



Economic Diversification: The Case of Chile

Maria Elena Varas¹

¹ Any views or opinions expressed here are solely those of the author and do not necessarily represent those of the entities mentioned herein.

Section 1. Introduction

Chile has often been pointed out as a success story because it has implemented policies that spurred growth and development with a market-friendly approach. This is the result of a long-standing industrial policy that has gone through different phases from import substitution to liberalized markets while trying to come up with the most optimal solution to the same question: how to achieve growth and development in a resource-abundant country. While several policies have been implemented through the years and much progress has been made, the question remains to be answered when there is still room for growth.

Chile has 38 percent of the world's copper reserves and is the largest copper producer, having produced 33.6 percent of the world's copper in 2009.² It's also a leading supplier of molybdenum, rhenium, silver, gold, iron, natural nitrates and others. Revenues from the mining industry constitute an important share of income, and key social programs in areas such as health, pensions, disability and innovation are funded in part by revenues from this industry. The biggest source of income comes from the two state-owned companies, the Chilean National Copper Corp. (CODELCO) and the much smaller National Mining Co. (ENAMI).³

The increase in the price of copper in 2004 reached historic highs. This has generated discussions about the role of public policies in the management of resource windfall. Chile's dependence on revenues coming from the mining sector became a central point of discussion as to how to avoid the resource curse. The latter refers to Dutch disease, which implies that real exchange appreciations driven by natural resource booms could prove to have negative long-term effects in exports and productivity (Lederman and Maloney 2007). Given Chile's position as an export-led country rich in natural resources, this has been a point of particular importance.

Historically, Chile's approach to industrial policy, productivity and growth in an initial phase focused on import substitution, high levels of government intervention and basic price controls; it relied heavily on the extractive industries and agriculture. After the second half of the 1970s and the implementation of liberal and market-friendly reforms, Chile experienced the first signs of government efforts to diversify through projects that openly steered away from the extractive industry; this was the case in the salmon, wine, pork and berry industries, in part propelled by efforts of *Fundación Chile*, a public-private initiative. The restoration of democracy

² Chilean Copper Commission (COCHILCO), "Yearbook: Copper and Other Mineral Statistics 1990--2009" Santiago, 2010. Download at: <http://www.cochilco.cl/productos/descarga/anuarios/anuario2009.pdf>

³ CODELCO was founded in 1976 and is an autonomous company in charge of all stages of exploration, exploitation, processing and sale of copper. It is the largest copper producer in the world with close to 20 percent of the world reserves and more than \$16 billion in assets. In 2009 its equity increased to \$5.3 billion and produced 1.78 million metric fine tons (MFT), which stands for 11 percent of world production. CODELCO also owns fully or in part other mining companies in Chile and abroad. ENAMI was founded in 1960 to support small and medium-sized copper mining companies through a set of incentives and assistance programs. It buys and partners with other companies by purchasing ores and concentrates to later process and sell them in international markets. In 2009, its equity was \$778 million and its net profits, although smaller than 2008, were about \$38 million.

in 1990 was followed by a third set of economic reforms and high levels of growth that averaged 6.7 percent in the 1990s in part due to high capital inflows, an extensive program of free trade agreements, important reforms in the financial sector, and the strengthening of macroeconomic policies. The approach to industrial policy generated productivity gains through the implementation of a set of horizontal policies. By the end of the '90s, though, it was clear that additional efforts needed to be made in order to achieve higher levels of growth and emulate the success story of other countries like Australia, New Zealand, Ireland and Finland. These were countries that once shared a common background as natural resource exporters that were able to move to higher development levels.

Being an export-led country that depended heavily on natural resources, export diversification could also prove to produce positive results by reducing the effects of volatile commodity prices diminishing the negative effects in GDP growth and creating a more predictable, stable economic environment (Agosin 2009). The process would entail investment efforts in new activities expanding the productive frontier and giving a crucial role to entrepreneurship and innovation. Acknowledging the causal relationship between growth and export diversification, Chile's industrial policy in the 2000s was marked by a fourth generation of reforms geared toward efficiency gains, diversification and innovation.

As a result, the National Council on Innovation and Competitiveness (NCIC) was created with the role of implementing a new national strategy that would put in place a set of horizontal and vertical policies in pre-defined industry clusters with set goals and deadlines. With a strong focus on creating higher human capital, the implementation of these policies was mostly funded by copper revenues through a new royalty tax on mining. The implementation of the strategy for innovation and competitiveness, however, has faced several challenges with mixed results. Export products and markets have increased, but there has been a halt in the diversification process since 2004, and there still are important gaps to fill in terms of human capital and innovation.

What are the main challenges that Chile faces in order to effectively move to the next level? Which policies have been key determinants, and what has been the underlying rationale behind them? This paper examines different public policies implemented to foster export growth and diversification as a means of achieving economic development. It aims to provide an overview of the policy-making process, the rationale and legal background behind the implementation of different programs, and assess results in order to identify key policy strategies and remaining challenges.

Section 2 reviews the historical background of resource management and industrial policy by different administrations. Section 3 deals in depth with the policies implemented after the return to democracy in the period of 1990 to 2010 when we analyze the web of policies implemented by different state agencies targeted at achieving higher productive and diversified export levels. In Section 4 we examine the role of fiscal reforms allowing the use of resource windfalls in the implementation of a new strategy for innovation and competitiveness. Section 5 looks at the economic performance in the past 20 years in order to analyze the level

of export diversification and sophistication achieved. Section 6 concludes with recommendations for best policy practices.

Section 2. A Historic Approach to Industrial Policy and Early Stages of Diversification

Chile's industrial policy and its stance toward its main productive sector, the mining industry, can be analyzed in three stages. The first, roughly going from 1934 to 1973, was based on import substitution; the second, from 1973 to 1989, was based on trade liberalization and open market reforms; and the third, from 1990 on, was marked by the return to democracy and policies based on social and economic development. We venture to add a fourth phase marked by legal reforms in 2006 that created a set of sovereign wealth funds and implemented a national strategy for innovation and competitiveness that would lead the following years' public policymaking (covered in Section 4).

The import substitution stage tried to supply its internal market without depending on foreign trade. Protection of the domestic industry came in form of high tariffs and heavy reliance on the state as the most important entrepreneur. It applied a model of industrial policy that relied heavily on state agencies as the main engine for growth and state companies vertically involved in mining, oil, electricity, telecommunications and other industries. One of the most important institutions created was the Chilean Economic Development Agency (CORFO) in 1939 with its primary role at the time being to serve as a holding for all public enterprises channeling Chile's industrial policy. In 1953 several funding and credit agencies were merged into the State Bank (*Banco del Estado*), an independent state agency with a key social role subsidizing and giving credit to the productive sector that could not access private banks.

In the 1960s the government began a process aimed at having more control over the mining companies, most of which were in hands of the private sector. In 1967 the government decreed the buyout of the major mining companies, and later in 1971 this process was completed with what is called "the nationalization of copper" by decreeing that all mining companies in hands of foreign companies would be owned by the state by need of national interest. Other reforms of similar nature took place in the agricultural and banking sector, all of which centralized the productive process in hands of the state.

The implementation of these import substitution policies generated a meager 2.1 percent average growth level from 1934 to 1973 (Eyzaguirre, Marcel, et al. 2005). The birth of new industries faced a deadlock as companies encountered high duties and were still highly dependent on manufactured products from abroad. The agricultural sector did not fare well either, and at the end of the period the country had a balance of payment crisis along with widespread social and political unrest that ended in a military coup in 1973.

From 1973 onward these policies were reversed. The subsequent years were marked by pro-market reforms and trade liberalization policies that characterized the regime until 1989. In the first part of this period (up to 1985 approximately), tariffs were unilaterally reduced, reaching 10 percent in 1979, restrictions on foreign direct investment (FDI) were eased, credit constraints

were removed, and price controls and subsidies were eliminated in an effort to liberalize the external and financial sectors. These reforms gave a pivotal role to the private sector, minimizing the role of the state in an attempt to reach a pure market economy. Interestingly, while these policies returned ownership of the mining companies to the private sector, the state kept ownership of some mines by creating CODELCO in 1976.

However, this period generated only 0.1 percent annual growth due to inadequate macroeconomic management and insufficient regulation of the financial markets (Eyzaguirre, Marcel, et al. 2005), all of which eventually exacerbated the financial crisis that hit the country in 1982. That year witnessed a 15 percent drop in GDP along with clear problems in social welfare and infrastructure, as result of a lack of proper regulation addressing market failures. The following years (1985-1989) introduced several reforms that regulated the financial sector and capital markets, and corrected failures in terms of macroeconomic management. The main tariff quota was raised to 35 percent (later eased), and restrictions on capital flows were implemented, while the government actively pursued an explicit policy to boost exports. This period had an average GDP growth level of 4.6 percent, and most of the export discoveries took place in this period through a set of particular state-backed programs.

In 1985 a program called *reintegro simplificado* (simplified reintegration) provided an export subsidy to nontraditional exports in which exporters would receive a credit of up to 10 percent of the free on board (FOB) price. This benefited nontraditional products that contained at least 50 percent of imported components. It allowed exporters to recover the dues paid to import those inputs used to make the product being exported. Although the program was phased out in 2003 after the Uruguay Round's agreement to eliminate export subsidies, it was considered an important tool to boost exports in that period.

Other specific programs targeted specific industries, two of them worthy of notice. The first was a strategic bet in the forestry industry based on the well-known fact among connoisseurs that, although scarcely grown in Chile, the *pinus radiata* (also known as Monterey pine) thrived in Chile's unique soil and weather conditions and thus grew faster than anywhere else in the world. As a result, the government passed several laws providing legal certainty and incentives for the planting of the trees. These new provisions stated that lands put to this use could not be expropriated, and they granted cash subsidies for up to 75 percent of the start-up costs, direct credit lines and other subsidies. Today the *pinus radiata* is one of the most important forestry exports and the first source of pulp and sawn wood exports.⁴

A similar case took place with the salmon industry in which Fundación Chile played a key role.⁵ Its mission was—and to a lesser degree still is—to find venture capitalists to invest in innovative projects promoting technology transfer and new business models that could benefit the country as a whole. Once the start-up company achieves a sustainable operational level,

⁴ Forestry Institute (INFOR) “Anuario Forestal 2011”, Boletín Estadístico N.132, Santiago, 2011. Download at: http://www.infor.cl/es/subir-archivos/doc_download/165-boletin-estadistico-132-extracto.html.

⁵ Fundación Chile was created as an agreement between the Chilean government and the U.S.-based Telephone and Telegraph Corp. (ITT) as part of a settlement of a nationalization without compensation in the early 1970s.

Fundación Chile sells its participation and reinvests the proceeds in new projects. The salmon industry is one of its most successful cases; the nonprofit implemented new technologies to grow salmon in the southern part of the country.

After several failed attempts throughout the 1960s and 1970s to grow trout and salmon, Fundación Chile adapted Norwegian technology in 1981 to grow salmon. This project was later sold to Nippon Suisan, one of the largest Japanese food producers, and a set of joint ventures followed that flourished during the 1980s. From 1985 to 1986 salmon exports reached more than \$1 million dollars, which rapidly increased to almost \$159 million in 1991. Today Chile is the second largest salmon exporter in the world, having exported an all-time high of \$2.4 billion FOB in 2008.⁶ It was also involved in the development of other sectors in the 1980s; in the case of blueberries, Chile is the leading exporter of the fruit in the Southern Hemisphere and the main exporter to the Northern Hemisphere, having exported \$164 million FOB from January through October 2010.⁷

Fundación Chile is considered to be a “true institutional innovation” that played a major role in the export discovery process (Agosin and Bravo-Ortega 2009). It demonstrated the importance of government support and public policies, the relevance of fostering entrepreneurship, the role of the private sector and industry associations, the key strategic role of technology transfer, and the importance in building human capital. However, a rather neutral stance (in this period as well as in subsequent years) toward the productive sector did not help Fundación Chile, but the salmon case remains its most successful case.

Although there were some public-private initiatives implemented in this period with efforts to build upon the country’s existing assets and comparative advantages (particularly in the historically prominent agricultural and fishing industries), the state played a subsidiary role. There were some good examples of targeted efforts to develop industries, but overall the fully free market approach resulted in a period with a meager average 1.5 percent GDP growth per capita, along with high inflation levels and several issues in terms of social equity related to education, income distribution and health care.

Section 3. Moving to International Markets

With the return to democracy in 1990, the ruling coalition set goals to increase growth levels and improve the population’s social and economic situation.⁸ A set of policies was implemented to stabilize the macroeconomic environment, supervise capital markets, regulate monopolies

⁶ See SalmonChile, www.salmonchile.cl/frontend/index.asp.

⁷ See National Customs Service, http://www.aduana.cl/prontus_aduana/site/edic/base/port/inicio.html.

⁸ The Coalition of Parties for Democracy (*Concertación de Partidos por la Democracia*, also known as *Concertación*) is a group of center-left parties founded in 1988 to face the plebiscite of 1989 proposed by the military regime. From 1990 to 2010, all presidents belonged to a party in the coalition. In a sense, the coalition’s rule for two decades and its presence in Congress—where it tends to vote as a block on major issues—has allowed some level of continuity in the public policy process.

and control volatility. In terms of a growth strategy, the government focused on increasing productivity through export growth.

To strengthen Chile's exports and its position in the world economy, the government adopted a set of programs in the 1990s that targeted increasing productivity and facilitating access to international markets. This twofold strategy first consisted of programs supporting the creation of small and medium-sized enterprises (SMEs) and facilitating their access to financing. Secondly, the government initiated an aggressive strategy to fully integrate into the world economy by negotiating free trade agreements, lowering tariffs and therefore facilitating access to untapped and bigger markets for the new and more diversified types of exports. Among the players involved in these programs, CORFO had a central role in supporting SMEs and facilitating access to financing. Other key players were the General Directorate for Foreign Economic Affairs (DIRECON) and ProChile in charge of negotiating trade agreements and reaching new export markets.

The main challenges for the SMEs were based on the restrictions to access the factor market due to lack of information, externalities, economies of scale and others (Alarcon and Stumpo 2001). To this effect, CORFO, the Technical Cooperation Service (SERCOTEC) and other agencies implemented a three-tier program. The first tier would be in charge of technical assistance with consultants and experts. The second had SERCOTEC and other accredited agents oversee information about the different existing support programs, as well as helping SMEs navigate the creation process and submit fund applications, and then assisting in the use and management of these resources. In the third tier, CORFO oversaw regulating the instruments, designing the contracts, distributing funds and evaluating results.⁹

In terms of access to international markets, in the early 1990s DIRECON began negotiating free trade agreements (FTAs) to lower trade barriers and open new markets. Along with other investment, trade and double taxation agreements, Chile created a stable, transparent legal framework in which to operate that encouraged trade and investment. Today Chile has trade agreements with 57 countries worldwide (three are still pending congressional approval and one is under negotiation). These agreements include all of the country's major trading partners and allow access to 86 percent of the world's GDP.¹⁰

These agreements have been important in terms of reaching other markets and fostering foreign direct investment, particularly through tariff dismantling or phasing out schedules. In the case of the Chile-United States FTA, the immediate tariff exemption of more than 97.1 percent of the products generated an increase in Chilean exports to the United States of 31.75 percent from 2003 to 2004, the year the agreement began. By 2006 total exports had more than doubled, reaching \$8.9 billion. In the case of China—Chile's main export market since 2007— exports increased by almost 100 percent from when the FTA went into effect in 2006 to

⁹ The process involved mainly four areas: financing, technical assistance, technology transfer and partnerships. It worked through programs granting credit and subsidies.

¹⁰See DIRECON, <http://www.direcon.gob.cl/pagina/1897>.

2007 from \$4.9 billion to \$9.6 billion; that amount reached \$11.5 billion in 2009.¹¹ Although most of the exports to the United States and China are mining products, the industrial and agriculture sectors have increased exports to these markets as well.¹²

Overall, the policies implemented in the 1990s and first half of the 2000s focused on increasing productivity and international trade without favoring any specific sectors over others, although some emphasis was placed on the use of technology in the productive process. Industries such as wine, pork and poultry flourished in this period, all of which in some way or another used or benefited from these programs. However, it's important to note that the policies implemented in this period were mainly composed of horizontal ones—with only a later addition of vertical policies after the recommendations of NCIC; in a way this continued the previous period's notion of state neutrality toward the productive sector.

The following table provides a summary of some of the main agencies and programs implemented from 1990 to 2010 (in alphabetical order):

Table 1: Main State Agencies and Instruments

	Main Mission	Instruments
BancoEstado	Provides financing to SMEs	As a government commercial bank, it provides credit to SMEs otherwise considered too risky to be given credit in commercial banks. It does so through the FOGAPE program, which serves as a guarantor in the credit process.
National Commission for Scientific and Technological Investigation (CONICYT)	Improve human capital and strengthen the scientific and technological base	Founded in 1967 as part of the Ministry of Education, it operates through 11 programs aimed at improving Chile's knowledge-based human capital through research and development (R&D). It is a key player, managing an average of 42 percent of the total funds allocated to the National Strategy for Innovation and Competitiveness.
CORFO	Supports entrepreneurs, provides funding, and promotes	It provides horizontal support to all sectors through an array of programs, some of which are programs working with small providers (Supplier Development Program-PDP). It fosters strategic alliances between

¹¹ See National Customs Service, http://www.aduana.cl/prontus_aduana/site/artic/20080328/pags/20080328122349.html.

¹² Now that this network of agreements is in place, Chile is entering in a second stage and making efforts to take advantage of them by engaging in productive value chains. This initiative actively involves the private sector in order to build business alliances in the production process with countries with which Chile has trade agreements. The process involves three stages: importing materials or parts from a partner country, transforming them into a final product, and exporting it to a third market with which Chile also has a FTA. Since the parts or materials need to be transformed in Chile into a final product in order to qualify with rules of origin provisions, the country of origin benefits by reaching other markets, and Chile moves up the value chain and away from commodity exports.

	innovation	SMEs (PROFO) improves management quality and productivity (FAT). It also supports technical assistance to encourage SMEs to get certified with international standards (FOCAL).
CORFO-GIF	Provides financing to SMEs	It provides access to financing for SMEs or people who do not qualify for loans from commercial banks. It does so by issuing debt instruments and placing them in the market. The funds available do not target specific sectors or clusters.
CORFO-INNOVA	Supports innovation	With the creation of the CNIC, this agency supports innovation programs with a high technological component through seed capital, connecting with angel investors, providing technical assistance, and other types of subsidies.
CORFO-InvestChile	Attracts foreign investment in high technology	This was created in 2000 to encourage FDI focusing on assisting technology-intensive companies that relocate to Chile. It offers economic incentives and assistance throughout all stages of development and start-up. Some companies established through the implementation of this program are Delta's call center, Yahoo, JP Morgan and McAfee.
Foreign Investment Committee	Attracts FDI and positions Chile as an investment platform	This administers the contracts through which FDI is materialized and promotes Chile as a stable, modern, open economy for investments. ¹³ It also promotes Chile's trade network through which investors can operate to reach other markets.
DIRECON	Negotiates and administers Chile's trade agreements	Specialized teams negotiate and administer free trade agreements and other economic or association agreements.
ProChile	Supports exporting efforts of SMEs	This promotes Chilean products and services through a network of 56 offices in the world. It co-finances participation in trade shows, identifies business opportunities, and provides technical assistance to exporters.
Ministry of Agriculture - FIA	Supports innovation in agribusiness	The agency provides support through financing and technical assistance to projects and businesses incorporating higher technology into their productive process.
Ministry of Agriculture -	Support small agricultural family-	Created in 1962, it provides micro-credits to rural, small family-owned businesses in order to achieve

¹³ Most of the FDI that materializes in Chile enters through Decree Law 600 (DL 600), whereby there is a subscription of a contract between the investor and the state of Chile that grants both parties rights and obligations that cannot be changed or rescinded unilaterally. It is governed by principles of nondiscrimination, nondiscretionary treatment and economic freedom.

INDAP	based businesses	sustainability and increase competitiveness in the national and international market.
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Section 4. The Role of Resource Windfalls in Chile’s Competitiveness Strategy

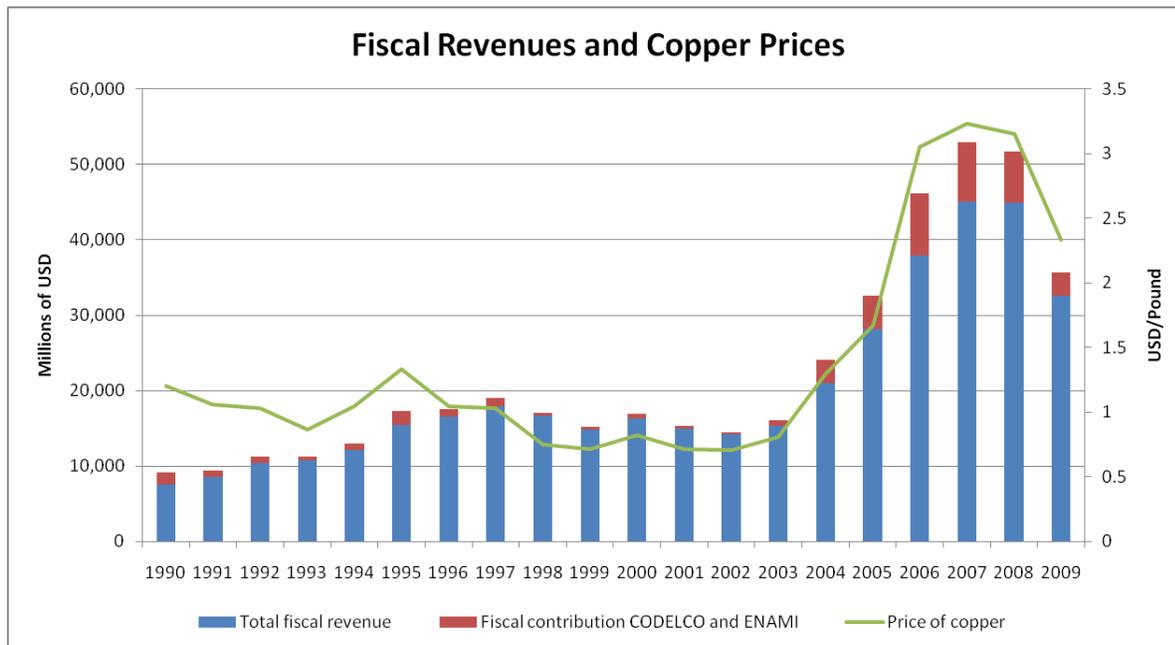
From 1990 toward the end of the decade, Chile managed to lower inflation rates from 26 percent in 1990 to 3.3 percent in 1999, and GDP had grown at an average of 6.4 percent annually, having reached a high of 12.3 percent in 1992. As consequences of the return to democracy, the liberal policies and the stable character of the economy, Chile received a big flow of FDI and a boost in international trade. The new millennium got off to a good start. Yet there were still big challenges in terms of competitiveness and resource dependence if Chile wanted to achieve economic development and emulate the success story of countries that once shared a similar economy, like Australia, New Zealand, Ireland and Finland.

Acknowledging that resource windfalls can be used for long-term economic development programs, policymakers started discussing a set of reforms in the first half of the 2000s that would allow the state to manage cyclical changes in the price of copper. In 2006 a new royalty on mining activities took effect that allowed the state to take part in the cyclical windfall, particularly of copper and, more recently, molybdenum prices.¹⁴ Along with the instatement of other laws, the increase in state revenues allowed the creation of three funds that would make a big impact on Chile’s public policy: the Economic and Social Stability Fund (ESSF), the Pension Reserve Fund (PRF) and the Innovation for Competitiveness Fund (ICF).

Chile has no earmarks, and therefore the revenues collected through the royalty law are not previously allocated to these funds. However, it is clear that this was made possible through the increased fiscal revenues that stem from the law. With copper and molybdenum prices at all-time high prices, along with the new royalty law, fiscal revenues increased considerably since 2004. It is worth noting that higher contributions are made by the state-owned companies than by the private sector under the royalty law. On average, contributions from CODELCO and ENAMI to total fiscal revenues between 2004 and 2009 amounted to 15.72 percent, having reached a high of 22 percent in 2006. The chart below shows the evolution of fiscal revenues and the share coming from CODELCO and ENAMI in relation to copper prices.

¹⁴ The way the royalty law operates is through a progressive tax system applied according to annual sales according to three categories. In the first case, mine operators with sales of more than 50,000 MFT are taxed at 5 percent. Companies with sales volumes equal or less than 50,000 MFT and more than 12,000 MFT have variable tax rates according to a bracket system that varies from 0.5 percent to 4.5 percent. The third case of mine operators with annual sales equal or less than 12,000 MFT are not subject to tax at all. The law applied to all companies except to those with sales of more than \$50 million that had a valid contract with the state under Decree Law 600 until December 1, 2004. These investors could apply to a tax invariability regime for a period of 15 years in exchange of submitting their yearly financial statements for external audit.

Figure 1: State-Owned Copper Companies and Total Fiscal Revenues



Source: COCHILCO, *1990-2009 Yearbook: Copper and Other Mineral Statistics* (calculations by author).

In this context, the ESSF was created in 2007 with the objective of financing possible fiscal deficits and/or to amortize public debt, therefore avoiding the effects of any economic or financial downturns stemming from the world economy or the volatility of state income from copper or other sources. Its initial asset was \$2.58 billion, most of it inherited from the old Stabilization from Copper Revenues Fund. These funds are administered by the Central Bank, which invests the money in international markets in low-risk instruments.¹⁵ The ESSF played an important role in financing the stimulus package to face the world recession in 2009 and the earthquake recovery plan in 2010.

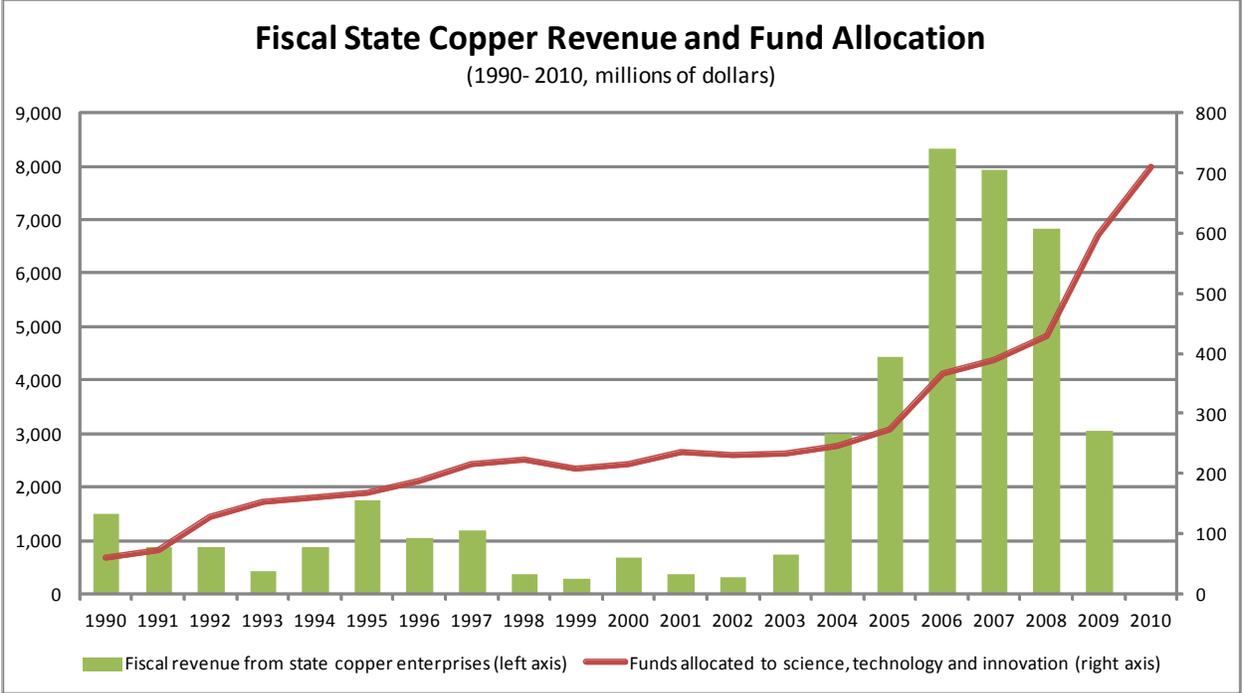
The PRF was created in 2006 with an initial asset of \$604.5 million. It is designed to finance programs introduced by pension reform targeting the increasing expenses of the aging population and covering basic old age and disability solidarity pensions. Each year the state allocates a minimum amount of 0.2 percent and up to 0.5 percent of the previous year's GDP to this fund. The funds are administered by the Central Bank the same way as the ESSF.

The ICF stems from the creation of the NCIC in 2005, a public-private advisory board for the president of Chile that does not have enforcement powers. Its main goal was to create a

¹⁵ Investments are made in instruments such as sovereign funds, money market instruments and/or sovereign funds indexed to inflation, and the assets are placed in U.S. dollars, euros and Japanese yen. The administration of these funds is done in a thoroughly transparent manner and all the financial statements are publicly available on the Sovereign Funds site (www.mhda.cl).

National Strategy of Innovation for Competitiveness (NSIC) for the next 15 years providing a vision of the role that Chile’s productive sector should have in the world economy.¹⁶ In order to implement the strategy, the ICF was created in 2006 and became the main instrument through which the state manages and funds the initiatives for innovation and competitiveness. Each year Congress allocates funds to the ICF while discussing the national budget. The following chart depicts fiscal revenues collected from the two state copper companies from 1990 to 2010, and the total investment in the ICF and technology and science programs.

Figure 2: Fiscal Revenues from State Copper Companies and Fund Allocation to ICF and Programs on Science and Technology



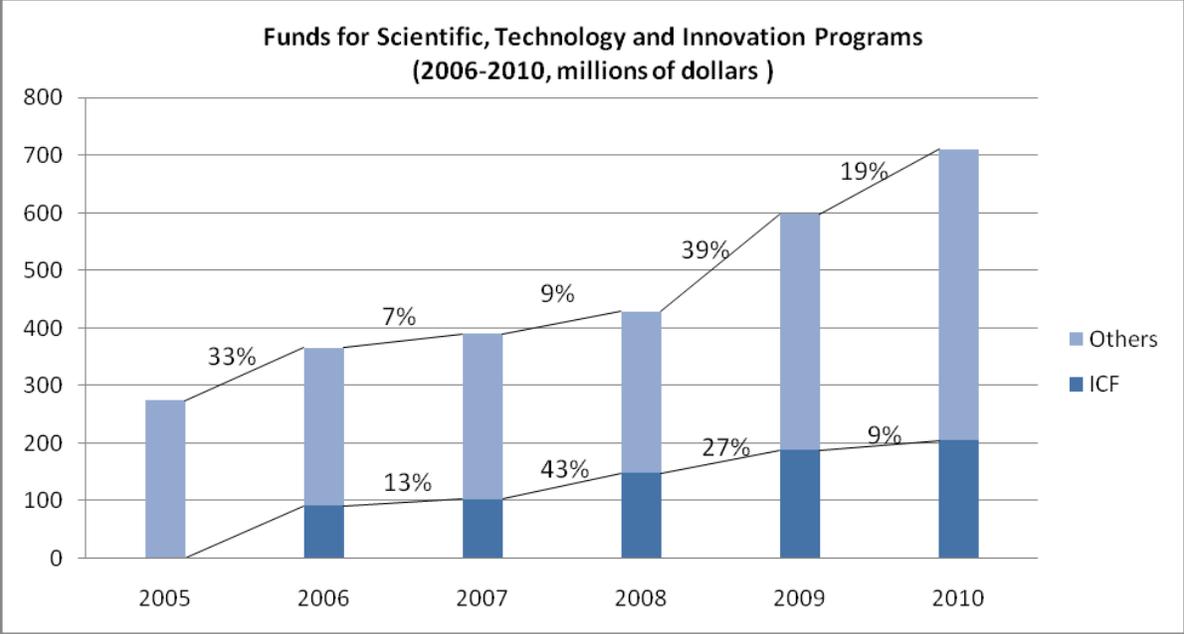
Source: Author’s calculations based on information provided by the ICF.

The ICF works by allocating funds to other government agencies, among which the most important are CONICYT and CORFO’s Innova Chile program. CONICYT manages an average of 42 percent (the highest being 49 percent in 2010) of the total funds for innovation and competitiveness, used to carry out different programs for science and technology R&D. Innova Chile is the other major player implementing vertical policies in support of innovation programs with high technological components through seed capital, connecting with angel investors,

¹⁶ The creation of the NSIC is an example of the continuity in the coalition’s government, since it was created in the last year of President Ricardo Lagos’s administration and fully implemented in the first year of President Michelle Bachelet’s term.

providing technical assistance and other types of subsidies. Additionally, Congress allocates part of the state's budget to other programs as well, substantially increasing the amount of public investment in innovation projects. The following chart depicts the total amount of funds for programs in science, technology and innovation; they spiked in 2006 as the NCIC's recommendations started to take effect.

Figure 3: Transfers to Innovation and Competitiveness Fund and Other Programs in Science, Technology and Innovation



Source: Author’s calculations based on information provided by the ICF.

The NSIC aimed to increase Chile’s knowledge-based productivity while achieving long-term growth in a sustainable, socially equalitarian manner. It was built upon the idea that there was no need to move away from Chile’s competitive advantages in natural resources and looked up to countries such Finland, Sweden, Australia and New Zealand that, although rich in natural resources, had managed to achieve high growth levels (Eyzaguirre, Marcel, et al. 2005). When compared with Chile, policymakers considered that these other countries had skilled human capital. Secondly, they had innovative capacities and applied new technology in their productive process, facilitated by high investments in R&D. Third, they had solid institutions and economic incentives that could foster and promote entrepreneurship and innovation. The strategy was built upon those three principles, rather than on specific productive sectors. It therefore “rejects the notion of a natural resource course and puts more emphasis on the how than on the what” focusing on adding value to existing productive sectors rather than moving to new ones (Agosin, Larrain and Grau 2009).

On that basis, the first stage for the creation of the NSIC recommended a research study to the Boston Consulting Group in order to identify key competitive sectors with potential for growth. There was an active participation from council members and representatives from different sectors in order to identify the best strategy to move forward. As a result, the council presented two white papers identifying 11 clusters in which Chile had a competitive advantage and upon which it would be able to build a new development strategy. It is based upon a subsidiary role

of the state operating in partnership with the private sector creating a new economic model in which higher levels of competitiveness are based on knowledge, innovation and human capital. The goals were to achieve the following by 2021: have a per capita income of \$25,000 with levels closer to developed countries; increase Chile's contribution to total-factor productivity; have 80 percent of the population enrolled in secondary education (in the 18- to 24-year-old group); reach 2.5 percent of GDP in R&D expenditures; increase diversification according to international rankings; and improve Chile's place in relevant international competitiveness indices.

The cluster's selection process started with around 70 sectors, later reduced to 31 and then to 11 based on the following four variables: current importance in GDP; 10-year forecast on the importance a sector might have on GDP; opportunities and challenges that each sector presents (an analysis of geographical location, presence of natural resources, human capital, FDI, access to technology, infrastructure, associability, environmental sustainability, regulatory framework and others); and degree of state intervention needed to fulfill the sector's potential.¹⁷ The report originally recommended working on 11 clusters that later merged into seven: aquiculture, fruit cultivation, mining, swine and aviculture, global services, specialty tourism and functional foods.¹⁸ Logistics and transport, telecommunications and financial services have been placed as a strategic transversal platform rather than a cluster.

Most of the existing horizontal programs that support SMEs and their exporting efforts were kept in place. But the focus on innovation and technology provided new incentives for entrepreneurs and SMEs belonging to the group of selected clusters, particularly through the implementation of Innova Chile's vertical policies. In March 2010 an evaluation report the NCIC recommended to an international panel stated that the role of the NCIC had been a key factor in achieving growth and higher levels of innovation. However, it concluded that there were still major challenges in terms of diversification and called for a stronger role of the NCIC in coordinating the different public policies in place. This topic is discussed in more detail in Section 6.

Section 5. Export Performance and Diversification: the Good, the Bad and the Ugly

After a slow performance in the 1970s and 1980s, Chilean export growth boomed in the early '90s due to a combination of factors and high capital influx in FDI that affected export capacity and the exchange rate. The 1990s had an annual average growth rate of 9 percent, and exports of nontraditional products accounted for the fastest growing sector, at an annual average of 13 percent.¹⁹ Overall, the initial dynamism gradually declined with the overvaluation of the peso

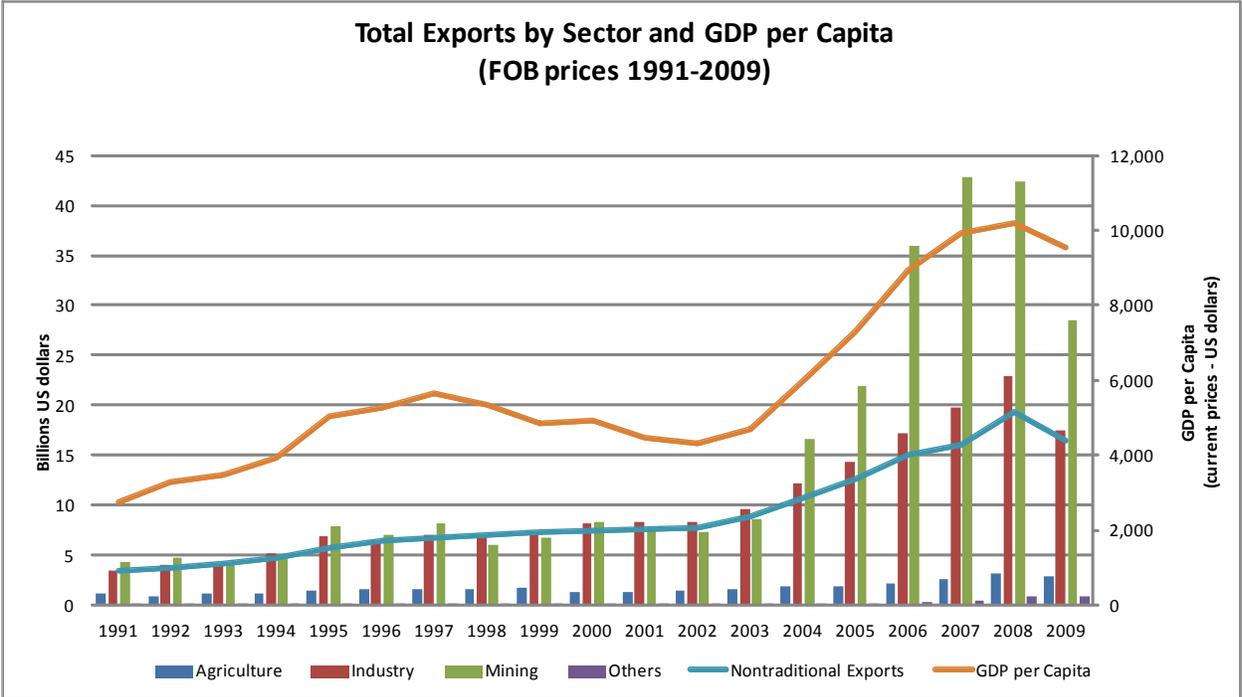
¹⁷ Arias, Hugo, ed. 2008. *Hacia una Estrategia Nacional de Innovación para la Competitividad, Volumen II*. National Council of Innovation for Competitiveness. .

¹⁸ These are also called health foods for their nutritional value or disease-preventing properties. With the help of biotechnology and advanced chemistry, these could later evolve into biomedicine.

¹⁹ Nontraditional products are defined as all products other than copper, fish meal, cellulose, iron, nitrate, metallic silver, oxide and ferromolybdenum, gold minerals, round wood, sawn wood and methanol.

from 1996 to 1997, but regained force from 2003 to 2004 with higher commodity prices and the opening of new export markets (Ffrench-Davis 2002). The following graph depicts GDP per capita and exports in the main sectors of the economy, namely agriculture (including silviculture and extractive fishing), industries (which includes processed foods and beverages, chemistry and processed goods deriving from the forestry industry like chips and furniture) and mining (including all mineral and nonmineral sources).

Figure 4: Total Exports by Sector and GDP per Capita



Source: Department of Trade Information, ProChile, and World Economic Outlook Database, IMF.

Export growth is also reflected in the data showing an increasing number of exporting firms, products and market destinations where there is an overall positive trend since 1990. In two decades the number of products exported rose 110 percent, the number of exporting firms rose 83 percent, and the exporting markets increased up to 56 percent; they now reach 191 markets.

Table 2: Number of Products, Markets and Firms

	Products	Exporting Markets	Exporting Firms
1975	200	50	200
1987	1,400	120	3,666
1990	2,300	122	4,100
1991	3,278	122	5,349
1992	3,433	147	5,445
1993	3,510	145	5,496
1994	3,622	141	5,844
1995	3,647	157	5,817
1996	3,890	168	5,839
1997	3,756	168	5,754
1998	3,828	170	5,840
1999	3,788	174	6,022
2000	3,749	175	5,666
2001	3,749	173	6,009
2002*	5,160	158	6,118
2003	5,232	165	6,435
2004	5,238	171	6,636
2005	5,303	184	6,880
2006	5,215	181	6,969
2007**	5,258	189	7,915
2008	5,156	185	8,240
2009	4,981	191	7,517

* In 2002 a new entry in the national classification system was introduced, which explains the sharp increase that year.

** Starting in 2007, a new classification system entered into force.

Source: *Análisis de las Exportaciones Chilenas*, 2009, ProChile.

Policies implemented in the 1990s aimed at correcting market failures by fostering entrepreneurship and innovation, facilitating access to capital, and lowering barriers to export markets, all of which are key engines for this growth. However, it is interesting to note that in 2009 out of a total of 7,520 exporting companies, the 10 exporting the highest amounts accounted for 45.2 percent of all export values. Eight of these are in the mining sector, and the other two are in the forestry and cellulose industries. From the rest of the 7,510 companies, 55

percent belong to the lowest bracket (companies that export goods worth up to \$100,000 and account for only 0.2 percent of total export value).²⁰ How does this reflect in Chile's diversification index?

To analyze the level of export diversification, we use the Herfindahl-Hirschman Index (HHI), which measures industry concentration.²¹ Table 3 depicts Chile's HHI from 1990 to 2009, along with three other countries. Including all sectors of the economy, Chile shows a trend of diversification (other than a slight increase in 1995 to 1997) up to 2004 when the trend reverses. The gap from 1995 to 1997 and the trend observed since 2004 could be explained by the increase in the price of copper (more than \$1 a pound in the 1990s and later between \$1 and more than \$3 from 2004 to 2008). A second exercise isolating copper exports draws a different picture in which we see a slight decrease in the index showing that the country is slowly moving toward a more diversified economy.

Table 3: HHI for Chile and Selected Countries

Year	Chile without Copper	Including All Sectors			
		Chile	Australia	Ireland	New Zealand
1990	0.28	0.30	0.18	0.19	0.26
1991	0.27	0.26	0.17	0.19	0.26
1992	0.28	0.26	0.16	0.19	0.27
1993	0.25	0.24	0.16	0.19	0.26
1994	0.24	0.24	0.15	0.20	0.24
1995	0.26	0.26	0.15	0.21	0.24
1996	0.25	0.25	0.15	0.24	0.25
1997	0.23	0.25	0.15	0.24	0.25
1998	0.23	0.23	0.15	0.26	0.26
1999	0.23	0.24	0.15	0.28	0.25
2000	0.21	0.24	0.15	0.29	0.24
2001	0.21	0.23	0.15	0.30	0.26
2002	0.22	0.23	0.15	0.31	0.25
2003	0.22	0.22	0.14	0.29	0.26
2004	0.22	0.25	0.15	0.29	0.26
2005	0.21	0.26	0.16	0.30	0.27
2006	0.20	0.29	0.16	0.30	0.26

²⁰ ProChile, *Análisis de las Exportaciones Chilenas 2009*.

²¹ The Herfindahl-Hirschman Index is defined as $HHI_j = \sum_i \left(\frac{x_{ij}}{x_j}\right)^2$ where x_{ij} is the export value of product i by country j , and x_j represents the value of total exports of country j . A value closer to zero indicates a higher level of diversification of exports, and a number closer to one indicates higher levels of export concentration.

2007	0.20	0.30	0.16	0.31	0.26
2008	0.20	0.27	0.20	0.33	0.26
2009	0.22	0.27	0.19	0.37	0.28

Source: Author's calculations based on data from UN Comtrade according to the Standard International Trade Classification, rev.3.

Although the industries that do not involve copper have been on a path to diversification, we still see a high proportion of these exports based on agriculture and natural resource-related industries. Considering Chile's total export basket, the path to diversification came to a halt after 2003. It is possible that higher copper prices experienced from 2004 onward may have had negative effects in export performance due to exchange rate appreciation. In terms of discovery and diversification, a study by Agosin and Bravo-Ortega (2007) found that "the real exchange rate had powerful lagged effects on export discoveries," when the most prolific period was encouraged by a competitive exchange rate.

This has been a long-standing issue for Chilean exporters, but the Central Bank—which implements its monetary policy based on inflation targeting—is cautious and rarely intervenes in exchange rate matters other than in exceptional situations. These pressures could be signs of a Dutch disease affecting the export capacity of the country, hindering incentives to move to other more sophisticated productive sectors.

The type of products being exported are relevant as shown in a study by Hausmann, Hwang and Rodrik (2005), in which they prove that "some goods are associated with higher productivity levels than others and the countries that latch on to higher productivity goods will perform better." They show there is a correlation between higher productivity goods and higher GDP per capita. For this purpose, they create an index named EXPY which stands for the income/productivity level associated to a country's export; a lower EXPY shows an export basket mostly associated with lower levels of income. In Chile's case, its EXPY is relatively low, particularly in comparison with other resource-exporting countries such as Canada, Australia and New Zealand.

Another research study by Hausmann and Klinger (2007) found that even without considering copper, Chile's EXPY falls short in comparison to other countries. This suggests that copper is not to blame for the low levels of export sophistication, but that Chile has maintained its export basket that is mostly composed of products associated with a lower income, such as raw materials, forestry and agriculture.

In terms of poverty levels, according to data collected every three years by the Ministry of Planning (MIDEPLAN), figures have gone from 38.6 percent of the population living below the poverty line in 1990 to its lowest level at 13.7 percent in 2006 and up three years later to 15.1 percent. Income distribution, however, has remained relatively unchanged with a Gini Index for 2009 of 0.53, in which the 10th highest percentile of the population has 39.2 percent of total

income.²² This issue remains one of the major challenges that need to be addressed in the implementation of Chile's social and economic development policies.

Overall, there have been significant achievements in the past decades. However, the country still seems to be lagging. The slow achievements in terms of diversification and sophistication levels of the export basket suggest that the implementation of vertical policies has not been efficient enough. There are more export products and companies than ever, but these have not been able to vertically move within their clusters to more sophisticated ones. Although there were certain clusters that were identified as priorities, not enough emphasis has been made to support the development of other sectors with higher human capital.

Section 6. Conclusions and Policy Recommendations

Chile joined the Organisation for Economic Co-operation and Development (OECD) as a full member in January 2010 after a longstanding process of building a stable political environment, solid institutions and sound macroeconomic policies. This paper provides an overview of the process Chile went through to get there and the quest to find the right approach to manage natural resources, diversify the productive base, interact with international markets, and leverage the role of the state and the private sector. In this process the country regulated properly, saved revenues stemming from natural resources, and implemented a strategy setting concrete goals for the future. Although there are still many challenges ahead, we believe that the following points were key in fostering Chile's current development levels:

- The state had a key role in the creation of CODELCO and in the management of profits stemming from natural resources. The accountable and transparent management of these resources allowed the creation of funds of strategic importance to foster economic stability, improve social welfare and encourage innovation for competitiveness. Reforms aimed at taking better advantage of copper windfalls for development purposes have been key in offsetting economic downturns and fostering higher levels of competitiveness.
- There was consensus on the importance of reaching international markets in order to achieve higher levels of growth. The twofold strategy to strengthen the productive base through SMEs and then facilitating their access to foreign markets proved to be effective. The wide network of FTAs facilitating market access through lower tariffs became crucial for Chile's full integration into the world economy. Additionally, Chile's political stability, strong macroeconomic policies, solid institutions and independent central bank allowed the creation of a stable and predictable social, economic and

²² The poverty line calculation is based on the cost of a basic food consumption bundle. That cost allows classifying households as indigent, nonindigent poor and nonpoor. For 2009 the lines were traced according to the following monthly income values (\$1=507 Chilean peso, per the average exchange rate in November 2009): poverty rural \$85, poverty urban \$126, indigence rural \$ 49, indigence urban \$63. Source: National Socio-economic Characterization Survey(CASEN 2009),

financial environment that served to create confidence in trading partners and attract high flows of FDI.

- The creation of the NCIC and the consensus of the importance placed on innovation, science and technology constitute an important step in moving toward higher value-added production. The need to diversify and to move to a more sophisticated, productive base was agreed on by government, private sector and academic experts, and this was a key point for the implementation across the board of the national strategy.
- Overall, there is an understanding of the role of the private sector as an engine for growth and the state's role as facilitator. These public-private partnerships for development operate in several areas (i.e., FTA negotiations and implementation of the NSIC) when there is a clear message in terms of a private and public sector working in the same direction committed to achieve the same goals.

However, since Chile is a resource-abundant country, its exports have been affected by high copper prices and currency appreciation. Our findings show that despite the efforts, there's still a strong need to achieve higher levels of diversification and sophistication in the economy. The discussion of whether horizontal or vertical policies—or a combination of both—are more effective is still subject to discussion. However, we offer five points that we consider fundamental obstacles in need of improvement: R&D spending, human capital, SME, birth/death ratio and institutional coordination.

- While OECD countries spend an average of 2.3 percent of GDP on R&D, Chile spends only 0.67 percent.²³ There is a compelling need for higher investment in R&D reaching levels closer to countries such as Portugal, Norway and Canada, which invest from 1.5 percent to 2 percent of GDP. While most R&D is financed by the public sector with just minor involvement of private firms, in countries like South Korea the private sector accounts for three-quarters of such expenditure (Kharas, Leipziger, et. al. 2010). A recent tax exception for private firms investing in R&D is a first step in this direction.
- Related to R&D is the lag in education and shortcoming of human capital. Special attention has been paid to training teachers, computer science and English as part of the regular curricula. However, Chile still faces obstacles in educational quality and equity: Students fare poorly in international standardized tests, and there are significant differences in results according to their socioeconomic background.²⁴

²³ *OECD Factbook 2010: Economic, Environmental and Social Statistics.*

²⁴ The results of the 2003 Trends in International Mathematics and Science Study (TIMSS) ranked Chile in the 39th place out of the 45 participating countries, and the OECD's 2009 Programme for International Student Assessment (PISA) ranked Chile 44 out of 65 countries.

- In terms of SME participation, there's a need to strengthen their assets and to lower existing high birth/death rates. More thorough, tailored and coordinated programs need to be implemented in order to support a higher level of SME participation in the economy. Targeted programs attracting venture capital and FDI could benefit a more diversified base of companies focusing on innovative and knowledge-based projects.
- Part of the problems that many SMEs face is the complex array of public and semipublic programs, instruments and subsidies available that lack proper coordination and follow-up. Some of the programs are duplicated in different state agencies in a system that is sometimes hard to navigate. A more cohesive structure would allow more coordination, closer monitoring and more efficient allocation of funds.
- One of the obstacles of having a more coordinated structure could be based in the advisory and nonbinding character of the NCIC. Some policymakers and academics favor the idea of having a council with binding powers, remaining a public-private nonpartisan entity in order to allow continuity in long-term goals. For the time being, the NCIC continues to be an advisory board for the president, but examples of similar, yet stronger agencies suggest that a different model may prove to be effective.

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