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Chile: Boosting Productivity
Growth by Strengthening
Competition,
Entrepreneurship
and Innovation

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**CHILE: BOOSTING PRODUCTIVITY GROWTH BY STRENGTHENING COMPETITION,
ENTREPRENEURSHIP AND INNOVATION**

ECONOMICS DEPARTMENT WORKING PAPER No. 785

By Cyrille Schwellnus

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ABSTRACT/RESUMÉ

Chile: Boosting productivity growth by strengthening competition, entrepreneurship and innovation

Productivity growth has declined since the late 1990s, slowing the catching-up process. Structural reforms to strengthen competition, entrepreneurship and innovation would go a long way toward enhancing it. Recent competition policy reforms that strengthen enforcement of cartel law must now be implemented effectively. The National Economic Prosecutor should receive sufficient resources and the ceiling on fines against cartels, which has recently been raised, may need to be reviewed again. Entrepreneurship should be strengthened by reducing regulatory “red tape” for start-ups and simplifying bankruptcy procedures. Recent reforms to the innovation policy framework are welcome but the focus on sectoral priority clusters will need to be accompanied by appropriate monitoring procedures and sunset clauses for public support. This Working Paper relates to the 2010 Economic Survey of Chile (www.oecd.org/eco/surveys/Chile).

JEL classification: F43; L16; L5; O3; O4; O54

Keywords: Chile; growth; productivity; regulation; innovation; competition

Chili : Augmenter la croissance de la productivité par le renforcement de la concurrence, l'entrepreneuriat et l'innovation

Le déclin de la croissance de la productivité observé depuis la fin des années 90 ralentit le processus de rattrapage. Des réformes structurelles visant à renforcer la concurrence, l'entrepreneuriat et l'innovation ouvriraient largement la voie à un raffermisssement de cette croissance. Il convient désormais de mettre concrètement en œuvre les récentes réformes de la politique de la concurrence visant à consolider l'application de la législation sur les ententes. Il faut doter le Procureur économique national de ressources suffisantes et revoir éventuellement le plafond – déjà relevé il y a peu – des amendes frappant les auteurs d'ententes. L'entrepreneuriat doit être renforcé grâce à l'allègement de la réglementation qui pèse sur la création d'entreprise et à la simplification des procédures de faillite. Les toutes dernières réformes du cadre de la politique de l'innovation vont dans le bon sens mais il faudra assortir les pôles sectoriels prioritaires de procédures de suivi adaptées et de clauses de caducité du soutien de l'État. Ce document de travail se rapporte à l'Étude économique de l'OCDE du Chili 2010 (www.oecd.org/eco/etudes/Chili).

Classification JEL : F43 ; L16 ; L5 ; O3 ; O4 ; O54

Mots-clés : Chili ; croissance ; productivité ; réglementation ; innovation ; concurrence

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CHILE: BOOSTING PRODUCTIVITY GROWTH BY STRENGTHENING COMPETITION, ENTREPRENEURSHIP AND INNOVATION

By Cyrille Schwellnus¹

1. Over the past two decades Chile has grown faster than most OECD countries. Between 1986 and 2007 GDP per capita grew on average 4.3% per year as compared to 2.2% per year in the OECD area. Income per capita (in PPP) relative to the United States has increased from 18% in 1986 to 31% in 2007 and Chile has overtaken all other Latin American countries except Mexico. While part of the exceptionally high growth in the second half of the 1980s was due to the cyclical recovery from the banking crisis in the early 1980s, it also followed the implementation of ambitious reforms to liberalise foreign trade, improve the functioning of labour, product and financial markets, and restructure the pension system. Sounder macroeconomic policies also played an important part (Ffrench-Davis, 2006).

2. Nevertheless, the income gap with many advanced OECD economies remains substantial and growth has slowed since the end of the 1990s. Chile's GDP per capita is around one third of the level in advanced OECD countries. Following the Asian crisis, growth of per capita GDP slowed to less than half the pace of growth during the "golden age" 1986-1997 and the severe recession of 2008-2009 may once again have negative long-term effects.

3. To the extent that the speed of convergence to the leading countries decreases as the income gap with the leading countries narrows, a slowdown in growth is to be expected. Although comparisons with other countries that have made the transition from middle-income to high-income status in the past have to be taken with a grain of salt because of changing world economic conditions, it appears that growth over the decade preceding the crossing of the income per capita threshold in 2007 (USD 13 000) has not been outstanding (Table 1). Moreover, in the past few countries have managed to sustain the pace of growth prevailing in the decade that preceded the crossing of this threshold.

4. Productivity explains the major part of the recent slowdown in growth. The contribution of capital formation to GDP growth has been similar over the past decade as over the 1986-1997 period but both labour input and total factor productivity (TFP) growth have slowed down. The slowdown in the labour input growth accounts for around one third of the slowdown in GDP growth over the past decade and the apparent stagnation of TFP accounts for the remaining two thirds. According to a growth decomposition, productivity grew at more than 2% per annum over the 1986-1997 period but was around its 1998 level in 2008.

5. In Chile the macroeconomic policy framework, in particular the structural fiscal rule with an independent inflation-targeting central bank and a flexible exchange-rate regime has gone a long way towards achieving macroeconomic stability. However, macroeconomic stability alone is not sufficient for achieving strong productivity growth. One important precondition for strong productivity growth is vigorous competition in product markets, which gives firms incentives to reduce inefficiencies in organisation and management and to innovate. The regulatory framework for entrepreneurship, including entry and exit regulations, can facilitate the

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reallocation of production from inefficient to more efficient firms. An appropriate innovation policy framework can also help to lift productivity growth, as it influences firms' propensity to upgrade their products or production technologies.

Table 1. GDP per capita (constant PPPs, constant prices)

Country	Threshold Year	GDP per capita (PPP)	Growth rate in decade preceding threshold year	Growth rate in decade following threshold year
Chile	2007	13108	2.6	n.a.
Australia	1961	13291	3.0	3.3
Finland	1970	13070	7.1	3.3
Greece	1971	12784	9.4	2.8
Ireland	1983	13020	2.5	3.7
Italy	1970	13600	7.8	3.3
Japan	1970	13541	12.5	3.3
Korea	1993	13572	7.4	4.6
New Zealand	1965	13371	5.0	3.0
Norway	1966	12795	4.8	5.8
Portugal	1987	13078	2.2	3.4
Singapore	1979	12326	14.5	6.4
Spain	1972	13156	8.2	1.5
Sweden	1967	13519	5.4	3.6

Note: The reference year for PPPs and prices is 2005. Threshold year indicates the year for which per capita GDP was closest to the USD 13 000 threshold.

Source: OECD, World Bank (WDI), Penn World Table Version 6.2.

6. A number of weaknesses in structural policy settings have contributed to Chile's disappointing productivity performance. Product market competition remains weak by OECD standards, as suggested by high price-cost margins. Furthermore, existing framework conditions do not encourage entrepreneurial risk-taking and the reallocation of production to new and higher-productivity activities. For instance, entry and exit regulations for businesses are overly restrictive and relatively high severance may limit labour market mobility. Until recently, the innovation policy framework favoured basic public research over business innovation. As a consequence, both rates of technological (product and process) and non-technological (marketing and organisation) innovation in firms remain low and production remains concentrated in low-productivity activities.

7. Education policy and human capital formation, which are further major bottlenecks for productivity growth in Chile, are mainly discussed in Chapter 4. The availability of a skilled workforce influences firms' capacities to adopt new technologies and organisational or marketing innovations. Improving the qualification level of the Chilean workforce, including through improving and expanding vocational education and training (VET) and lifelong learning, may also foster mobility from low-productivity jobs to higher-productivity jobs. Chile has made great progress in increasing the educational attainment of the workforce in the past decades but the quality of education as measured by standardised tests of student performance remains low by OECD standards. Moreover, education outcomes are highly unequal across socio-economic groups, suggesting the potential of some segments of society is not fully utilised. Policies to improve the quality and equity of basic education are discussed in Chapter 4 but the current chapter discusses VET and lifelong learning policies, as these are particularly closely linked to productivity.

8. Recent reforms in competition and innovation policies will reduce firms' scope for anticompetitive behaviour and may boost the pace of innovation in the business sector. A major

competition policy reform was adopted in April 2009, which will strengthen enforcement through an expansion of the investigative powers of the National Economic Prosecutor and through higher fines for cartel participation. The R&D tax incentive introduced in 2008 aims at improving incentives for innovation in the private business sector, and the newly created National Innovation Council has started to develop a long-term innovation strategy.

9. Despite recent reforms, much remains to be done if faster productivity catch-up with more advanced OECD countries is to be resumed. Even though the April-2009 reform has strengthened competition law enforcement, deterring anti-competitive behaviour, in particular by large corporations, will require diligent application of these rules. Public support for the formation of a number of sectoral industrial clusters, which is part of the long-term innovation policy strategy proposed by the National Innovation Council, risks spending public resources on sectors that eventually turn out to be unviable or that would have developed even in the absence of public support. Setting clear objectives for the sectoral clusters and regularly assessing progress towards achieving these will help reduce the risk of misspending public resources. Product market regulations on entry and exit remain restrictive. Resuming the pace of reform in product markets of the 1990s to foster productivity growth should be one of the main priorities on the economic policy agenda.

Background on recent productivity developments

10. A growth accounting exercise shows that on average the contribution of total factor productivity growth (TFP) to GDP growth has been close to 0 since 1998. Even excluding the mining sector, in which TFP has actually decreased, the contribution of TFP would only be marginally higher (around 0.2% per year). Total factor productivity growth, which accounted for a substantial part of GDP growth from the late 1980s to the mid-1990s, slowed down markedly at the end of the 1990s (Table 2). The contribution of hours worked has also slowed over the past decade but remains positive at around 1.5% per year. Over the past few years, the contribution of growth in the capital stock has accelerated and represents the major growth component over the period 2004-2008. As TFP is calculated as the residual of a Cobb-Douglas production function, it may to some extent reflect errors in the measurement of the capital stock. Firstly, the Chilean capital stock is computed using a perpetual inventory method, making it dependent on assumptions on depreciation rates. Secondly, the capital stock is not corrected for capacity utilisation, which may vary over the business cycle. Although there are therefore some uncertainties as to the exact level of TFP and its yearly growth rate, it appears safe to say that TFP growth has been close to 0 over the past decade: the use of the same measurement method for the capital stock over time should keep errors in the growth rate of the capital stock to a minimum and cyclical capacity utilisation effects should even out over 10-year periods.

Table 2. Contributions to annual GDP growth 1986-2008

Period	TFP	Capital	Labour	Total
1986-1991	2.1%	1.8%	2.8%	6.7%
1992-1997	2.2%	3.6%	2.1%	7.9%
1998-2003	-0.7%	2.2%	1.2%	2.7%
2004-2008	0.0%	3.1%	1.6%	4.7%

Note: TFP is calculated as the residual of a Cobb-Douglas production. Following Ministry of Finance calculations for the expert panel on potential GDP, the weight on the capital stock is set to 0.48 and the weight on the labour input to 0.52. The labour input is measured as actual hours worked corrected for educational attainment of the workforce.

Source: OECD calculations based on Ministry of Finance data

11. Weak TFP growth appears to be a structural issue. The investment boom of 2007-2008 (20% growth of gross fixed investment in 2008) led to a substantial increase in the capital stock but not necessarily to an immediate increase in production, thereby reducing measured TFP as no adjustment is made for the utilisation rate of the capital stock. However, this cannot explain why average TFP growth over the period 1998-2008 decreased by more than 2 percentage points after having grown by more than 2% over the period 1986-1997. Instead, part of the slowdown may also be due to the tailing off of the structural reforms of the 1980s and 1990s, which had helped sustain high rates of TFP growth (Box 1).

Box 1. Main structural reforms in Chile over the past three decades

Starting in the mid-1970s a series of structural reforms in the following areas were enacted:

- Tax reform: Introduction of value added tax and improvements in tax collection.
- Trade and FDI reforms: Elimination of all non-tariff barriers, introduction of a flat multi-lateral tariff, non-discriminatory treatment for foreign direct investors.
- Large-scale privatisations in all sectors of the economy.
- Pension reform: Shift from a pay-as-you-go to a fully-funded system.
- Labour market reform: Collective agreements at the firm level (as opposed to the sectoral level); easing of dismissal regulations.

After the banking crisis in the early 1980s, the main reforms in the late 1980s and over the 1990s were in the following areas:

- Banking law: Strengthening of government supervision and regulation.
- Deregulation of network industries: Multi-carrier system in telecommunications, infrastructure concessions, privatisation of water provision and sanitation.
- Macroeconomic framework: Independence of the central bank, gradual adoption of inflation targeting and a flexible exchange rate, adoption of a structural fiscal rule.

The main structural reforms over the past decade were:

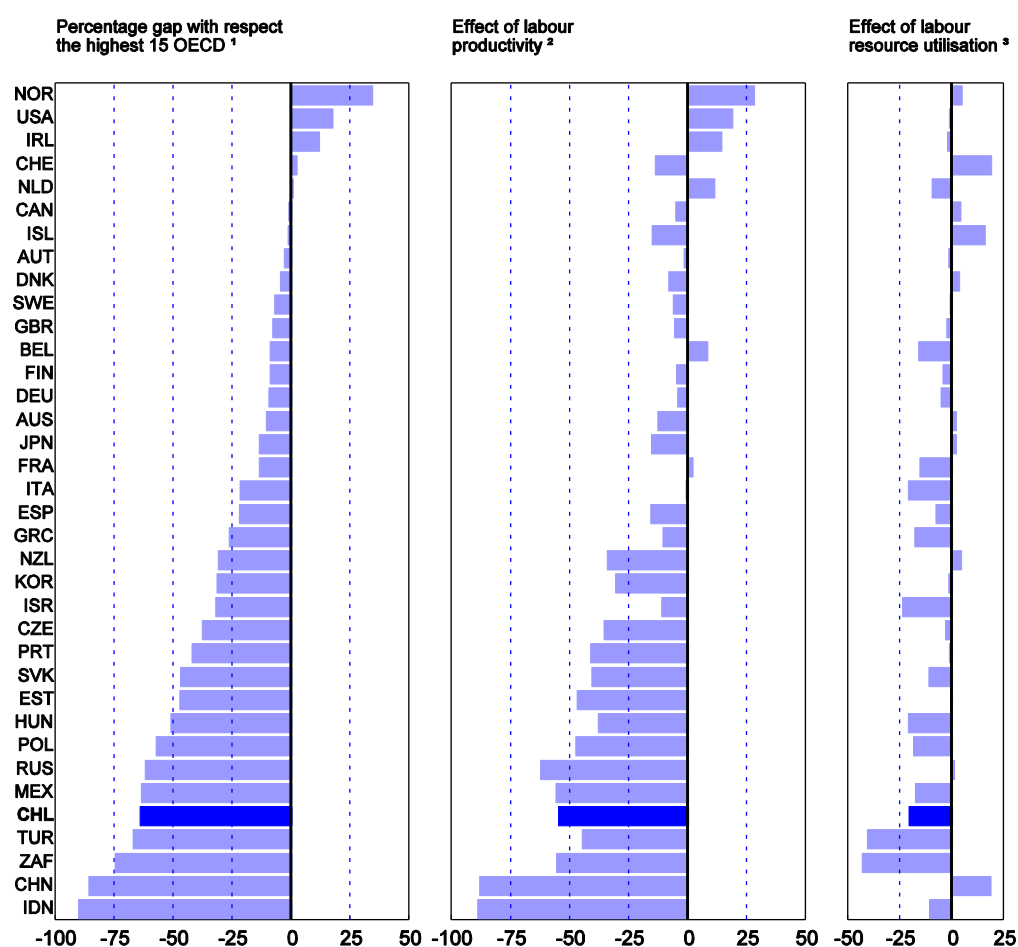
- Capital market reforms: Increase in investment options for pension funds, elimination of capital gains on a number of transactions, corporate governance (rules on disclosure of information, voting rights, among others), regulation of pension funds (easing of restrictions on investment choices, among others).
- Several competition policy reforms: Creation of the Competition Policy Tribunal, more powers for the National Economic Prosecutor, introduction of a leniency programme.

12. The income per capita gap with more advanced OECD countries is to a large extent attributable to lower labour productivity. Although labour utilisation is lower than in most OECD countries, mainly because of lower labour market participation of women and youths, lower labour productivity explains around 80% of the remaining income gap (Figure 1).

13. A sectoral decomposition of the sources of labour productivity growth shows that transitory gains from the movement of labour from low-productivity sectors (such as agriculture or personal services) into higher-productivity sectors (such as financial services or manufacturing) have been declining. Indeed, the potential for reaping such gains might already be largely realised. Consequently, future labour productivity growth will mainly have to come from within the sectors themselves. A low contribution of the “between sectors” component is a general feature of high-income economies, as for instance Australia and the United States (Figure 2), as transitory gains from the movement of resources from agriculture and other low-productivity sectors into higher-productivity sectors become largely exhausted. In Chile the decline in

the “between sectors” components results from the tailing off of transitory effects from the recovery of the banking crisis in the early 1980s. A large part of the positive “between-sectors” effect in the late 1980s and early 1990s was in effect attributable to the movement of resources into the finance sector, in which measured labour productivity is high, from other sectors of the economy. In this sense, the large contribution of changes in industrial structure to labour productivity in Chile in the early and mid-1990s was most likely a one-off effect and sustaining high rates of labour productivity growth in the future will therefore mainly require technological and non-technological innovation within sectors. Nevertheless, remaining unexploited “between-sectors” productivity gains may be reaped from improving the skills of the workforce, which would increase labour mobility from low-productivity sectors, as the “other services” sector that remains large, to higher productivity sectors.

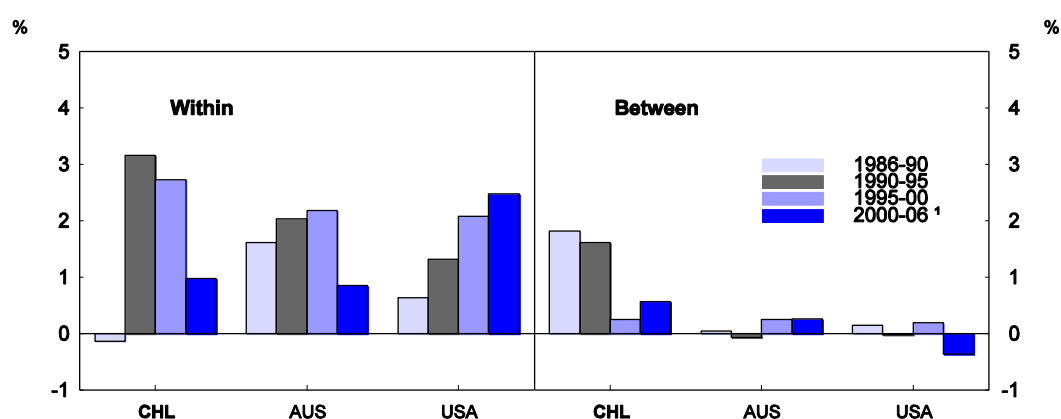
Figure 1. The sources of real GDP per capita differences, 2007



1. Simple average of the highest 15 GDPs per capita (based on 2005 purchasing power parities).
 2. Labour productivity is measured as GDP per person employed.
 3. Labour resource utilisation is measured as the ratio of those employed to the persons of working age.
- Source: World Bank.

Figure 2. Shift-share analysis

Average annual contributions



1. 2000-08 for Chile.

Source: Banco Central de Chile; and EUKLEMS database.

Box 2. Sectoral decomposition of labour productivity growth

Labour productivity growth can be decomposed into three components. The “within-sectors” component is calculated as the sum of sectoral labour productivity growth rates weighted by their shares in total value added. This component measures the hypothetical labour productivity growth rate of the economy in the absence of structural change. The “between-sectors” component is calculated as the sum of changes in sectoral employment shares weighted by the relative productivity of each sector. It measures the hypothetical labour productivity growth rate of the economy in the absence of within-sector labour productivity growth, or the pure effect from structural change. Even in the absence of productivity growth within sectors the economy-wide productivity level can increase if resources move into the sectors with the highest levels of productivity. The third or “cross-sectors” component is calculated as the product of the “within-sectors” and the “between-sectors” components and measures labour productivity growth attributable to the movement of resources into the sectors with the highest productivity growth rates. As the “cross-sectors” component is, in practice, negligible over the whole 1986-2008 period, it is not shown in Figure 2.

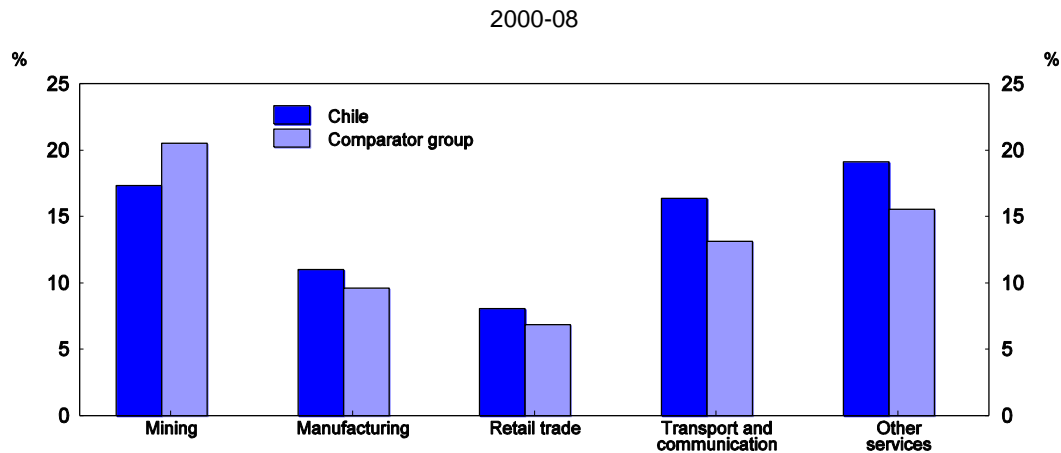
Policies to enhance product market competition***Product market competition is weaker than in some OECD countries***

14. One important microeconomic precondition for strong productivity growth is vigorous competition in product markets. Strong competitive pressures can give firms incentives to reduce inefficiencies in organisation and to upgrade their technology. Nickell (1996), for instance, argues that lack of competitive pressures may increase managerial slack or reduce workers’ effort. A number of empirical studies (for instance, Nickell, 1996, Blundell *et al.*, 1996 or Aghion *et al.*, 2008) find that firms with more competitors and lower rents display higher productivity growth. Similarly, several empirical studies find that regulations that reduce competition in product markets reduce productivity growth at the level of the firm and the industry (for instance, Conway *et al.*, 2006, Arnold *et al.* 2008). Competition can also foster productivity growth by driving the most inefficient firms out of the market and ensuring that only the most efficient survive. This hypothesis has received strong empirical support in recent studies on trade liberalisation, which have shown that the major part of productivity gains from stronger import competition can be attributed to reallocation effects (for instance, Pavcnik, 2002, Eslava *et al.*, 2009).

15. Increasing the level of competition may have especially large payoffs in terms of productivity growth in a catching-up economy such as Chile. Recent empirical evidence indicates that the effect of competition on innovation depends on the technological gap between competitors (Aghion *et al.*, 2005). When the technological gap between the firm at the technological frontier and its competitors is large, lower competitive pressures may improve the laggards' incentives to innovate, as post-innovation rents are high. By contrast, when the technological gap between the firm at the frontier and its competitors is small, greater competitive pressures reduce pre-innovation rents and therefore increase incentives to innovate in order to escape competition. As Chilean firms' catch up with the technological capabilities of their foreign competitors in the market, the "escape competition effect" will become increasingly important. Strengthening competition will increase firms' incentives to innovate, which may have large payoffs in terms of productivity growth.

16. Despite high rankings on overall competitiveness indicators, and openness to trade and FDI, competition as measured by price-cost margins of listed firms appears to be less intense than in a comparator group of resource-intensive OECD countries. Chile ranks high on overall competitiveness indicators compiled by think tanks and international organisations, which measure the quality of regulation and the overall macroeconomic framework.² Chile is also very open to international trade and FDI, with a 6% multi-lateral tariff, an extensive network of free trade agreements (FTAs), which has brought the average actual tariff rate paid on imports down to close to 2%, and no restrictions to inward FDI. The structure of price-cost margins, defined as the ratio of operating income over total revenue, across industries in Chile is similar to a comparator group of resource-rich OECD countries (Box 3. on the calculation of price-cost margins). This is in line with expectations because price-cost margins are partly determined by the production technology in an industry, as for instance the level of fixed costs. However, the level of price-cost margins is higher in Chile than in the comparator group in all industries, except mining. Price-cost margins are higher even in the manufacturing sector, which is open to international trade, and in the retail sector, which has a reputation of being competitive (see for instance EIU, 2008). But the largest differences can be found in transport and telecommunications and in other services, which mainly includes business services. This indicates that competition, in particular in the services sectors, is weak in Chile.

². On the Fraser Institute indicator that combines measures of governance, macroeconomic management and regulatory quality into a summary indicator of "economic freedom", Chile ranks sixth in the world (Fraser Institute, 2008). On the subindicator for regulatory quality of the World Bank governance indicators Chile ranks 19th (Kaufmann *et al.*, 2009). The World Economic Forum ranks Chile among the top emerging-market performers on its Global Competitiveness index, which apart from macroeconomic and regulatory framework conditions also measures the level of education and infrastructure, and on which Chile ranks 30th in the world (World Economic Forum, 2009).

Figure 3. Price-cost margins in Chile and comparator group¹

1. Average ratio of operating income to total revenue. The comparator groups includes Australia, Canada and New Zealand.

Source: Thomson Financial, Wordscope database.

Box 3. Calculation of price-cost margins using Wordscope data

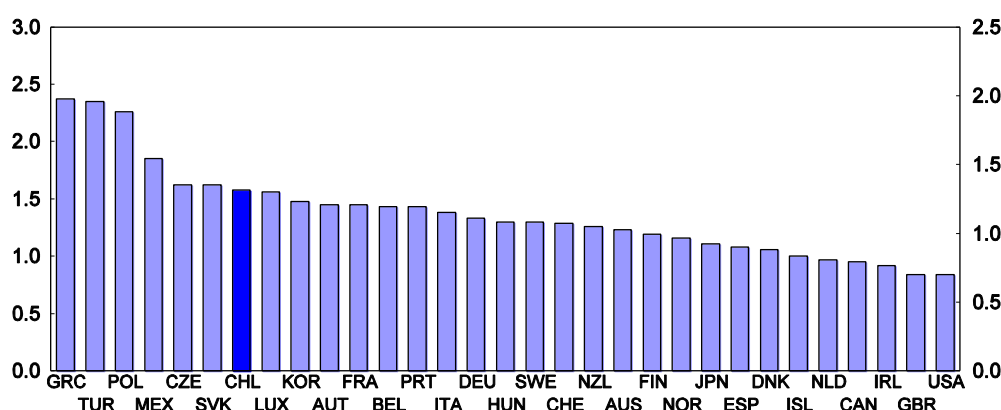
- The calculation of price-cost margins uses financial statement data of publicly listed companies obtained from the Wordscope dataset (Thomson Financial). The dataset contains yearly balance sheet items and information on basic firm characteristics.
- Following Aghion *et al.* (2008) the price-cost margin (or Lerner index) is chosen as a measure of product market competition. In theory, it is defined as the ratio of price (p) minus marginal cost (mc) over price, or $(p-c)/p$. The larger $(p-c)/p$, the larger is the distance between the price and the competitive price. In the empirical implementation the price-cost margin is approximated by the ratio of operating income (total revenue - cost of goods sold - depreciation - selling, general and administrative expenses) to total revenue.
- The sample contains only firms from the mining, manufacturing, retail services, transport and communications services, business services, and other services (mainly personal services) in Chile, Australia, Canada and New Zealand for the years 1990-2008. In the reported results business services and other services are aggregated to a single "other services" category. Firms reporting negative average price-cost margins over the sample period are considered as outliers and are dropped from the sample. Australia, Canada and New Zealand are chosen as the benchmark for Chile, as they are resource-rich economies with fairly similar industrial structures but more pro-competitive product market regulation, according to the 2008 OECD product market regulation indicator. The final sample contains 8257 firm-year observations.
- The results are robust to using net income (gross income + net interest income + extraordinary income – income taxes) instead of gross income in the empirical approximation of price-cost margins.

Regulation of start-ups and some services sectors is restrictive

17. One reason for high profit margins is that by OECD standards Chile has relatively restrictive product market regulation in some areas, according to the 2008 OECD product market regulation (PMR) indicators (Woelfl *et al.*, 2010) (Figure 4). While Chile ranks high on broad indicators of overall competitiveness, the OECD PMR or the World Bank Doing Business indicators, which measure more specifically regulation affecting competition in product markets, suggest some regulation could be eased to catch up with the OECD average (Chile ranks 49th on the World Bank Doing Business indicators, World Bank, 2009).

Figure 4. Product market regulation¹

2008



1. Overall indicator.

Source: OECD, Product market regulation database.

18. While Chile has less barriers to trade and investment than most OECD countries, according to the OECD PMR indicator, administrative burdens on start-ups are higher than in almost any OECD country, which reduces the disciplining effect of potential entry on incumbent firms. Only in Mexico are administrative burdens imposed on sole-proprietor firms higher than in Chile and no OECD country imposes a higher burden on corporations, mainly through lengthy and costly registration and notification requirements. According to the World Bank Doing Business indicators, it takes 9 procedures (against 5.8 in the OECD), 27 days (against 13.4 in the OECD) and costs 7.5% of GNI per capita (against 4.9% in the OECD) to start a business. The government does not ask sectoral regulators to use alternatives to traditional forms of regulation and does not provide guidance on alternative forms of regulation.

19. Regulation of retail and professional services is stricter than in most OECD countries. In particular, Chile appears to have higher entry barriers in retail, mainly because of stricter registration and notification requirements, than any OECD country. A similar pattern emerges in professional services (accountants, architects, engineers and lawyers), in which entry barriers are comparatively high. Whereas education requirements to enter the professions are around the OECD average, exclusive rights of provision for accountants, architects, engineers and lawyers keep potential entrants out of the market. Advertising bans in these professions further restrict competition. Against the background of high price-cost margins in services (see Figure 3), the authorities should consider easing these regulations.

The regulatory framework for network industries is sound

20. The regulatory framework for network industries is sound (see OECD, 2005), but regulation in the electricity sector could be further improved. Tariffs for electricity distribution are set according to the efficient-firm standard. In essence, this standard calculates assets and costs of an efficient model firm and sets tariffs such that this firm could earn a given rate of return in the market (see OECD, 2005 for more details). Tariffs are reviewed every four years, making the firm the residual claimant of any cost savings during this time interval. In this sense, the efficient-firm standard can be viewed as a reasonable incentive-based regulation mechanism. A particularity of the Chilean system is that the firms and the regulator both prepare tariff studies, with the regulator's study receiving a weight of two thirds and the firms' study a weight of one third. This gives the regulated firms strong incentives to overestimate the costs of an efficient firm to obtain higher regulated tariffs. The authorities plan to leave dispute resolution to an independent expert panel. This would reduce the incentive problem but in the medium-term the

authorities could consider leaving the determination of prices entirely to the regulator, as in some OECD countries.

21. Electricity generation, transmission and distribution are unbundled but distribution and retail are vertically integrated. This means that separate firms provide generation, transmission (high-voltage) and distribution (from the high voltage transmission network to final consumers) but electricity distribution companies both deliver electricity and buy electricity from generators for resale to final customers (retail). Except for large final consumers, retail prices are regulated. This is similar to the regulatory arrangements in most OECD countries, although some of them have introduced distribution and retail unbundling, including for small customers (among others, the UK and the Nordic countries). Most final consumers pay a tariff that combines a fixed charge, a distribution charge, an electricity charge, and a peak power charge into a single tariff. The main disadvantage of this tariff is that it does not give final consumers an incentive to reduce their consumption of electricity when demand is high or supply is low.

22. The sector regulator (*Comisión Nacional de Energía*) is currently examining whether distribution and retailing could be unbundled to achieve more efficient electricity use. With unbundled distribution and retailing, distribution companies would operate the distribution wires and separate retail companies would contract electricity from the generators and sell it on to final consumers. Distribution prices would remain regulated whereas retail prices would be liberalised. The economic rationale is that electricity distribution remains a natural monopoly but retailing is a potentially competitive market. If retailers were allowed to set price schedules freely, they would have incentives to find the consumers that are willing to reduce their consumption at peak hours or times of energy shortages at the lowest cost. Retail prices would have to be accompanied by prudential regulations to ensure retailers either contract enough electricity to meet peak demand or set their price schedules such that consumers have incentives to reduce demand when there is a supply shortage. Otherwise, some retailers may choose to undercut their competitors' prices by offering cheap peak electricity and default if a deficit occurs. As all users are connected to the same grid this may lead to electricity outages.

In telecommunications, competition in fixed-line telephony has mainly depended on an entrant to the local telephony market competing with the incumbent by building its own network, so-called facilities-based competition. By contrast, in services-based competition, competitors have non-discriminatory access to the network and compete on the quality and the price of the service. In Chile, facilities-based competition in local telephony has increased over the past decade. In 2000 the incumbent company (*Telefónica*) had a market share of around 80% and its largest competitor (*VTR*) a market share of around 4%. In 2008 market shares were 60% and 17%, respectively. Despite this improvement, the authorities should consider regulating the access price to the incumbent's network, which would avoid costly duplication of the network and bring prices down more quickly in localities where the incumbent has the only network. The sector regulator has already taken first steps in this direction by commissioning a study on the relative benefits of services-based versus facilities-based competition.

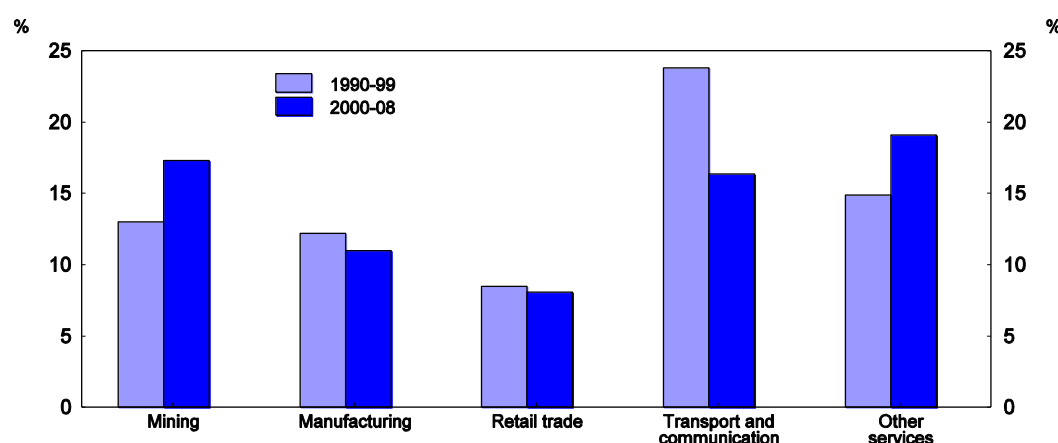
Recent competition policy reforms strengthen enforcement

Apart from overly restrictive product market regulation in some areas, a major reason for high price-cost margins is weak enforcement of competition law, in particular in the area of cartels. The institutional structure for competition law and enforcement is now sound. The National Economic Prosecutor (*Fiscalía Nacional Económica*, FNE) investigates cases of potential anticompetitive behaviour while the Competition Tribunal makes decisions and can impose fines. Any deed, act or agreement, including a contract, that "prevents, restricts or hinders free competition," or that tends to do so, is subject to sanctions under the law. As in the competition laws in OECD countries, the anti-competitive practices covered by the Competition Act include collusive agreements such as cartels to fix prices explicitly includes as anticompetitive practices collusive agreements such as cartels (e.g. to fix prices, allocate

market shares); (unilateral) abuse of dominant position; and predatory behaviour to obtain, maintain or increase a dominant position (e.g. through predatory pricing). Until the recent amendments, the investigative powers of the National Economic Prosecutor were limited. It could initiate investigations, but it could not make surprise inspections (“dawn raids”), intercept communications or seize documents. Because it was hard to obtain direct factual evidence, the cases brought before the Competition Tribunal often relied instead on indirect evidence, such as parallel behaviour, to imply that participants had reached an anti-competitive agreement.

Strengthening the enforcement of competition law is particularly important to increase competitive pressures in the services sectors, which face no import competition. As shown in Figure 3, price-cost margins tend to be higher in the services sectors, that are mostly non-tradable, than in manufacturing. Of course, this is not only the result of weaker competition but also reflects differences in production technologies, as for instance high sunk costs in network industries such as transport and telecommunications. However, Figure 5 shows that price-cost margins are not only generally higher in services but they have also increased in some sectors since 2000. Even in the retail sector in which price-cost margins are relatively low and which is reputed to be competitive, there have recently been several high-profile cases of collusion and anti-competitive behaviour (Box 4 on the ongoing lawsuit against pharmacy retailers).

Figure 5. Price-cost margins in Chile¹



1. Average ratio of operating income to total revenue.

Source: Thomson Financial, Wordscope database.

Box 4. The lawsuit against pharmacies

- May 2008: The Health Ministry announces that it has detected coordinated fixing of prices through the main pharmacy chains (*FASA, Cruz Verde, Salcobrand*) that control more than 90% of the market; the FNE starts an investigation.
- December 2008: The National Economic Prosecutor concludes that there has been coordinated fixing of prices in 222 pharmaceutical drugs between December 2007 and April 2008 and files a lawsuit at the Competition Tribunal.
- March 2008: *FASA* admits having engaged in price fixing and reaches an agreement with the National Economic Prosecutor. It agrees to pay a fine amounting to around 1 million US dollars in exchange for the National Economic Prosecutor dropping the charges against *FASA*. As the National Economic Prosecutor had already filed a lawsuit at the Competition Tribunal this can be assimilated to a cartel settlement but it is unrelated to the new leniency programme introduced in 2009.
- Currently: *Cruz Verde* and *Salcobrand* have not admitted and the lawsuit is pending at the Competition Tribunal.

23. Strengthening the enforcement of competition law and improving market transparency is especially important in small markets, such as Chile. A small market might sustain only a small number of firms producing at the minimum efficient scale. Markets in small economies therefore tend to have a more concentrated production structure, with only few firms serving a large share of the market (Table 3 for concentration in a selected number of industries in Chile). This could be productively more efficient than a less concentrated structure, of course. But a highly concentrated structure could also lead to allocative inefficiency. In an oligopolistic market structure, where each producer's action has a direct effect on its competitors, prices may rise above competitive levels even if the parties do not explicitly reach collusive agreements (Tirole, 1988). A liberal trade regime helps to deter anti-competitive conduct, but it cannot substitute for a well-designed and enforced competition law and market transparency, in particular in

Table 3. Concentration in selected industries

Sector	Market share three largest companies (%)	Herfindahl-Hirschman Index
Internet access services	81.9	0.269
Granulated nitrogen fertilizer	83	0.268
Granulated phosphorus fertilizers	78	0.252
Granulated potassium fertilizer	71	0.221
Basic local telephony service (fixed line)	86.4	0.451
Cable and Satellite TV delivery	94.2	0.525
Diesel ¹	62 ²	0.384
Petrol ¹	81.9 ²	0.671
Pharmaceuticals	92.1	0.304
Matches ¹	92.9 ²	0.868
Beer ¹	98.3 ³	0.714

Notes: HHI is defined as the sum of the squares of the market shares. It ranges between 0 and 1, where 1 represents a single monopolistic firm.

1. Information for 2006.

2. Market share of largest company.

3. Market share of two largest companies.

Source: National Economic Prosecutor.

services which are often non-tradable. The government is planning to take several measures to improve market transparency and consumer protection: (i) facilitation of dispute resolution in consumer-related disputes, in particular collective action procedures; (ii) strengthening of consumer protection in financial markets (information, abusive clauses, renegotiation of loans, switching financial institutions); (iii) obligation for credit institutions to offer at least one standardised product which is easily comparable across institutions (MK III financial markets reform, see Chapter 1); and (iv) consolidated credit register for banks and non-banks to improve transparency in credit markets (see Chapter 1).

24. In Chile, the difficulty of proving cartels based on indirect evidence has led to a focus of competition policy on unilateral abuse of dominant position. In 2007, for instance, the National Economic Prosecutor opened 66 matters of unilateral abuse of dominant position as compared to only 13 matters of horizontal or vertical collusion. Most recent cartel cases based on indirect evidence have resulted in acquittals, either in the first instance at the Competition Tribunal or in the second instance at the Supreme Court. There are some signs of change, as a recent Supreme Court ruling confirmed the finding of the Competition Tribunal in the so-called “flat-panel TV war” case that was based on the indirect evidence of the number of phone calls between two retailers engaging in an anti-competitive agreement.³ But it is too early to judge whether this represents a trend.

25. The absence of a leniency programme and relatively low fines have also contributed to weak enforcement. Many OECD countries, among others the United States and the European Union, use leniency programmes to detect cartels. In Chile, firms participating in cartels could until recently not apply for immunity in exchange for cooperating with the National Economic Prosecutor. This has further contributed to making the collection of direct evidence on collusive agreements difficult. Moreover the level of fines is relatively low. The highest fine ever imposed was around USD 11.2 million against the two retailers in the “flat-panel TV war” case. According to the income statement of one of the retailers involved (*Falabella*), the fine for the company amounted to less than 0.1% of its revenues in 2008.⁴

26. A 2009 reform addresses some of the enforcement issues, but may require additional resources for the National Economic Prosecutor. The reform includes an increase in the maximum fine for cartel infringements from around USD 15 million to around USD 23 million, enhanced investigative powers for the National Economic Prosecutor (it will be allowed to request “dawn raids”, intercept communications and search premises to seize documents), and a leniency programme for cartel infringements (the National Economic Prosecutor can grant full immunity to the first firm to confess to a cartel and fine reductions of up to 50% for others). It is expected that these reforms will lead to an increase in the number of cartel cases brought before the Competition Tribunal, which may require additional resources for the National Economic Prosecutor.

3. In the “flat-panel TV war case”, the Competition Tribunal ruled that two large retailers (*Almacenes Paris* and *Falabella*) had colluded and used their dominant position *vis-a-vis* their distributors to make them boycott a promotional event organised by a potential competitor (*Banco de Chile*). It based its decision on indirect evidence from an unusually high telephone traffic between the two retailers. The Supreme Court in most part confirmed this ruling.

4. According to *Falabella*’s income statement, its revenues in 2008 were 3 727 186 million pesos or around USD 7.1 billion (available at www.google.com/finance) and the fine imposed on it was 8 000 tax units, which in 2008 was equivalent to USD 6.9 million. The other retailer involved, *Almacenes Paris*, is owned by Cencosud and a separate income statement is not available.

Box 5. Evolution of Chile's competition policy framework

The Chilean competition policy framework has evolved from an emphasis on “economic freedom” (autonomy of firms) to an emphasis on efficiency and consumer welfare.

- 1973-1993: *Fiscalía Nacional Económica* (National Economic Prosecutor), Competition Commission and Consultative Commissions (sanctions and recommendations) played less important role than macroeconomic reforms (trade liberalisation, privatisation, deregulation).
- 1993-2003: Microeconomic reform in network industries and capital markets. Because of limited investigative and enforcement powers existing institutions could not deal effectively with significant cases.
- 2003: New Competition Tribunal (*Tribunal de Defensa de la Libre Competencia*) replaced Competition Commission and Consultative Commissions. Average level of fines increased from USD 13 500 in over the period 1973-2002 to USD 840 000 since 2004. Some new powers for the National Economic Prosecutor.
- 2009: Apart from an increase in the maximum fine for cartel infringements, enhanced investigative powers for the National Economic Prosecutor, and the introduction of a leniency programme, the reform passed in April 2009 includes:
 - Measures to ensure the independence of the head of the National Economic Prosecutor: introduction of a public contest for selection and strict rules on dismissal, among others a majority ruling of the Supreme Court.
 - Measures to increase the professionalism of the Competition Tribunal: increase in remuneration and time judges dedicate to Competition Tribunal; strict rules on professional incompatibilities.
 - Streamlining of procedural rules of the Competition Tribunal: notification of resolutions, statute of limitations, and regulation of discovery, testimony of witnesses and other evidence.

27. Competition policy enforcement could be enhanced further. A firm weighs the expected profits of engaging in anti-competitive practices against expected losses, namely the probability of being caught times the fine it expects to pay in such a case. In this sense, the enhanced investigative powers of the National Economic Prosecutor will increase the expected costs of anti-competitive behaviour by increasing the expected losses of anti-competitive behaviour. Nevertheless, it seems that, at least for large corporations, even the increased maximum fine remains too low, as it probably only represents a very small fraction of the additional revenues they can earn by forming a cartel.

28. Removing the ceiling on fines imposed against cartels and treating price fixing as a criminal offence would increase deterrence. On theoretical grounds, it is desirable to link fines to firms' profits from cartel participation, because even high fine ceilings may have weak deterrent effects if the expected profits from cartel participation are very large. In practice, it is difficult to precisely evaluate these profits. In some OECD countries the fine is therefore calculated as a percentage of the cartel participants' revenue. In the United States, for instance, the base fine is calculated as 20% of the firms' revenues in the market involved in the conspiracy (Viscusi *et al.*, 2005). The simplest policy option would be to remove the fine ceiling altogether and leave the determination of the fine to the Competition Tribunal and appeal courts. If this is legally not possible, the maximum fine could be set as a percentage of the firms' revenues in the market involved in the conspiracy. The authorities plan to make price fixing a criminal offence, which would also help to increase deterrence.

29. The leniency programme is well designed and in many respects in line with best OECD practice. However, its effectiveness will depend in part on legal certainty for applicants to the programme. Best practice suggests that discretion of the competition authorities in granting immunity should be limited and firms be eligible even after an investigation has started. This has the advantage of giving the firm legal certainty and giving it the possibility to apply even after the start of an investigation has changed the trade-off between expected payoffs and costs of forming a cartel.⁵ For instance, the United States reformed its leniency programme along these lines in 1993 and the number of applications rose from approximately one per year to two per month (Motta, 2004). The European Union, since 2002, has applied a leniency programme with automatic immunity and eligibility after an investigation has started. The Chilean leniency programme is in line with best practice in that firms can apply after an investigation has started. The National Economic Prosecutor has also published the first draft of a guide on the conditions it will require for granting immunity. The final guide should make the granting of immunity automatic if a number of clearly stated conditions are satisfied to give potential applicants legal certainty.

30. The use of diverging concepts and definitions by the judiciary may create legal uncertainty and weaken the deterrent effects of the 2009 reforms. In several instances in the past the Supreme Court overturned decisions of the Competition Tribunal using diverging concepts to define anti-competitive behaviour. For instance, in 2006 the Supreme Court used a concept of predatory pricing that was different from the one of the Competition Tribunal to overturn a Competition Tribunal ruling that had acquitted a firm producing fibrocement sheets.⁶ This divergence in concepts and definitions has introduced an element of legal uncertainty which may reduce the expected losses from competition law infringement. While judicial review through a higher court is clearly desirable on accountability grounds, the Competition Tribunal and the Supreme Court should work more closely together to harmonise concepts and definitions. The quality of the economic analysis of the Supreme Court may also be enhanced by the hiring of specialised economic consultants.

31. The procedural rules for merger control could be further clarified. There is no pre-merger notification or review requirement, except for television and radio. Firms can voluntarily submit a planned merger for review, which has increasingly been the case since 2003. The system appears to function satisfactorily without imposing excessive administrative burdens on competition authorities and firms. Merger remedies in the form of behavioural or divestiture requirements are applied regularly. But the National Economic Prosecutor and the Competition Tribunal do not speak with one voice about merger analysis methods. The National Economic Prosecutor issued an internal guide for merger analysis in 2006 but the Competition Tribunal deviated from it in the recent case of a merger between two major retailers (*D&S* and *Falabella*).

Policies to foster entrepreneurship and business innovation

32. Entrepreneurship and innovation are important determinants of productivity growth. Entrepreneurship may enhance productivity through the reallocation of resources from low-productivity firms to higher-productivity firms if entrepreneurs with potentially successful ideas face low barriers to entry and failing firms can exit the market with relative ease. Innovation increases productivity not through

⁵. Before an investigation has started the availability of a leniency programme does not change the firm's trade-off between expected profits and expected losses. After an investigation has been started, the probability of being caught increases and a firm may be willing to turn itself in and cooperate with the authorities to unveil the cartel if it is eligible for immunity (see Motta and Polo, 2003, for a formal model).

⁶. The Competition Tribunal's ruling was based on the consideration that the firm was not a dominant player, its prices were above its average variable costs, and its investments were not aimed at creating an entry barrier. The Supreme court, in contrast, argued that predatory pricing does not require a dominant position, that prices were below "costs" without specifying its cost definition, and that the level of investments created an entry barrier.

the reallocation of factors of production across sectors but through the development of new products, the improvement of production processes, and the adoption of new marketing or organisational techniques. As it is often entrepreneurs who enter the market with new ideas who are at the forefront of innovation, entrepreneurship and innovation are closely linked.

33. Innovation on the global technology frontier (“on-the-frontier” innovation) as measured by patent registrations is low, which is to be expected for a country at Chile’s income per capita level (Box 6). Although the number of patent registrations is an imperfect measure of on-the-frontier innovation, because companies may prefer to keep commercially sensitive information secret, it is nonetheless frequently used (Griliches, 1990, OECD, 2007a). Chile’s triadic patenting -- patents that are registered simultaneously in the United States, the European Union and Japan -- is almost negligible (23 patent registrations over the period 1996-2004). Despite a relatively large stock of FDI, foreign affiliates of multi-national companies located in Chile only account for a very small share of R&D. The share of foreign affiliates in total business R&D was 3.6% in 2002 as compared to 47.9% in Brazil, 32.5% in Mexico and 23.2% in Argentina (UNCTAD, 2005), countries with a similar GDP per capita level. On-the-frontier innovation will become increasingly important as Chile grows richer and an appropriate innovation framework will help avoid the risk that low on-the-frontier innovation becomes a drag on productivity growth going forward.

34. The number of new products entering the Chilean export basket has recently slowed down (Figure 7). This partly reflects the pattern that the number of new products entering countries’ export baskets decreases as countries grow richer (Box 6). But it may partly also reflect a slowdown in “within-the-frontier” innovation. Given Chile’s remaining degree of export concentration, the sharp decrease in the number of products entering the export basket appears to be difficult to explain by Chile’s growing income per capita alone. While of a total of 1 836 product categories (at the 5-digit level of disaggregation), resource-rich New Zealand exports more than USD 1 million (2005 prices) in 527 product categories, Norway in 637, Australia in 848 and Canada in 1268, Chile exports in 374, *i.e.* in only one fifth of the categories.

35. Even by the standards of natural resource-abundant OECD countries, Chile’s exports of goods remain heavily concentrated in mining and natural-resource intensive products, partly reflecting low levels of within-the-frontier innovation. Chile’s specialisation pattern partly reflects its pattern of comparative advantage and a strategy of trade liberalisation and export-led growth over the past three decades. Trade liberalisation in the 1970s and 1980s led to a specialisation on natural-resource intensive activities in the primary sector and on the resource-processing manufacturing subsectors, as traditional trade theory would suggest for a natural-resource abundant country such as Chile. However, the specialisation pattern also reflects the slowdown in within-the-frontier innovation, as the number of products added to the Chilean export basket over the past decade was below the value expected for a country of Chile’s income per capita. Although export concentration has decreased over the past decades, in 2006 the share of the 10 largest exports in Chile’s total exports was above 65% (see Table 1.A1). This is lower than for Norway and Russia but higher than for other resource-rich OECD countries, such as Australia, Canada or New Zealand. Although export concentration has decreased over the past decades, around 90% of Chile’s exports remain concentrated in primary products (mainly copper) and resource-based manufacturing (Figure 8). The share of non-resource based manufacturing is low -- at any level of technological sophistication -- relative to a control group of resource-abundant OECD countries.

Box 6. "Inside-the-frontier" and "on-the-frontier" innovation

Conceptually, it is useful to distinguish between "inside-the-frontier" innovation and "on-the-frontier" innovation (Klinger and Lederman, 2009). "Inside-the-frontier" innovation involves the discovery of products for exports that have been invented abroad but that are new to the country or firm. The number of products that enter a country's export basket in any given year is a frequently used measure of "inside-the-frontier" innovation. "On-the-frontier" innovation is defined as the invention of products that are new not only to the country but also internationally and is usually measured by the number of patents a country files in a given year. As countries grow richer and approach the global technology frontier, "inside-the-frontier" innovation tends to decline while "on-the-frontier" innovation tends to increase.

To evaluate the relevance of "within-the-frontier" and "on-the-frontier innovation" at different levels of income per capita, new export flows and patent registrations are regressed on per capita GDP, squared per capita GDP and population (to control for country size effects).¹ The results from these regressions are reported in Table 4. Figure 6, which plots the predicted values from these regressions, shows that for a country at Chile's income per capita level the relevance of "on-the-frontier" innovation is low relative to "within-the-frontier innovation". As Chile grows richer, however, "on-the-frontier" innovation will become gradually more important.

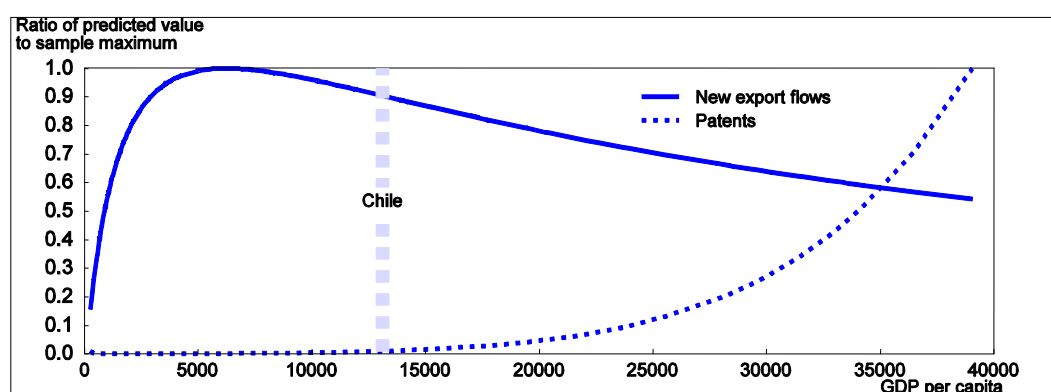
Table 4. Negative binomial regressions for patents and new exports

Dependent Variable	Patents	New export flows
	(1)	(2)
Ln (GDP per capita)	-12.723*** [3.471]	3.157*** [0.817]
Ln (GDP per capita) ²	0.846*** [0.189]	-0.181*** [0.048]
Ln (Population)	0.961*** [0.084]	0.174*** [0.052]
N	79	172
Log likelihood	-315.49	-481.64

Note: Standard errors in brackets. *** significant at 1%. Negative binomial regressions are used to account for the count data nature of the dependent variables. Regressions include a constant.

Source: OECD calculations using OECD Triadic Patents Dataset, COMTRAD (BACII-CEPII)

Figure 6. New export flows and patents ¹

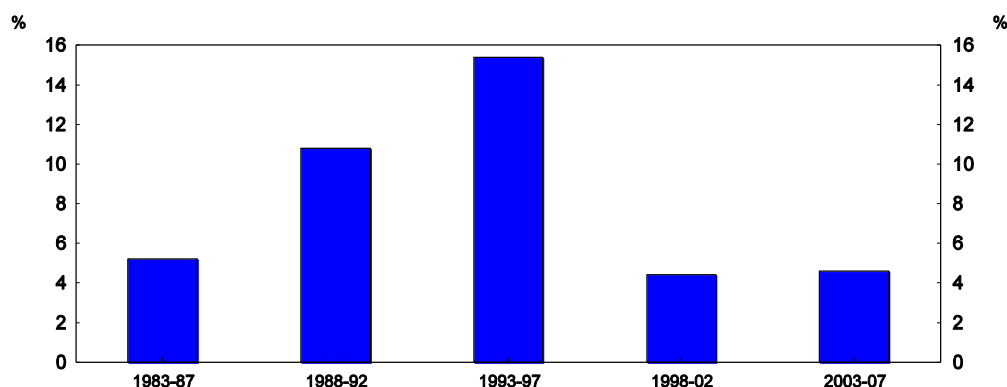


1. New export flows calculated as the number of products entering a country's export basket in any given year (using a threshold of 1 million USD in 2005 constant prices). Variables are averaged for the period 1998-04.

Source: Own calculations using trade data from COMTRADE (BACI-CEPII), number of patents from OECD Triadic Patent Families, GDP per capita (PPP) from OECD and World Bank (WDI).

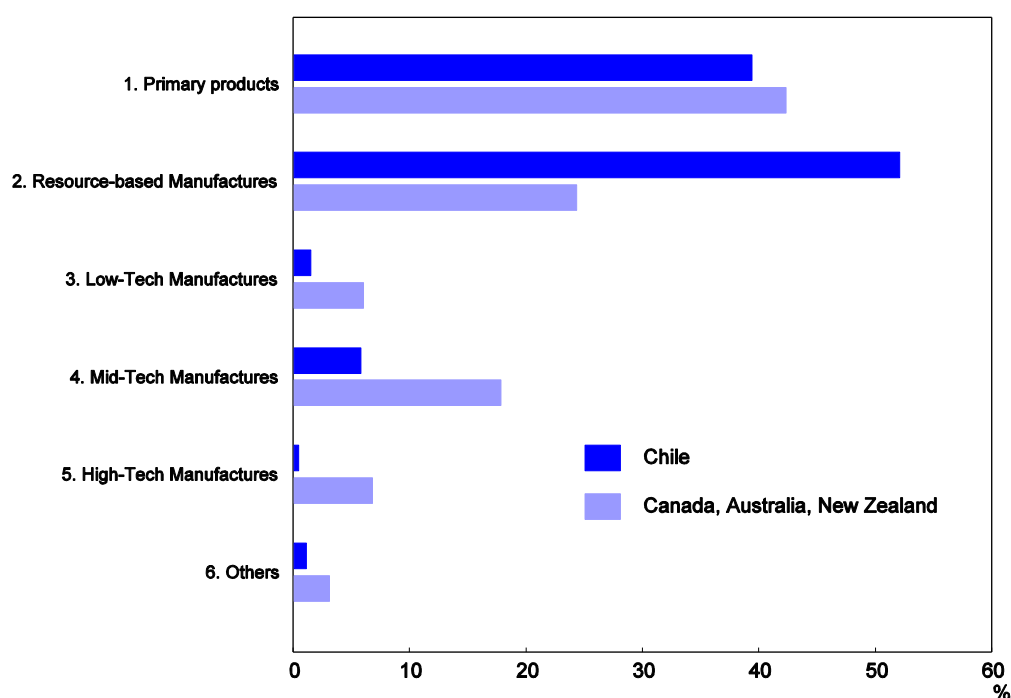
Figure 7. New export flows¹

Yearly averages



1. SITC Rev2 product classification. Threshold for new export flows is 1 million USD.

Source: COMTRADE (BACI-CEPII).

Figure 8. Export composition in 2006

1. Export shares for the benchmark calculated using simple average across countries. Lall (2000) product classification.

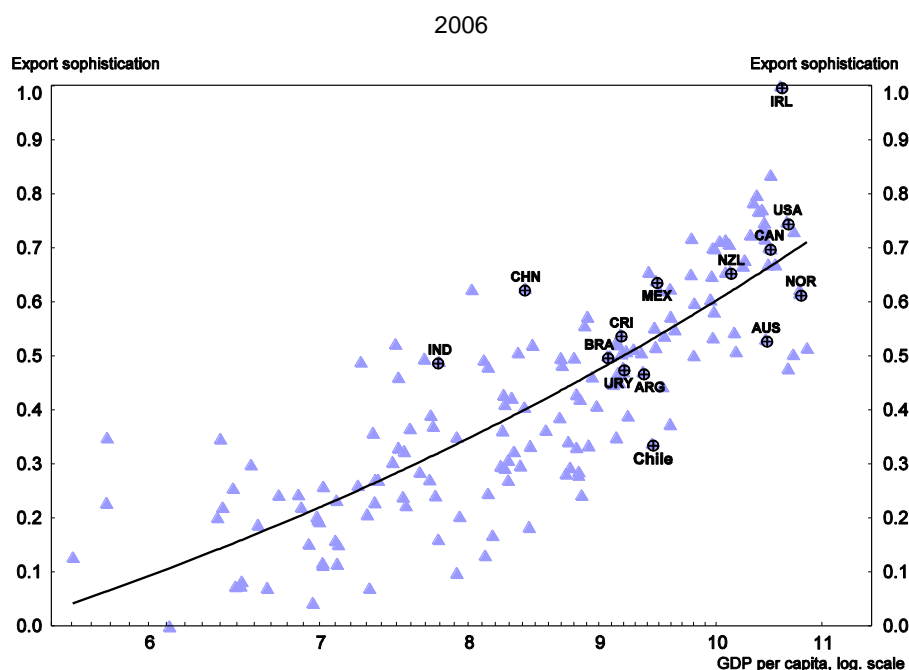
Source: COMTRADE (BACI-CEPII).

36. Due to the pattern of export specialisation the sophistication of the Chilean export basket is lower than in other emerging and OECD countries, including natural-resource exporters. Hausmann *et al.* (2007) propose an indicator of the sophistication of a country's export basket, which is computed as the sum of a country's exported products weighted by the average income per capita of the countries exporting these products. Figure 9 shows that the sophistication of the Chilean export basket is lower than predicted by its income per capita. This reflects to some extent the weight of copper in the Chilean export basket but the

OECD natural-resource exporters Australia, Canada, New Zealand and Norway have more sophisticated export baskets.

37. While empirical evidence suggests that there is a good case for increased diversification and sophistication leading to higher productivity growth, there are risks associated with actively targeting specific sectors through public policy. Recent cross-country panel studies find that diversification has a positive effect on per capita income growth (Hesse, 2009, Ledermann and Maloney, 2009). Feenstra and Lee (2004) find that export product variety explains 13% of productivity gains in a sample of industrial and developing countries. Meanwhile, Herzer and Nowak-Lehmann (2006) show that past export diversification has boosted growth in Chile. Hausmann *et al.* (2007) show that increased export sophistication has positive effects on subsequent GDP growth. Increasing the diversification and sophistication of Chilean exports may therefore indeed lead to higher productivity growth but the risks of targeting specific sectors through public policy should not be overlooked, as public resources may be wasted on sectors that turn out to be unviable or on sectors that would have developed even in the absence of public support. In any case, cluster policies should be complemented by easing overly-restrictive regulations on firm entry and exit that limit the reallocation of resources, which would be a relatively low-risk and low-cost policy to foster export diversification and sophistication. Improving the qualification level of the Chilean workforce, including through improving and expanding vocational education and training (VET) and lifelong learning, may also facilitate the transition from low-productivity to higher-productivity activities (Box 7).

Figure 9. Export sophistication¹



1. Export sophistication indicator corresponds to EXPY in Hausmann *et al.* (2007), normalised between 0 and 1.
Source: World Bank WDI database; COMTRADE (BACI-CEPII); OECD National Accounts database.

Box 7. VET and lifelong learning in Chile

Upper secondary education in Chile comprises grades 9 to 12, of which the first two years follow a general curriculum. In the last two years, students have the choice between the general track and the vocational track, which offers 46 specialisation options in 14 occupational areas (see OECD, 2009b). To obtain a VET certificate in addition to the secondary school leaving certificate, students have to complete a period of workplace training, which typically takes place after graduation from secondary school. A small minority of students (4.5%) follows a dual track, which alternates periods of classroom education and workplace training. Tertiary VET includes two-year programmes in technical training centres (CFTs) and four-year programmes in professional institutes (IPs). The government is committed to improving VET and a VET commission has recently evaluated the system. According to OECD (2009b), the main issues are:

- **Insufficient literacy and numerical skills of VET students:** In Chile 36% of 15 year olds (those at or below level 1 in PISA) lack basic literacy skills to benefit from educational opportunities throughout their life and 55% have serious difficulties with mathematics. This seems to be a problem particularly among students who choose the vocational track of upper secondary education. As modern workplaces require good literacy and numeracy skills, employers increasingly value general skills. Of course, improving basic literacy and numeracy skill is primarily the task of the basic education system (see Chapter 4), but insuring these receive sufficient emphasis in VET curricula, and correcting initial deficiencies through special literacy and numeracy support would increase employability and job mobility.
- **Weak employer engagement:** Currently there are few systematic attempts in engaging employers in the VET system, as, for instance, through the definition of required competences for particular jobs or in the development of VET policies. The recently created National Council for Vocational Education and Training (CNFP) may help to improve consultation between the VET system and employers. Encouraging workplace training is one way of creating partnerships with employers. Its quality could be improved, for instance, by creating special apprenticeship contracts clearly setting out rights and obligations of both employers and students. Some OECD countries, as Germany, Switzerland and Norway, have made good experiences with extensive workplace training, which closely involves employers and business associations and has contributed to relatively low youth unemployment.
- **Weak connection between the various elements of the system:** Both the Ministry of Labour and the Ministry of Education have key responsibilities in VET policy and supervise different VET programmes. To improve the articulation between the elements of the system, the government plans to introduce a qualifications framework. This would increase mobility of students from one part of the system to another, for instance from the CFTs to the IPs and improve transparency for employers.

While VET can improve the professional skills and job mobility of youths, the International Adult Literacy Survey (OECD, 2000) showed that the skills of a large share of adults were insufficient to master basic tasks (see Chapter 4, Figure 4.1). The government is developing a National Labour Skills Certification System (*Sistema Nacional de Certificación de Competencias Laborales*) as part of the *ChileCalifica* programme, which aims at providing a framework for the recognition of professional competences, regardless of whether these were acquired on the job or through formal training. This may help adults without formal degree enter VET or other education programmes and improve their employability across sectors through lifelong learning.

Restrictive start-up regulations and an inefficient bankruptcy procedure slow entrepreneurship

38. Regulatory barriers in Chile have impeded entrepreneurial activity and the reallocation of resources from low-productivity activities into innovative and productivity-enhancing activities. Overly restrictive regulation of start-ups has prevented the development of new entrepreneurial ideas and an inefficient bankruptcy procedure has slowed the exit of inefficient firms from the market. A first best policy to enhance innovation would therefore be to ease these regulations, a conclusion supported by a number of recent studies that have shown that a liberalised trade and FDI regime needs to be

complemented by free entry and exit in order to generate productivity gains (see Harrison and Rodriguez-Clare, 2009 for a survey).

39. Restrictive start-up regulations not only act as a brake on competition but can also hold back innovation by restricting the entry of firms with new and innovative ideas. The government is currently considering several reforms to ease regulatory red-tape for start-ups. These include easing administrative procedures for obtaining permits and an initiative to integrate the different administrative procedures in a single electronic platform (Platform of Interoperability of Public Services, PISEE). In the medium term this platform could act as a one-stop shop for business start-ups.

40. The bankruptcy procedure is inefficient, which holds back entrepreneurial risk taking and makes access to credit difficult. According to the World Bank Doing Business indicators, Chile's bankruptcy procedure is lengthier and more costly than in most OECD countries. It takes 4.5 years and costs 15% of the estate to close down a business, as compared to 1.7 years and 8.4% in the average OECD country. Lengthy bankruptcy procedures and high costs can deter entrepreneurial risk taking by making it costly to fail (White, 2005). Moreover, the protection of creditors during bankruptcy appears to be weak. While creditors in the average OECD country recover 68.6 cents on the dollar, in Chile they recover only 21.3 cents. As creditors anticipate low recovery rates, they can become reluctant to give credit to potentially very productive but risky businesses. Several initiatives to make the bankruptcy law more efficient are under way. The government has facilitated the reorganisation or orderly close down of SMEs through an extra-judicial procedure (*Estatuto Pyme*). The authorities have also launched an inter-ministerial working group to assess options for reform, which considers, among other options, the creation of specialised bankruptcy courts.

41. Inside-the-frontier innovation and the shift of resources into higher-productivity activities is also held back by high severance pay, which can lock workers into low-productivity jobs in traditional activities. Chile's employment protection legislation (EPL) is less rigid than in the median OECD country. However, employers who dismiss an indefinite-duration worker with more than one year of tenure for economic reasons have to pay one monthly wage of severance pay for every year of service (see Chapter 2). As workers lose their entitlements when they terminate a contract, high severance pay can lock them into low-productivity jobs. Even when higher-productivity and higher-wage opportunities emerge, they may prefer to stay in a low-productivity occupation if they expect to receive severance pay in case of dismissal for economic reasons.⁷ Moreover, recent empirical evidence shows that restrictive employment protection legislation, including high severance pay, can reduce firms' speed of adjustment to shocks, thereby lowering aggregate productivity growth (Caballero *et al*, 2006).

The innovation policy framework has improved

42. Despite several recent innovation policy reforms, a further reason for low innovation are a number of remaining weaknesses in innovation policy. R&D is mainly financed by the government and carried out in universities and public research institutes. With the caveat that data on the composition of R&D spending in Chile after 2004 are not available, only around 46% of R&D is financed by industry as compared to an OECD average of more than 60%. Links between universities, public research institutes and the private business sector are weak.⁸ As a consequence, the private business sector's propensity to

^{6.} According to the OECD's Labour Market and Social Policy Review of Chile (OECD, 2009), around 6% of workers who become unemployed are entitled to severance pay and even less actually receive it. Nonetheless, workers may ex-ante attach a high value to severance pay if they are very averse to the risk of being dismissed for economic reasons or if they are imperfectly informed on the actual probability of receiving severance pay.

^{8.} According to a 2008 government communication to the Committee for Scientific and Technological Policy of the OECD and OECD (2007).

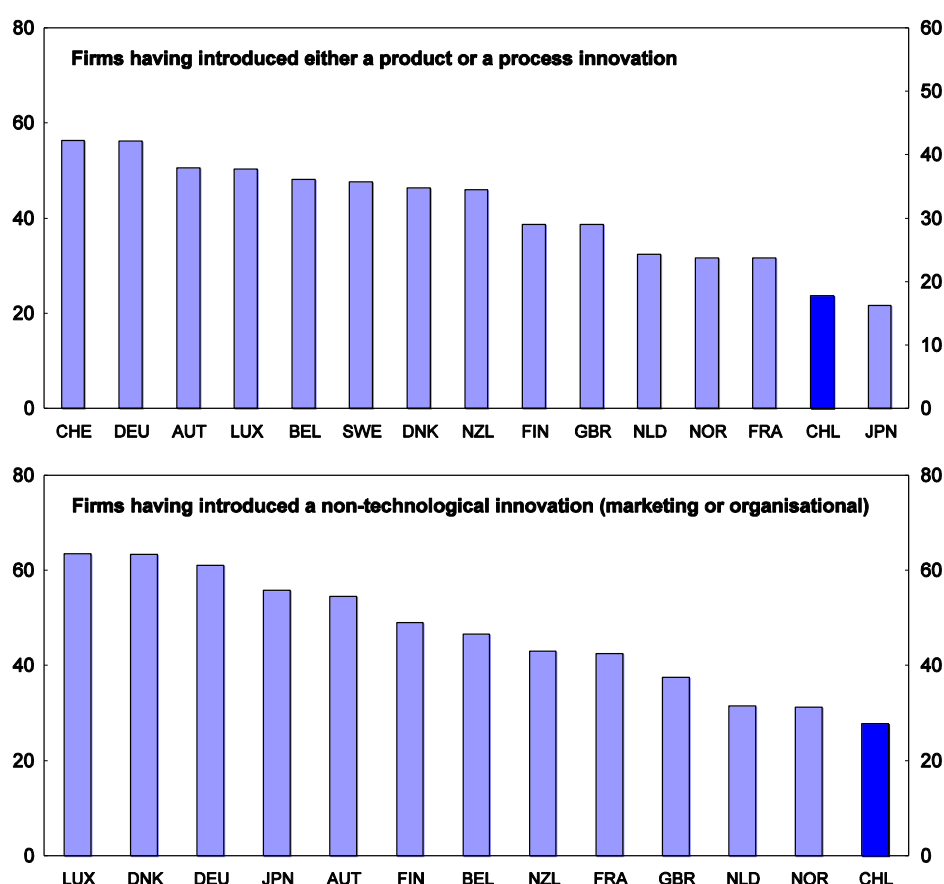
engage in innovation is low by OECD standards (Figure 10). The share of firms reporting technological innovations (product or process) in the 2007 innovation survey is 23.7% and the share reporting a non-technological innovation (marketing or organisational) is 27.8% (SCL, 2008).

43. For firms that do introduce technological and non-technological innovations, public innovation policy instruments and cooperation with public research institutes or universities play a minor role. Only 5.2% of firms that had introduced an innovation reported having used a public innovation policy instrument. Only around 10% of firms having introduced an innovation cooperate with public research institutes or universities on innovation. Moreover, cooperation with universities and public research institutes is the least-valued form of cooperation next to cooperation with competitors.

44. The authorities have recently taken several measures to promote links between public research institutes or universities and private enterprises. They introduced an R&D tax credit in 2008, under which firms can claim a tax credit of 35% of the payments made to a public research institute they have contracted to conduct R&D and can deduct 65% of the remaining amount from taxable income. Research centres and R&D contracts have to be certified by the Economic Development Agency (CORFO) and in-house R&D is excluded from the tax credit. It remains to be seen whether the R&D tax credit will induce more R&D. Because the entire amount of R&D expenditure contracted with a certified research institute can be claimed, the credit may have little incremental effect on R&D spending. To make sure that firms benefit from tax credits only for additional R&D, some OECD countries use incremental schemes (Ireland, United States) in which only additional R&D with respect to a reference base is eligible, while others use mixed volume-incremental schemes (France, Korea, Portugal and Spain). A volume-based mechanism is of course a precondition for setting up an incremental scheme, as it collects information on R&D per firm, which can then be used as the reference for the incremental mechanism. Once the current volume-based scheme is up and working, the Chilean authorities should consider a switch to an incremental mechanism.

45. Since the introduction of the R&D tax credit in 2008, 56 research centres have registered with the economic development agency and 8 R&D contracts have been certified. Although it is too early to judge the success of the R&D tax credit the number of certified contracts seems relatively low. This may be due to the double certification process (both research institutes and contracts have to be certified) or to the business sector's insufficient knowledge about the scheme. Although CORFO has already held seminars and meetings with the business sector, greater advertising efforts may be needed to reach potentially interested businesses. Another reason may be that in the sectors in which R&D is currently concentrated firms conduct R&D mostly internally within firms' own R&D departments. These firms may not be willing to contract out R&D to avoid the leakage of sensitive knowledge. Indeed, the certified R&D contracts are not in the mining and manufacturing sectors, in which R&D is currently concentrated, but instead in the fishing and aquaculture sectors.

46. The authorities have launched other promising initiatives to promote links between private enterprises and public research institutes that require the matching of public grants by private funds. One of these programmes is the joint Technological Consortia Programme of the National Commission for Scientific and Technological Research (CONICYT), the Economic Development Agency (CORFO) and the Foundation for Agricultural Innovation (FIA), which requires private enterprises and research institutes to set up technological consortia to be eligible for public grants; 24 consortia are currently in operation. CORFO's *InnovaChile* runs a similar technological consortia programme (although it does not require the participation of a university or technological institute). An older programme created in 1991 is CONICYT's Fund for the Promotion of Scientific and Technological Development (FONDEF) which requires public research institutes to match public grants with private funds for applied research projects, research at the pre-competitive stage and technology transfer.

Figure 10. Innovations in firmsAs per cent of all firms¹

1. Two-year reference period 2004-05 and 2005-2006 for Chile.

Source: OECD (2009a); Ministry of Economy, Fifth Innovation Survey Indicators.

47. Traditionally, most of the public funding instruments have focused on R&D, rather than technology diffusion, although *InnovaChile* has recently devoted more effort to business innovation. According to the Innovation Survey, only 30.9% of firms having introduced an innovation (technological or non-technological) report R&D spending, as the bulk of innovating firms mainly rely on the acquisition of machinery and equipment. Indeed, only around 20% of firms' spending on innovative activities is on R&D. Benavente (2006b), using the standard Crepon *et al.* (1996) methodology, finds no link between R&D spending and innovation in Chile. The move of *InnovaChile* to support any type of innovation (product, service, marketing, organisational) and not exclusively spending recorded as R&D may help foster more market-oriented innovation, as does the support for the formation of technology consortia including private enterprises and public research institutes that develop market-oriented technologies.

48. Creating networks of technological institutes and private enterprises for technology diffusion is a promising idea. To enhance the diffusion of existing technologies the National Innovation Council for Competitiveness (2008) proposes to create an association of the 15 technological institutes (Sistema Nacional de Institutos Tecnológicos, SNITec), which would provide R&D and technological consulting services especially tailored to the needs of SMEs. This association would also certify private enterprises or

public research institutions to act as “trusted brokers” for technology transfer. The Ministerial Committee for Innovation has approved the creation of a coordinating secretariat in early 2009. Against the background of the currently weak cooperation between enterprises and research institutes the authorities should pursue this project further and emphasise its technology diffusion component.

49. Until the creation of the National Innovation Council for Competitiveness, the setting of innovation policy priorities had not been separated from funding and the innovation policy framework was fragmented. Several agencies in the ministries of economy, education, agriculture, and planning had been setting the innovation policy priorities in a decentralised manner, which had made the formulation of a coherent long-term innovation strategy difficult (see Box 8 on the government agencies responsible for innovation policy). The creation of the National Innovation Council in 2006 follows international best practice by separating the policy-setting function from the funding function. However, the multiplicity of funding mechanisms remains and funds partly overlap. For instance, the FONDEF fund, operated by CONICYT and CORFO’s business innovation programme, targets similar market failures and similar firms.

50. A number of sectorally neutral or “horizontal” policies address presumed failures in the market for innovation, in particular financial restrictions for small and innovative entrepreneurs. The state-owned bank *BancoEstado* guarantees credit for SMEs through its FOGAPE programme, which helps small and potentially innovative entrepreneurs to obtain access to credit. CORFO’s venture and seed capital instruments also help innovative but risky ventures to obtain access to capital. Further support for this type of enterprises may come from a planned capital market reform (MK III, see Chapter 1) that foresees the easing of regulatory restrictions on domestic and foreign risk capital funds.

Potential risks from prioritising sectoral clusters should be borne in mind

51. The authorities have started to move away from a purely horizontal approach to innovation policy towards a more vertical approach, under which some sectors are singled out for priority support (National Innovation Council for Competitiveness, 2007, 2008). In other areas, the authorities have already moved away from a purely horizontal approach. The economic development agency, for instance, has a programme to attract FDI to high-technology sectors (Box 9). The withholding tax for repatriated earnings has also been reformed in 2007 to make investment in knowledge-intensive services more attractive (15% withholding tax rate on knowledge-intensive services as compared to a 35% rate on other repatriated earnings).

52. In the first white book the National Innovation Council (National Innovation Council for Competitiveness, 2007, pp. 21-29) states that the cluster strategy aims at enhancing competitiveness and the diversification of production. While it explicitly rejects the view that resource-abundant countries should move away from resource-intensive production irrespective of their comparative advantage (“hard” industrial policies by creation of comparative advantages from scratch), it nevertheless emphasises the need to diversify into more knowledge-based activities.⁹ The National Innovation Council therefore ranks potential clusters for priority support according to both distance from Chile’s revealed comparative advantage and potential growth on world markets.

9. “This strategy recognizes that, at least initially, the greater part of our future gamble must be placed with the development of natural resource-intensive economic activities. However, we must emphasise that this does not imply ignoring the benefits of a greater production diversification (towards knowledge-intensive services and industries) or the argument that manufacturing has more possibilities for innovation in the final product.” (National Innovation Council for Competitiveness, 2007, p. 28).

53. The National Innovation Council outsourced the identification of priority clusters for public support to a global consulting firm, which was chosen through a competitive bidding process. In its study, the consulting firm evaluated growth potential on world markets and the comparative advantage of Chile for a large number of industries through interviews with the main actors in the industry, consultation with leading sector specialists, benchmarking of industries, and scientific and press publications. Even though large uncertainties surround the consultant firm's potential global growth and comparative advantage estimates, and it remains unclear how the two factors are weighted in the final ranking, outsourcing the identification procedure to a private consultant has the benefit of being transparent.

Box 8. The innovation policy framework after the 2006 reforms

- The National Innovation Council for Competitiveness (created by decree in 2006 pending approval by Congress) sets guidelines for long-term national innovation strategy.
- The Ministerial Committee for Innovation chaired by the Ministry of Economy designs the innovation policies and sets up action plans based on the National Innovation Council's recommendations. It also administers the newly created Fund for Competitiveness, which mainly provides funding to the funding agencies mentioned below.¹
- The main funding agencies are:
 - i) the National Commission for Scientific and Technological Research (CONICYT) which is attached to the Ministry of Education and which focuses on public support for scientific and technological research and the development of human capital; among others, CONICYT runs the Fund for the Promotion of Scientific and Technological Development (FONDEF) that requires matching public grants with private funds for applied research projects.
 - ii) the innovation arm (*InnovaChile*) of the Economic Development Agency (CORFO) which operates under the oversight of the Ministry of Economy and focuses on supporting business innovation and entrepreneurship; among others, *InnovaChile* runs a business innovation programme aimed at supporting all types of innovation (product, service, process, marketing, organisational) in individual firms and the setup of technological consortia between private enterprises and public research institutes; it also administers (through the certification of R&D contracts and research institutes) the tax credit for private R&D that came into force in 2008 and under which firms can claim a credit of 35% of the payments made to a certified public research institute contracted to conduct R&D.
- Other relevant funding agencies are:
 - iii) the Millennium Scientific Initiative which is attached to the Ministry of Planning and which finances research centres of excellence in areas that are relevant to Chile's economic development;
 - iv) the Foundation for Agricultural Innovation which is attached to the Ministry of Agriculture and supports innovation in the agricultural sector.
- According to Ministry of Economy (2009) and information provided by the Ministry of Finance, spending on science, technology and innovation in 2009 amounts to 325 billion pesos (0.38% of GDP). This represents a 41% growth of the science, technology and innovation budget in real terms with respect to 2008. Of these, around 31% are allocated through the Fund for Competitiveness, around 5% through the scholarship programme *Becas Bicentenario* and around 60% through other budgetary items (CONICYT, CORFO and other funding agencies). The authorities plan to allocate at least 50% of the Fund for Competitiveness and part of the *Becas Bicentenario* and other budgetary items to priority clusters.

1. Although earmarking of public funds is prohibited by constitution in Chile there is a clear political commitment to use the proceeds of the new mining tax introduced in 2006 for innovation policy purposes through the Fund for Competitiveness.

54. The number of clusters identified for priority support has been narrowed down to eight by the National Innovation Council. These priority clusters are mostly linked to natural resources, in which Chile's comparative advantage has been revealed in the past. The selected sectors are fish farming, special interest tourism, copper mining, global services, processed food, primary fruit industry, pork and chicken farming, financial services. The National Innovation Council also identified five "transversal" platforms: human capital; research and development; infrastructure and natural resources; regulatory, legal and political framework; and financial services.

55. Based on the strategic guidelines elaborated by the National Innovation Council, the Ministerial Committee for Innovation has developed a biannual action plan for 2009-2010. This action plan has reduced the number of priority clusters to five (food industry, fish farming, mining, special interest tourism, global services) and redefined the priority transversal areas as environment and water resources, biotechnology, renewable energies and ICT (Ministry of Economy, 2009). The reduction of the number of priority clusters appears to be the result of regrouping the processed food industry, pork and chicken farming and the primary food industry under the processed food industry, but the prioritisation of biotechnology, renewable energies and ICT as transversal areas appears only loosely related to the National Innovation Council's principle to rank sectors according to Chile's comparative advantage and potential growth on world markets. Instead, it appears to aim at supporting knowledge-based industries irrespective of Chile's comparative advantage. To make sure the selection of sectoral priority clusters and transversal areas are based on similar principles, the selection process for the transversal areas could be made more transparent.

56. One risk of deviating from sector neutrality in innovation policy is to pick sectors that would have formed successful clusters even in the absence of public support. Cluster policies can help overcome coordination failures between private businesses that prevent the emergence of successful clusters. However, cluster policies may also erroneously target sectors in which private businesses are able to overcome coordination failures on their own. This could occur even if the National Innovation Council's projections of global growth of the sector and its comparative advantage were accurate. Sectors with strong global growth potential and a strong comparative advantage may turn out to form successful clusters without public sector intervention. For instance, the Chilean wine industry has moved towards promoting the image of Chilean wine abroad and increasingly cooperated on upgrading Chilean grapes through R&D as export prospects soared over the past decade (Box 10). In this case, targeted public funds may have little additional effect.

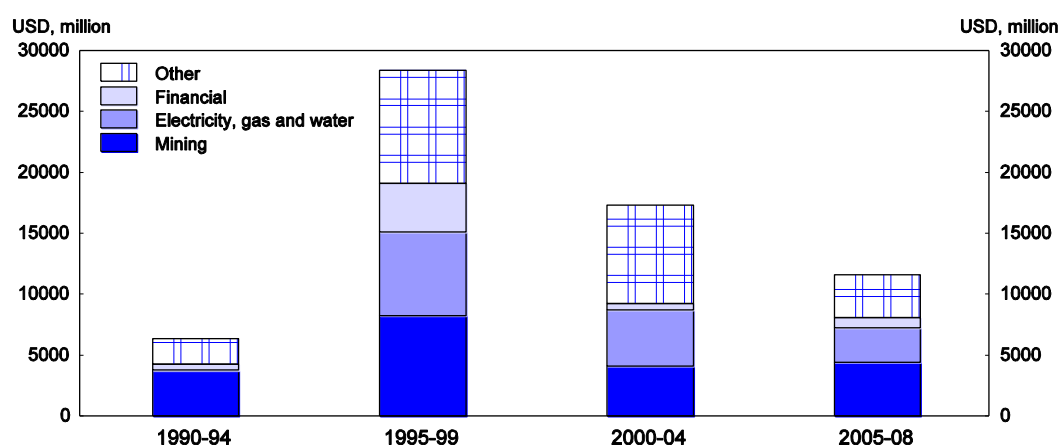
Box 9. FDI and technology diffusion

As a share of GDP, inward FDI to Chile is the highest among South American countries, attracted by a stable macroeconomic environment and an open and non-discriminatory FDI regime. Although the share of FDI in services -- mainly related to privatisation and deregulation in network industries -- has increased over the past two decades, the mining sector remains the most important recipient of inward FDI (Figure 11).

FDI in the mining sector is generally seen as bringing limited gains in terms of technology diffusion because of its relative disconnection from the rest of the economy. When in 1996 the multi-national Intel chose to set up shop in Costa Rica instead of Chile -- mainly because of the lack of qualified workers but partly also because Chile rejected the request for a tax break (Rodríguez-Clare, 2001, Agosin *et al.*, 2009) -- this sparked a debate on targeting specific sectors for FDI. Since 2000 CORFO targets high-technology sectors through its High Technology Investment Promotion Programme (renamed *InvestChile*), through subsidies for feasibility studies, investment in fixed assets, and training. At the beginning the programme targeted only high-technology producing sectors, which proved to be ineffective as no investment could be attracted. Nowadays, the programme targets high-technology using sectors, such as software development and call centres. According to Agosin *et al.* (2009), around 40 of the around 70 firms that have benefited from subsidies have decided to set up shop in Chile. However, the authorities have not conducted a formal impact study of the programme to date. It therefore remains difficult to judge whether the high-technology companies that decided to set up shop in Chile have indeed been attracted by CORFO's programme or whether they would have chosen Chile as the FDI location even in the absence of the programme.

Ultimately, FDI policy should not be assessed in terms of the number of high-technology investments it attracts but in terms of the technology diffusion and knowledge spillovers it helps to generate. A number of studies find that technology diffusion and knowledge spillovers are not automatic (see Hoekman and Javorcik, 2006 for a survey). In this sense, the training subsidies of *InvestChile* appear justified, as they may help diffuse the knowledge of the multi-national firm to the local workforce but the subsidies for feasibility studies and investment in fixed assets appear more questionable in this respect. In any future upscaling of the programme, which is currently relatively small (11 million US dollars in 2008), the focus should therefore be on training subsidies.

Figure 11. Foreign direct investment by sector ¹



1. Investment through the Foreign Investment Statute (DL 600).

Source: Foreign Investment Committee.

57. Another risk is the opposite problem: supporting sectors that are not viable. If the National Innovation Council's projections of global growth and Chile's comparative advantage turned out to be

inaccurate, public resources would be wasted on failing sectors. Moreover, labour and capital would be allocated to relatively unproductive uses, thereby reducing overall output and productivity.

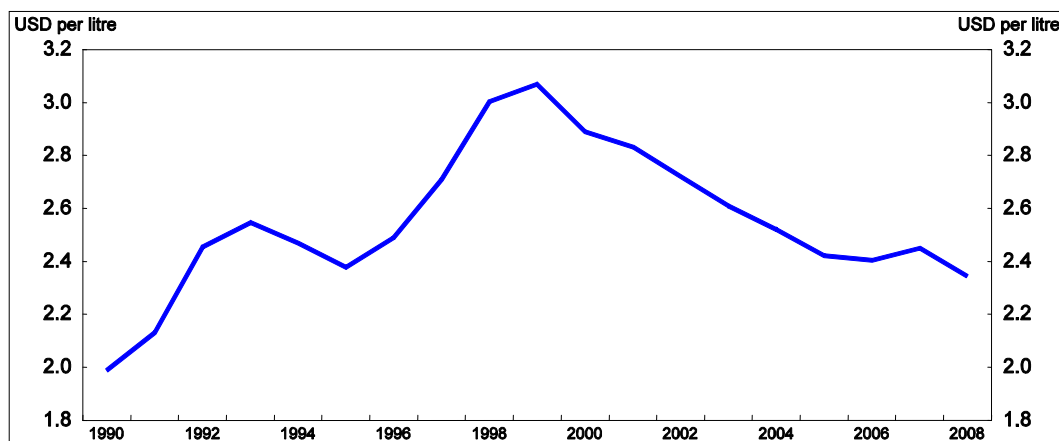
Box 10. Export discovery and cluster formation without public intervention: The Chilean wine industry

Chile has a century-old tradition of wine production but “export discovery” took place in the late 1970s, as a result of foreign direct investment. In 1978, the Spanish firm *Miguel Torres* started to import technologies that were standard in higher-income markets (small oak barrels, stainless steel vats) but new to Chile and started to produce export-quality wines. Several vineyards followed suit and exports started to take off in the late 1980s. While in the 1980s most technology was imported, over the 1990s national suppliers of technology started to emerge and wine producers started to access more advanced foreign technologies and marketing techniques through joint ventures with foreign firms.

The role of the public sector in export discovery and technological upgrading was limited to providing appropriate framework conditions, such as an open trade and FDI regime and a reasonable level of market regulation. An open FDI regime helped *Miguel Torres* and other foreign firms with advanced technological and marketing know-how to set up shop in Chile. Low tariffs kept the price of imported technologies in the 1980s low and an expanding network of free trade agreements provided preferential access to key foreign markets. On the regulatory side, the elimination of restrictive regulations for wine production (limits on land surface allocated to wine production) and agriculture in general in the 1970s established a more business-friendly environment; appropriate phyto-sanitary regulations helped to keep diseases outside the Chilean borders; and the introduction of denominations of origin in 1994 effectively established minimum quality standards.

Currently, the main challenge for the industry is to move into higher quality segments on world markets, as the price per exported litre has fallen since the late 1990s (Figure 12). According to industry observers (Benavente, 2006a), to achieve quality upgrading Chile's country brand has to be strengthened, research capacities in the industry have to be stepped up and the denominations of origin have to be enforced. The industry association (*Vinos de Chile*) has taken significant steps in promoting the Chilean brand as a high-quality wine producer and has started to cooperate on R&D. The major challenge for the public sector is currently to fully enforce the denominations of origin.

Figure 12. Export unit value for bottled wine¹



1. In 2000 USD deflated with the US price deflator (PPI) for wines with denomination of origin (product code: 22042110).

Source: ODEPA.

58. Capture may be another problem with selecting sectors for priority support, although the planned institutional setup for the National Innovation Council and the use of temporary grants limits this risk. According to a draft bill currently discussed in Congress the members of the National Innovation Council would be independent (nominated by the president and ratified by the Senate) and the terms of office would not coincide with those of the president. In this sense, the members of the National Innovation Council would be independent of the electoral cycle and less likely to make concessions to special interest groups to enhance their electoral

prospects. The predominant use of the existing funding mechanisms of the Economic Development Agency (CORFO) and the National Commission for Scientific and Technological Research (CONICYT), which mainly use temporary grants to redirect resources to the priority clusters, also limits the risk of capture by special interest groups, as compared to “hard” industrial policy instruments, such as import tariffs or tax breaks.

59. The authorities have identified the outcome targets of the industrial clusters. These should be monitored closely. Although setting quantitative performance objectives for clusters is a complicated task, three measures can be implemented in practice (Rodrik, 2004). Firstly, objectives can be set in terms of productivity growth. Although productivity is difficult to measure, project audits by technical and business consultants can provide useful information. Secondly, clusters can be benchmarked against similar industries in other emerging countries. Finally, outcome objectives can be set in terms of export performance, as this provides useful information on how the cluster performs compared to world-class competitors. The authorities have chosen to specify the outcome targets for the industrial clusters mainly in terms of export performance.¹⁰

60. Cluster designations should be reviewed periodically and clear protocols should be established on when to withdraw public support. Support should be withdrawn from clusters which continually fail to meet their performance objectives to avoid lock-in of failures (Rodrik, 2004). Even for clusters that meet their performance objectives, support should be reviewed after a pre-specified period of time has elapsed (sunset clauses), as for successful clusters the objective should be that private financing eventually substitutes for public support.

61. More generally, the role of the public sector in selecting export sectors should not be overemphasised and public sector action should focus on providing adequate framework conditions, such as an open trade and FDI regime and an appropriate level of regulation. This is the main lesson that can be learned from the case studies on the salmon and wine industries (Boxes 10 and 11). In the case of salmon farming the public sector did play a role in the identification of the sector for exports through a partly publicly-owned institution (*Fundación Chile*), but the wine sector emerged as a successful exporter on world markets without public support. While in the presence of severe coordination failures the public sector may play a useful role in identifying export sectors, in general a strong comparative advantage and adequate framework conditions will be sufficient for export success. The wine sector, for instance, was helped by an open trade and FDI regime and appropriate regulation. By contrast, the salmon sector suffered from over-reliance on self-regulation and a lack of government oversight which led to the outbreak of a preventable disease and the near-breakdown of production over the past year (Box 11).

Concluding remarks

62. Lifting productivity growth from its current slow pace is one of the main policy challenges in Chile and enhancing competition should be a major element of any economic strategy setting out to address this challenge. The recent reform of the competition policy framework is a big step forward in this respect but effectiveness will depend on diligent implementation. Product market regulation, which is overly restrictive and stifles competition in some areas, should be another priority for reform.

63. Policies to foster entrepreneurship and innovation may also help enhance productivity growth. Restrictive regulations on entry and exit of firms limit the discovery of new entrepreneurial ideas and restrict the exit of inefficient firms from the market. The innovation policy framework has improved considerably over the past years and many promising projects have been launched. The authorities are right

10. According to information provided by the Ministry of Economy for the offshoring cluster an export target of 1 billion US dollars by 2010 has been specified; for the tourism cluster the outcome objective is to increase average expenditure per tourist from 2 700 US dollars to 4 000 US dollars; for the mining cluster the objective is to increase exports of provider firms from 300 million US dollars to 1 billion US dollars in 2012; for the agrifood cluster the objective is to reach 1.5 billion US dollars of processed foods exports by 2010 and 1.5 billion US dollars of fresh fruits by 2012; the objective of the aquaculture cluster is to reach 4.5 billion US dollars of exports by 2015.

to emphasise potential positive effects from greater export diversification on productivity and growth but risks of targeting specific sectors should be borne in mind.

Box 11. Salmon farming: Public sector induced export discovery and regulatory failure

Salmon farming is generally viewed as a successful example of a public sector induced export discovery. In 1980 *Fundación Chile*, a private non-profit institution partially owned by the State, established an aquaculture programme, whose success had strong demonstration effects on private entrepreneurs. Although some observers have argued that the salmon farming would have been discovered for exports even in the absence of intervention from *Fundación Chile* (Quiroz, 2006), its role in the take off and development of the industry is unquestionable. After selling off the pilot project to the private sector, *Fundación Chile* continued to support the growing industry through knowledge-generation initiatives and the establishment in 1986 of a first business association (*SalmonChile*).

Over the 1990s the salmon industry emerged as a major exporter on world markets, helped by low tariffs and an open FDI regime. Low tariffs facilitated the import of inputs, such as capital goods and salmon eggs. Favourable conditions for FDI attracted foreign firms, which introduced new business strategies (such as vertical integration) in Chile. Moreover, an expanding network of free trade agreements gave Chilean exporters an important edge over its major competitors in some markets.

The increase in exports went hand in hand with falling prices on world markets and deteriorating sanitary conditions on the salmon farms. Exports soared from 50 million US dollars in 1989 to 2.4 billion in 2008 and Chile became the world's second-largest exporter of farmed salmon (after Norway), which contributed to a fall in world market prices. Chilean firms reacted by increasing production, which, in turn, led to a deterioration in sanitary conditions on salmon farms and an extensive use of antibiotics.

The recent outbreak of Infectious Salmon Anemia (ISA) that brought the industry to its knees in 2008 and 2009 can partly be attributed to regulatory deficiencies. One of the main determinants of sanitary conditions on salmon farms is the geographical proximity of production units, as a high density favours the spread of diseases. In Chile the density of production is higher than in other salmon farming countries (Economist, 2008), mainly due to inadequate regulations on the minimum distance between farms and to an over-reliance on self-regulation. A second main determinant of sanitary conditions is controls for imported salmon eggs, which failed to detect ISA early on. The authorities have taken emergency measures to address these deficiencies but going forward a change in the regulatory framework will be necessary to maintain Chile's position as a main player on world markets.

Box 12. Recommendations on enhancing competition, entrepreneurship and innovation

The main objectives of economic policies to enhance productivity growth should be to strengthen competition through legal and regulatory action, to remove regulatory barriers to entrepreneurship and to strengthen innovation in firms.

- Ensure the National Economic Prosecutor receives sufficient resources. Strengthen deterrence for cartel participation by linking the maximum fine to revenues on the market involved in the conspiracy; make price fixing a criminal offence.
- To encourage participation in the new leniency programme, clarify the conditions under which firms will be granted immunity through the publication of transparent guidelines.
- Enhance consumer protection to improve the functioning of product markets through increased price transparency.
- Reduce entry barriers in retail and business services to discipline incumbent firms.
- Reduce "red tape" for start-ups to both strengthen competition and the discovery of new entrepreneurial ideas.
- Reform the bankruptcy law to encourage entrepreneurial risk taking in non-traditional sectors.
- In innovation policy, continue efforts to strengthen links between universities and firms and continue to move away from the narrow focus on R&D and support all forms of innovation in firms.
- Publish the quantitative objectives for the industrial clusters and review public support if targets are not met; establish sunset clauses for public support.

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Annex A1

TEN MAIN EXPORT PRODUCTS

The ranking is based on trade data at the 6-digit level of the Harmonized System (HS6) using the BACI-CEPII version of COMTRADE. The BACI dataset improves the reliability of COMTRADE data by harmonising import and export declarations of trading partners.

Table 1.A1 Shares of Chile's main exported products in total exports

Rank		Product ¹	Million USD	Export share	Markets
1	740311	Copper cathodes and sections of cathodes unwrought	16 142	28.6	34
2	260300	Copper ores and concentrates	11 450	20.3	22
3	740200	Unrefined copper, copper anodes, electrolytic refining	2 797	5	18
4	261310	Molybdenum concentrates, roasted	1 367	2.4	22
5	290511	Methyl alcohol	1 032	1.8	20
6	261390	Molybdenum ores and concentrates except roasted	944	1.7	13
7	740319	Refined copper products, unwrought, nes	912	1.6	19
8	080610	Grapes, fresh	879	1.6	82
9	220421	Grape wines nes, fortified wine or must, pack < 2l	844	1.5	111
10	470321	Chem wood pulp, soda or sulphate, conifer, bleached	814	1.4	39
		Total	37 185	65.9	126 ²

1. The ranking is based on trade data at the 6-digit level of the Harmonized system (version 1989-92). This classification is composed of 5041 products.

2. All destinations to which any of the 10 products is exported.

Source: COMTRADE (BACI-CEPII).

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