fits all’ recommendations in innovation policy.

Lacking the necessary evidence to benchmark Chile’s government policy domains across all domains, the STI Outlook 2014 provided some insights about Chile’s innovation policy mix in comparison with other countries (Figure 4.21). Public R&D resources were in Chile strongly focused on public research and within the public research system particularly on universities. Public R&D resources were in Chile less – compared to most other OECD countries - targeted to supporting business R&D. Support for business R&D was mainly provided through direct support (grants, loans, subsidies) while R&D tax incentives were much less important.

Chile introduced a tax credit in 2008 to encourage further private investment in R&D and stimulate specifically the cooperation between business and public research. The tax credit was modified in 2012 making in-house R&D activities also eligible for the tax credit (collaboration with external research centres was required before), increasing the annual tax ceiling, abolishing the requirement to invest at least 15% of the company’s gross profits and simplifying administrative requirements. The changes have increased the attractiveness of the system resulting in a significant increase in applications from the business sector, although relatively more from larger firms.

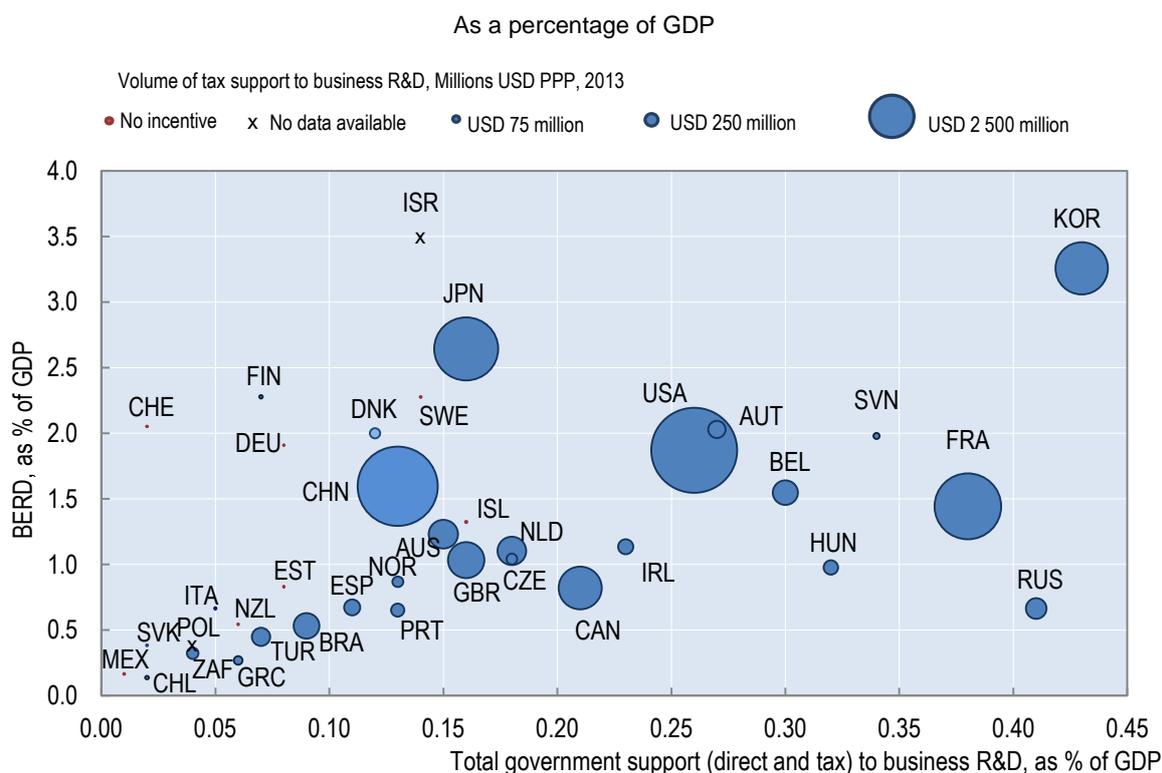
**Figure 4.21 Allocation of public funds to R&D by sector type and mode of funding, 2012**



Source: OECD (2014), Science, Technology and Industry Outlook.

More targeted government support (direct as well as indirect) could be considered to stimulate the much-needed business R&D and innovation in Chile. Governments can choose among various instruments to promote business R&D: in addition to giving grants or loans and procuring R&D, many also provide fiscal incentives. Across countries, R&D intensity in the business sector (vertical axis in Figure 4.22) is significantly correlated with total government support for business R&D (horizontal axis in Figure 4.22), although this does not imply a causal relationship and notable exceptions exist. There is considerable evidence that government financial assistance can increase overall R&D expenditure, without crowding out of private R&D investment (OECD, 2015g). For example many firms lack access to low cost sources to finance needed for innovation and cannot endure the long time period before investments in R&D begin to receive returns on their investment (Navarro et al., 2010).

**Figure 4.22. Business R&D intensity and government support to business R&D, 2013**



opportunities for rent-seeking and can lead to lock-in. While direct subsidies are more targeted towards long-term research, R&D tax schemes are more likely to encourage short-term applied research and boost incremental innovation rather than contribute to radical breakthroughs.

The benefits of R&D tax support may however be skewed as large, incumbent and multinational firms may be best placed to reap the benefits from such measures. This is due in part to their capacity to exploit international tax-shifting opportunities but it may also be due to the design of the tax incentive itself. For example, if there are no carry-forward provisions, new firms may not be able to benefit. Bravo-Biosca et al. (2013) provide evidence of the impact of R&D tax subsidies on the distribution of employment growth in R&D-intensive sectors. This work shows that support for R&D only has a positive impact on employment growth in incumbent firms with relatively low growth rates, while it has a negative effect on firm entry and on the employment of firms in the top of the growth distribution. These results suggest that R&D tax incentives might favour incumbent firms and slow down the reallocation process. The effect of the design of incentives on overall firm dynamism is, therefore, of great importance (OECD, 2015g).

It is therefore important that R&D tax incentives are refundable or contain carry-over provisions so as to avoid overly favouring less dynamic incumbents at the expense of dynamic young firms. The implicit subsidy rate of R&D tax incentives increases with the profitability of the firm and many young innovative firms are typically in a loss position in the early years of an R&D project. Thus, these firms will not benefit from the program unless it contains provisions for immediate cash refunds for R&D expenditure or allows such firms to carry associated losses forward to deduct against future tax burdens (OECD, 2015g). Chile should monitor the implementation of the scheme closely and consider adopting refundable credits as a complement to its recently revised scheme. To enhance incentives among larger firms in the future, an incremental element could be added to the existing scheme to provide enhanced incentives (OECD, 2015f).

### *Policy setting in Chile has become more supportive to innovation recently...*

Just like a number of other resource-based economies, Chile is trying to promote a diversification of its economy by actively managing the revenues derived from the exploitation of its natural resources, and allocating a proportion to long-term investment in innovation. Norway has been a prime example of how to manage large revenues from its petroleum sector prudently, and with a long-term perspective. It has combined good management of its oil and gas revenues with seizing opportunities for knowledge-intensive activities in and around this sector, using it as a platform for developing its own technological capabilities leading to the development of marketable goods and services.

Chile has been making a persistent effort to move towards more innovation-based development during recent years. In addition to open trade and investment policies which have been implemented for a longer time, Chile has created a broad range of good framework conditions for innovation. Chile has been successful in entering new export-oriented businesses in a number of traditional industries, for example in the agro-food sector. But agriculture and mining tend to be less conducive to the development of product variety than certain services and manufacturing (which has stagnated). In order to help make the transition broader and more rapidly, the government has stressed the importance of innovation for Chile's economic future (e.g. 2013 was named the 'Year of Innovation') and has been trying to build a comprehensive innovation system in Chile:

- New governance structures and funding mechanisms for innovation have been put in place. These include the Innovation Fund (FIC), and the associated levy on mining revenues, the creation of a National Innovation Council for Competitiveness and an Inter-ministerial Committee for innovation. The National Innovation Council is entrusted with the mission of proposing guidelines for a long-term national innovation strategy.

- The National Innovation Strategy for Competitiveness consists of three main pillars: i) the development of human capital; ii) the strengthening of the science base to address socio-economic needs; and iii) the improvement of business R&D and innovation activities. The 2010-14 Innovation Plan developed eight major axes, including greater emphasis on entrepreneurship and on technology transfer, global connection and dissemination.
- The National Innovation Council for Competitiveness has, together with CORFO, implemented cluster initiatives which are expected to strengthen and broaden the scope of the country's comparative advantage in different areas, from mining to agro-food and services. The OECD Innovation Review of Chile (2007) observed the lack of (nascent) clustering of firms which is instrumental in the transition from a natural resources-driven to an innovation-based economy.
- The Chilean government is additionally focusing on smart specialisation strategies to transform the structure of production, increase productivity and diversify the economy, and encourage sustainable development. It promotes a public policy that aims - through private-public cooperation - to enhance strategic sectors where Chile has a high growth potential, providing the resources to remove obstacles for the development and scaling of these industries. A new effort is being devoted to *Programas Estratégicos* which foster public-private co-ordination and could help to promote clusters. Chile's copper deposits for mining, waters for fish farming, soils for wine making and clear skies for astronomy are an important asset for developing science and cross-links that can help generate a local innovation eco-system and strengthen technological development.
- Public spending of R&D in Chile has increased over the years as the government's objective is to increase spending on R&D from 0.4% to 0.8% of GDP.
- In order to address the limited industry-science cooperation in Chile (OECD, 2007), several ministries and agencies promote collaborative research by companies, researchers and public research institutes in priority sectors (e.g. aquaculture, the food industry, mining). CORFO for example offers a number of incentives to improve technology transfer (e.g. support for IPRs and programmes to strengthen universities' transfer and licensing offices). Go to Market, a programme launched in 2011, aims to facilitate the commercialisation and export of the results of applied R&D carried out by enterprises and researchers. A programme for placing researchers in enterprises has been implemented to enhance researchers' involvement in activities that support private innovation.
- Regulatory barriers for entrepreneurship have been significantly reduced and the government supports entrepreneurship through several funding schemes including seed, angel and venture capital that provide financial, legal and managerial advice (see above). In addition, programmes such as Fondo Capital Abeja aim to ease access to credit and finance for small enterprises and. The Incubator Programme supports innovative entrepreneurs in developing their business projects through co-financing activities while the Support for Entrepreneurial Environment programme aims to foster entrepreneurship skills and competences.
- Several initiatives have been developed to increase the international linkages in R&D and innovation. A programme to attract international centres of excellence for competitiveness aims to facilitate the installation in Chile of international centres of excellence in R&D. Collaboration has already been established with the Fraunhofer-Gesellschaft (Germany) in biotechnology, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) (Australia) in mining and mineral processing, Inria (France) in ICT, and Wageningen UR (Netherlands) in the food industry. It focuses specifically on generating capacity in priority sectors such as aquaculture and mining.
- In addition, programmes have been set up to support the internationalisation of Chilean business like Global Connection programme. CONTACTChile targets technology-intensive companies

(primarily SMEs) with a strong export potential by providing financial support. Start Up Chile which was launched as a pilot programme in 2010, seeks to attract entrepreneurs from abroad by offering equity-free seed capital and a temporary one-year visa to develop innovative start-up activities.

- The improvement of the quality of the national education system at all levels is a top priority for Chile and investments in the education systems have significantly increased in Chile (see above). Despite the fact that the share of the Chilean population having benefitted from tertiary education is comparable with other OECD countries, the clear shortage of human capital including STEM inhibits the transition to an innovation economy. The Teacher Vocation Scholarship, launched in 2010, encourages good students to become teachers, and a quality assurance system was introduced in 2011. Chile VA! (2011) is a programme to promote S&T vocations by organising science camps. These programmes are complemented by an increase in scholarships and a reduction in the interest rate on guaranteed student loans. The *Becas Chile* programme provides fully-funded scholarships to students studying at the best schools abroad, conditional on these students returning to Chile.

### ***... but future challenges remain***

It is clear that the policy environment in Chile has become more conducive to innovation and thus to GVC upgrading during the past years, to a large extent based on the observations in the OECD Innovation Review of 2007. Chile has several well-designed innovation promotion programmes but programme scale and take-up have not been large enough yet to make a substantial impact. Although business R&D grew by almost 15% in 2009-2012 (20 billion \$), R&D activities in Chile lag these of other countries (OECD as well as more similar countries) as reflected in the low figure of business R&D expenditures relative to GDP. Likewise, innovation in Chile is limited with only a small share of companies active in innovation; in addition Chilean companies are collaborating less in innovation; particularly the small involvement of SMEs in innovation poses a major barrier for GVC upgrading and densification.

In order to guarantee the efficiency and effectiveness of the different measures to encourage and support innovation, a number of issues have to be taken into account. First, many countries have a tendency to add further policies to the existing mix, rather than to replace existing policies with new ones. This can lead to duplication of policies, lack of critical mass and also to a complex environment for businesses that are seeking to understand the policy support that they might be eligible for. A regularly review of innovation programmes - on effectiveness, efficiency and relevance - is necessary in order to stop or adjust inefficient ones, and expand those that are proven to work.

Second, while it may still be too early to carry out a full evaluation since policy measures have been implemented only recently, evaluation of the implemented measures will be desirable/needed at some point in time. Some early evaluations have been undertaken (e.g. of the modified R&D tax credit system and the Incubator programme), but more systematic evaluations should be planned later. To boost take-up and ensure the cost-effectiveness of programmes in Chile, the authorities should design these so that they can be adequately evaluated. These evaluation exercises can benefit from the assessment of specific policy measures in other OECD countries (e.g. see discussion on R&D tax credits above).

Third, the OECD Innovation Review for Chile (2007) pointed already to important problems in the governance of the innovation system, in particular the existence of different programmes run by different governments departments and agencies without a lot of coordination and a common, long-term vision for STI policy. It called for strengthening the institutional and policy coherence of innovation in Chile, which has become only more important over the last years. Also the ongoing OECD review of Chilean public research centres programmes referred to major governance problems, in particular related to the different funding mechanisms for these centres.

Likewise, the S&T advisory committee (STAC) which was created in 2013 to improve the governance of the innovation system in Chile, identified several obstacles that are hard to address under the current governance framework. The STAC suggested creating an institutional body to co-ordinate the agencies involved. In addition, to strengthen collaboration of public research with the business sector, the STAC proposed creating a ministry in charge of formulating co-ordinated policies for STI and higher education.

The government's Agenda for Productivity, Innovation and Growth goes a long way to addressing the fragmented institutional set-up for innovation. It includes 47 different measures, focused around promoting the diversification of production, boosting sectors with high growth potential, the expansion of programmes and resources available for early-stage start-ups, increasing productivity and competitiveness of businesses and generating a new impetus to exporting. Among the most notable of these endeavours is the creation of a Productivity Commission that will help to ensure that productivity is the focus of policymaking across the government, and help to identify policies.

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