The Use of Intellectual Property in Chile*

INAPI-WIPO

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Executive Summary

The past decades have seen profound changes in the use of the intellectual property (IP) system worldwide. Several forces have driven these changes. First, investment in the creation of intangible assets has markedly increased. Second, the increased international integration of national economies has prompted companies to obtain IP protection more often in multiple jurisdictions, including a number of middle income economies. Third, national intellectual property policies have undergone substantial reforms. Fourth, technological advances and evolving business models – driven by technological opportunities, complexity and competitive pressures – have led companies to adapt their innovation management, often leading to more active IP management and filing strategies.

The resulting changes in the IP landscapes have prompted numerous new questions on the role that the IP system plays in the innovation process. So far the economics literature has heavily focused on high income countries and does not provide much evidence on the role of IP in middle income economies. There appear to be two underlying reasons. First, in absolute terms, these countries have seen the largest increases in IP use and questions of IP protection have gathered considerable public interest. Second, efforts by IP offices in high income countries and academic researchers have led to the creation of micro-level patent and trademark databases that have enabled a wide range of empirical investigations. To date, no comparable data infrastructure exists for middle income economies.

This study reports on the outcome of a joint effort by the National Industrial Property Institute of Chile (INAPI) and the World Intellectual Property Organization (WIPO) to build a comprehensive database on the use of IP in Chile. This database contains all patent, trademark, utility model, and registered design filings for Chile over the period 1991-2010. One key contribution of the data construction work was to harmonize applicant names and uniquely identify applicants for all four forms of IP. In addition, the data were matched to firm-level data of the National Statistical Institute (INE) – specifically, the manufacturing census (ENIA) as well as five waves (1997-2008) of the Chilean innovation survey (INNOVACION).

Chile offers an interesting setting to study the role of IP in the innovation process of a middle income economy. Chile has achieved considerable economic growth over the past decades, but still relies heavily on commodities and agricultural products as its export base. Chile has also proactively integrated into the world economy through a large number of bilateral and regional trade agreements. It has modified its IP law several times during the past two decades, strengthening IP protection significantly. Chile also has a large number of research active universities. Shifting the sources of economic growth towards new sectors and gains in economy-wide productivity through innovation is an important imperative for Chilean policymakers.

The new database – henceforth the INAPI-WIPO database – enables new investigations that can deepen our understanding of the role that patents play in Chile's innovation

system and explore new questions that have not been considered so far. As a first step, this paper provides a descriptive overview of IP use in Chile.

Our analysis shows that the number of patent filings has more than tripled since the IP law was enacted in 1991. Nevertheless, like in most other middle income countries, patent use as reflected in the total number of filings – slightly over 3,000 in 2008 – is still relatively modest. In contrast, trademarks are used intensively. Filings increased from slightly less than 30,000 per year in 1991 to more than 44,000 in 2010. This puts Chile among the top trademarking countries relative to GDP worldwide. The use of utility models and industrial designs remains low throughout the two decades, even relative to countries of similar income levels.

Our data reveal that non-residents file over 90% of patents in Chile. Multinational pharmaceutical and chemical companies file most of these patents – in contrast to developed countries, where so-called complex technology industries account for most patent filings. Industrial designs are also overwhelmingly used by non-residents, with only 16% of filings coming from residents. Trademarks, in contrast, are overwhelmingly filed by domestic entities and so are utility models. Trademarks are widely used across the economy. Agricultural products account for the largest share of trademark filings, a category which includes wine and fruit products. There is also a large share of trademarks related to pharmaceuticals.

The great majority of patents are assigned to companies. However, a considerable number of Chilean universities file for patents and they are among the top resident patentees. Other top resident patentees are companies in the mining industry and chemical and consumer product companies. Trademark filings come from both companies and individuals. In contrast to patents, several Chilean companies are among the top trademark filers, mostly companies in the consumer goods industry.

Looking at the origin of non-resident filings, the data show that the great majority of non-resident filings across all four IP forms come from the United States and Europe. Other South American countries, in contrast, account for only a small share of filings. For patents they represent only 2% of all filings between 1991 and 2010, whereas the US and EU combined account for more than 80% of filings. Pharmaceutical and consumer goods companies account for most of these patent filings.

The analysis also looks at the joint use of different IP rights. More than 90% of applicants only apply for trademarks and less than 5% of applicants apply only for patents. Applicants that apply for more than a single type of IP right are rare; they account for only 2% of applicants. The joint use of different IP rights is limited to patents and trademarks as well as trademarks and industrial designs. A breakdown by applicant type shows that a large share of universities files for both patents and trademarks.

The data show that trademarks covered, on average, in 2.5 Nice classes until 2005. Due to a change in the law in 2005, the average number of classes declined sharply to 1.3 classes in 2006. A fall in the average number of product classes explains this decline. The average number of services classes, in contrast, steadily increased over time. This

reflects the nature of the legal change in 2005, which did not affect filings in service classes.

The INAPI-WIPO dataset can identify co-assignment patterns in patent filings. Co-assignments are interesting as they reveal underlying research co-operation between universities and industry as well as among product market competitors. Like in other countries, co-assigned patents account for a small share of patent filings in Chile – on average less than 3% between 1991 and 2010. We find that most patents are co-assigned among non-resident companies and in fact there is little evidence for international cooperation. The share of co-assigned patents with resident and non-resident assignees is only 8%. Co-assignments involving universities account for around 20% of co-assigned patents, which suggests a significant amount of university-industry collaboration.

Finally, we analyze international patent filings that have at least one Chilean assignee or inventor. We show that only a small fraction among resident patentees also files for patent protection abroad. Nevertheless, the share increased from 2% in 1992 to around 10% from 2006 onward. The data also show that half of the inventions underlying international patent families assigned to Chilean residents originate in Chile. The most important foreign offices of first filing are the US and Europe. Other South American countries, in contrast, are rarely the jurisdiction of first filing. China, Mexico, and South Africa emerge from 2000 onward as important destinations for patents by Chilean applicants. International filings by Chilean residents in most jurisdictions are dominated by patents related to the mining industry and chemicals as well as patents filed by universities.

Overall, this study offers an example of empirical research that can be conducted on the use of IP in a middle income economy once an appropriate data infrastructure has been put in place. It also shows the importance of including other IP rights beyond patents in this type of analysis and of analyzing the use of the different forms of IP in combination rather than isolation.

The descriptive evidence provided in this study provides useful insights in better understanding the role of IP in Chile's economy. Of course, descriptive evidence can only go so far in fully evaluating the effects of IP policy choices on applicant behavior and economic performance. Deeper analysis on the basis of the newly available data infrastructure is needed. Indeed, two analytical studies – on the incidence and effects of trademark squatting as well as on the role of patents in the domestic pharmaceutical sector – are currently under way and will be made available separately.

1. Introduction

The past decades have seen profound changes in the use of the intellectual property (IP) system worldwide. Several forces have driven these changes. First, investment in the creation of intangible assets has markedly increased. For example, global R&D expenditure almost doubled in real terms from 1993 to 2009. Available data similarly suggest rising investment in other intangible assets, such as designs and branding.[1] Second, the increased international integration of national economies – often referred to as globalization – has prompted intellectual property holders to more frequently seek protection abroad and, indeed, in a greater number of countries.[2]

Third, national intellectual property policies have undergone substantial reforms with far-reaching implications on the behavior of IP applicants. International agreements – notably the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) – have been an important driver of legal reforms. As a result developing countries have seen a significant strengthening of IP rights over the past two decades. There have also been increased efforts towards the harmonization of procedural standards and the creation of regional and international filing systems. Technological advances have often contributed to legal reforms, as they created the need to adapt IP policies to the evolving nature of technological progress. Finally, evolving business models – driven by technological opportunities and competitive pressures – have led companies to adapt their innovation management strategies, importantly affecting the way they use the IP system.

The shifting IP landscapes have prompted numerous new questions on the role that the IP system plays in the innovation process. For example, how important are different IP rights for firms to appropriate returns to investments in new technology fields? How do dense patent landscapes for complex technologies affect innovative behavior and commercialization strategies? How can IP offices best manage the growing inflows of applications and promote the delivery of quality services?

A rich economic literature has emerged that offers important empirical perspectives on these and other questions.[3] However, this literature heavily focuses on high income countries and, more recently, also China. This focus appears to have two underlying reasons. First, in absolute terms, these countries have seen the largest increases in IP use and questions of IP protection have gathered considerable public interest. Second, efforts by IP offices in high income countries and academic researchers have led to the creation of micro-level IP databases that have enabled a wide range of empirical investigations. The patent databases published by the National Bureau of Economic Research (NBER) in the United States and the Patstat database published by the

[1] See WIPO (2011a) for a review of the available evidence.

[2] WIPO (2011b), for example, shows that international filings have contributed substantially to the growth in patent applications worldwide.

[3] Chapter 2 in WIPO (2011a) reviews some of the most important studies in the field of patents.

European Patent Office (EPO) are good examples of such efforts.[4] Additional efforts to combine IP data with micro-level information on firm performance and inventor behavior have further enriched the data infrastructure available to researchers.

Equivalent studies on middle income countries – except China – remain scarce.[5] However, such studies are of great interest. Many middle income economies have similarly seen rapid growth in IP use, often driven by both foreign and domestic filings, even if the absolute numbers remain small in a worldwide context.[6] Relative to the size of their economies, certain middle income countries even see more intensive use of IP – especially trademarks – than most high income countries.

Many middle income economies have been able to ignite economic growth on the back of low wages, natural resources, or a combination of both. As these economies continue to develop, they may begin or intensify the development of innovation domestically. The question is which role IP can play in this process – whether it is generated domestically or abroad.[7] The different structure of middle income economies, the evolving nature of innovative activity, and the institutional context suggest that this role differs from that in high income economies. Policymakers in middle income countries thus cannot rely exclusively on the evidence generated in advanced economies in designing IP and innovation policies. They stand to benefit from empirical research specific to their economies.

One critical constraint towards such research has been the lack of an IP data infrastructure. The EPO's Patstat database offers rich unit record patent data for a large number of middle income countries, but it is incomplete for many middle income countries and cannot be straightforwardly combined with other micro data sources. In any case, Patstat only covers patents and utility models. Fully exploiting the potential of IP data requires dedicated investments in new databases.

This paper reports on one such effort undertaken for Chile. As part of a project under WIPO's Committee on Development and Intellectual Property (CDIP), INAPI in collaboration with WIPO created a database that contains all patent, trademark, utility model, and registered design filings for Chile over the period 1991-2010.[8] One key

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[4] See https://sites.google.com/site/patentdataproject/Home and http://www.epo.org/searching/subscription/raw/product-14-24.html.

[5] The patent system of the Republic of Korea has also seen considerable study, but Korea already reached high income status in 1995.

[6] See WIPO (2012) for an overview. China again is an exception, as it emerged as the largest recipient of IP filings for all major forms of IP in 2012.

[7] It is important to keep in mind that there is no one-to-one relationship between IP and innovation. Therefore, IP statistics provide limited information on innovation and broader economic performance. Every IP title describes a different intangible asset. There is a large literature pointing to a highly skewed distribution of those assets. Few patents yield high economic returns. On the other hand, this does not imply that IP statistics have no use. IP activity correlates in meaningful ways with other measures of innovative activity – at the level of firms, industries, and economies. Indeed, IP statistics remain one of the few widely available indicators of innovation available to analysts.

[8] See WIPO document CDIP/5/7.

contribution of the data construction work was to harmonize applicant names and uniquely identify applicants for all four forms of IP. In addition, the data were matched to firm-level data of the National Statistical Institute (INE) – specifically, the manufacturing census (ENIA) as well as five waves (1997-2008) of the Chilean innovation survey (INNOVACION).[9]

Chile offers an interesting example of a middle income country that has achieved considerable economic growth over the past decades, but that still relies heavily on commodities and agricultural products as its export base. Chile has also proactively integrated into the world economy through a large number of bilateral and regional trade agreements. It has modified its IP law several times during the past two decades, strengthening IP protection significantly. Shifting the sources of economic growth towards new sectors and gains in economy-wide productivity through innovation is an important imperative for Chilean policymakers.

Accordingly, Chile has a number of dedicated programs to promote innovation. For example, the Chilean Economic Development Agency (CORFO) currently has over 30 initiatives designed to promote innovation, innovative entrepreneurship, and technology transfer. Chile also has other dedicated innovation funds, such as the Fund for Agrarian Innovation, which has a focus on agricultural innovation. In addition, there is the Fund of Scientific and Technological Development, which seeks to promote R&D projects of universities and public research institutes in conjunction with private companies. Another relevant policy is the Scientific Millennium Initiative, which aims to promote the development of scientific and technological research, through the creation and financing of scientific research institutes.

Existing studies on the Chilean innovation system offer important insights into the determinants of companies' innovative activities as measured in the Chilean innovation surveys. However, as for most other middle income countries, there are few empirical studies on the use of IP that could inform policy. Existing studies typically analyze questions related to IP only in passing, mostly as one aspect among many related to innovation, technology transfer, exporting or productivity. Chile's innovation surveys, conducted from 1992 onwards, offer some information on IP use; however, they rely on respondents' self-reported use of IP and cover only certain segments on the Chilean economy.

The limited empirical literature on the Chilean IP system has been primarily concerned with patents and, in particular, the low use of patents by Chilean residents (OECD, 2007; Amorós et al., 2008; Katz and Spence, 2008). According to the OECD (2007), the low patent intensity in Chile can largely be explained by three factors. First, there is a limited capability in Chile to generate innovative and first-to-the-world products and processes. Second, Chile has an industrial specialization in sectors with a low propensity to patent, such as mining and services. While there is a growing Chilean pharmaceutical industry, it is largely focused on the production of generics and brand drugs under licensing contracts. Third, while Chile has a number of successful exporters, they rely mainly on imported technologies and hence are unlikely to rely on

[9] This report does not include an analysis of the matched data but focuses on an analysis of IP filings more generally.

patents for their business model. The low use of patents by Chilean residents stands in stark contrast to their heavy use of the trademark system. However, despite the large number of trademark applications in Chile, there are no empirical studies on the use of trademarks in the Chilean economy.

The new database – henceforth the INAPI-WIPO database – enables new investigations that can deepen our understanding of the role that IP rights play in Chile's innovation system and explore new questions that have not been considered so far. As a first step, this paper provides a descriptive overview of IP use in Chile.

The paper's discussion is structured as follows. As background, Section 2 will offer a short introduction into the main features of Chile's IP system. The following sections will then discuss different dimensions of IP use – focusing, in particular, on overall trends (Section 3), the origin of IP applications (Section 4), the applicant distribution (Section 5), applicant types (Section 6), filings by technology and class (Section 7), grant ratios and lags (Section 8), IP bundles (Section 9), co-assignment patterns of patents (Section 10), patent filings abroad (Section 11), and additional perspectives on the trademark system (Section 12). A concluding section summarizes the key findings of the descriptive analysis and points to potential avenues for future research. The paper's appendix provides additional details on the legal IP regime in Chile as well as a detailed description of the methodology used to construct the data.

2. The IP system in Chile

The Intellectual property system in Chile is administered by various institutions. The Ministry of Education is in charge of the Copyright Register,[10] the Ministry of Agriculture is in charge of plant breeder's rights as well as in part of appellations of origin for wines and spirits and of undisclosed information regarding agrochemicals.[11] The Ministry of Health is in charge of undisclosed information regarding pharmaceutical products[12] and the Ministry of Foreign Affairs is in charge of international negotiations and of the coordination of an inter-ministerial technical committee for the implementation of international commitments.[13]

INAPI is the main Government agency in charge of industrial property rights since 2009. Besides acting as the register for patents, trademarks, industrial designs, utility models, and appellations of origin, INAPI also functions as a first instance court in opposition and nullity procedures. In addition, it has several other important functions: INAPI is advisor to the President of Chile on all issues concerning industrial property; it is the agency in charge of recommending the accession to IP treaties; and it is tasked with the

[10] The Ministry of Education has an Intellectual Property Department which is part of the Directorate for Libraries, Archives and Museums of the Ministry.
[11] Through the Cattle and Agricultural Service of the Ministry.
[12] The relevant body is the Public Health Institute of the Ministry.
[13] Through the Intellectual Property Department, which is part of the General Directorate for International Economic Relations of the Ministry.

promotion of IP and the dissemination of knowledge, particularly of information that has fallen in the public domain.

The law on industrial property (Law 19.039), which covers trademarks, invention patents, utility models, geographical indications, appellations of origin, integrated circuit topographies, drawings and industrial designs, entered into force in October 1991. Since then the law has undergone three major amendments.

The first amendment (Law 19.996) was published in March 2005 and entered into force in December, 2005. This law adapted Chilean legislation to TRIPS, mainly through changes to opposition proceedings, trademarkable and patentable subject matter, and the statutory lifetime of patents. It also incorporated industrial drawings, geographical indications, appellations of origin and integrated circuit topographies into national legislation. Finally, it also introduced trade secrecy and civil actions for IP enforcement – before 2005, IP infringement was only sanctioned by criminal courts.

The second major amendment (Law 20.160) entered into force in January, 2007. It adapted Chilean legislation to free trade agreements signed since the 2000s. This amendment contains mainly changes regarding cancellation procedures for all IP rights and the definition of subject matter eligible for geographical indications and appellations of origin. It also incorporates sound marks into the law.

The third amendment (Law 20.569) entered into force in February, 2012. This law incorporated certain provisions agreed by Chile through the signature of the Trademark Law Treaty (TLT) and the Patent Cooperation Treaty (PCT).

This section offers a brief description of the legal regime applicable to patents, trademarks, utility models and industrial designs which are covered by the analysis.[14]

Trademarks

Trademarks are defined as signs that distinguish products, services, or industrial and commercial establishments in the market. Since 2007, a trademark can also be used to protect slogans or sounds marks. A trademark can be classified as a word, figurative or mixed mark. Word marks protect a word or words with or without idiomatic meaning or a combination of letters and/or numbers. Figurative trademarks are labels with pictures, images, symbols or drawings. Mixed trademarks are a combination of both word and figurative trademarks – that is, labels that have a word or words with or without idiomatic meaning or a combination of letters and/or numbers, combined with pictures, images, symbols or drawings. Chile is not part of the Madrid System for the International Registration of Marks, which means that non-resident applicants have to file directly with INAPI to obtain a trademark in Chile. Details on the registration procedure for trademarks can be found in Appendix 1.1. Trademark rights last for a period of 10 years from the grant date but can be renewed indefinitely. Unlike some other countries, INAPI does not require the applicant to prove actual use of the trademark, neither at the initial filing stage nor at the renewal stage.

[14] The discussion does not cover geographical indications, appellations of origin and integrated circuit topographies (that is, semiconductor mask protection).

During the application process, third parties can file an opposition during a 30 day period following the publication of the mark. INAPI does not notify third parties who have previous trademark applications or registrations that could justify an opposition.

If no opposition if filed, the total processing time of an application until its registration is approximately nine months. If there is an opposition, the procedure may take on average seven months longer.

A trademark can also be cancelled post-grant. Any person can request the cancellation of a registered trademark. A trademark can only be cancelled within five years after it was registered. This restriction does not apply when a trademark was obtained in bad faith. Details on cancellation procedures are provided in Appendix 1.1. If INAPI cancels a trademark, the trademark is considered void as of the grant date.

If a trademark was dismissed or cancelled due to the existence of a famous and well-known trademark abroad, the owner of the trademark has 90 days to register the trademark. Once the 90 day period lapses, any interested party can apply for the trademark.

According to Chilean law, trademark counterfeiting is sanctioned by both civil and criminal law depending on the type of infringement. Details about the enforcement of trademarks are provided in Appendix 1.2.

Patents

The most important changes to the scope of patent protection occurred in the area of pharmaceuticals. In 1991, active chemical and pharmaceutical ingredients became patent eligible, whereas before 1991 only the production process could be patented. The amendment in 2005 restricted the patent eligibility of new uses of known substances. Prior to 2005, new uses were patentable if they solved a technical problem or changed the essential qualities of the invention. Following the amendment, the law requires that both conditions be satisfied. Moreover, to be patent eligible, the new use has to be supported by empirical evidence. In Chile, software *per se* is not patent eligible and protected by copyright.[15] Appendix 1.3 provides details on patent eligible subject matter. Before the 2005 amendment, the statutory lifetime of a patent was 15 years from the grant date. The amendment changed this into 20 years from the date of filling. This term is not renewable.

There is a 45 day term during which third parties can present an opposition to a patent application. Opposition is possible on the grounds that an application does not meet one or more of the patentability requirements.

The grounds for cancellation have remained the same since 1991. Any person can request the cancellation of a granted patent. The 2005 amendment reduced the timeframe during which a patent can be cancelled from 10 to 5 years counting from the date of grant. In contrast to trademarks, bad faith does not suspend this restriction. Appendix 1.4 provides further details.

[15] Law 17336 of Intellectual Property.

As for trademarks, patent infringement can be sanctioned by both civil and criminal law depending on the type of infringement. Details about enforcement are provided in Appendix 1.2.

Utility models

Utility Models are similar to patents, but generally apply to less complex technical inventions than patents. Utility models can protect instruments, apparatus, tools, devices or objects which can be described in claim form. The legal protection of utility models applies to an individual object, but protection of several elements or aspects of an object can be claimed in a single application (Article 56 Law 19309).

Utility models differ from patents in the following ways:

- Utility models are exempt of the inventive step requirement of invention patents.
- Utility models only need to be new and have industrial applicability.
- Utility models last for a non-renewable term of 10 years counting from the application date.
- The registration procedure for a utility model involves the same steps and deadlines as for a patent (see Appendix 1.4). However, because the technology involved is generally less complex and novelty is not assessed, the procedure for utility models is generally faster and simpler than in the case of invention patents. All fees are the same as for patents, except for the examination fee which is cheaper for utility models than for patents.[16]
- Utility models can only be obtained for products, not for processes. Accordingly, utility models are more relevant for certain technological areas such as mechanical or electrical engineering.

Industrial designs and drawings

Industrial designs are any three-dimensional shapes and industrial or handicraft items that can be used as a template for the production of other units. Industrial designs must be distinguishable from similar three dimensional objects, either by their shape, geometric configuration, ornamentation or a combination of these characteristics (Article 62 Law 19309).

Industrial drawings include any set or combination of figures, lines or colors that are developed on a flat surface. Industrial drawings must be capable of being part of an industrial product and provide a new look to the product.

Industrial designs and drawings differ from patents in the following ways:

- Industrial Designs and drawings are exempt of the inventive step and industrial applicability requirements of patents. They are only required to be new. Designs and drawings are considered new if they differ significantly from known drawings or industrial designs or if they differ from combinations of

[16] For patents the fee is $427.000 Chilean pesos (approx. US$ 900 dollars). For utility models, the fee is $343.000 (approx. US$ 730 dollars).

characteristics of known drawings and industrial designs (Article 62 Law 19039). The prior art search is conducted searching for industrial designs and drawings protected under the same Locarno classification in international offices such as the USPTO or the Office for Harmonization in the Internal Market (OHIM). For drawings, novelty means a new physiognomy, for designs a new appearance.

- Industrial designs and drawings are valid for a non-renewable term of 10 years from the date of filing.
- The application procedure for industrial designs and drawings involves the same steps and deadlines as for patents (see Appendix 1.4). However, industrial designs and drawings do not contain claims.
- All fees are the same as for patents except for the examination fee which is lower for industrial designs and drawings.[17]

3. Overall trends

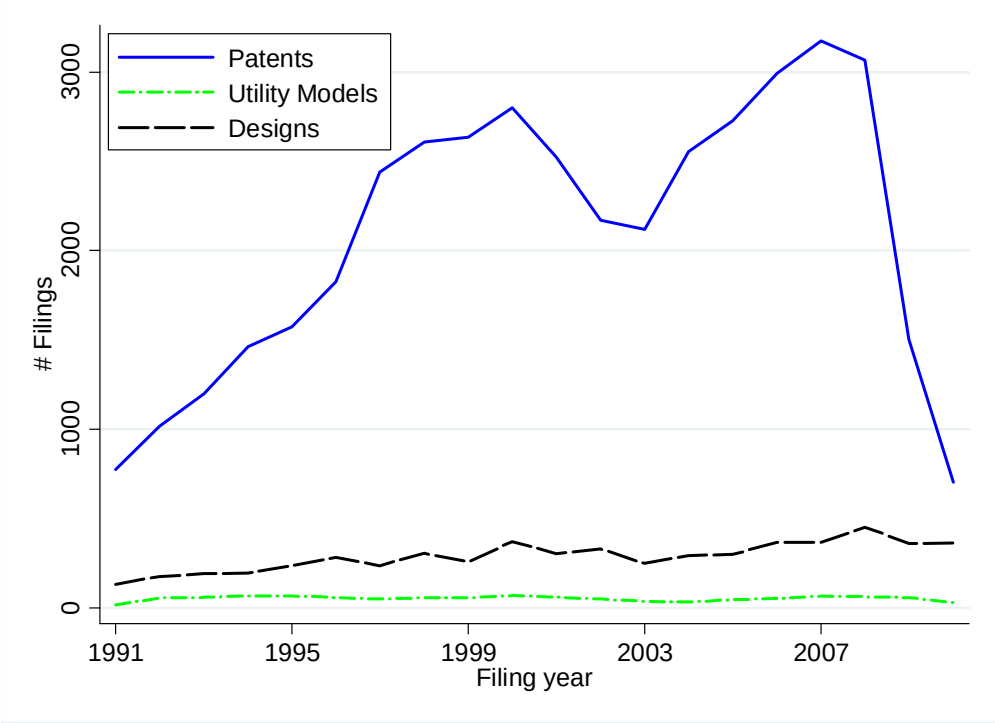
Over the past two decades, INAPI has seen rapid growth in the use of most IP forms. Figure 1 presents the filing trend for patents, utility models, and industrial designs over the period 1991-2010. Patent filings have more than tripled from 775 applications per year in 1991 to over 3,000 in 2008. While it is difficult to precisely quantify the drivers of the observed growth in patent filings, three factors appear to stand out:

- as described in the previous section, Chile's patent reform in 1991 expanded the scope of patent protection to new subject matter, notably pharmaceutical products;
- the Chilean economy has experienced robust growth since the early 1990s, prompting greater interest by innovators in the Chilean market;
- the past two decades have seen greater reliance on the patent system worldwide, and Chile has become more closely integrated into the global economy.

Despite the extension of the statutory patent life from 15 to 20 years in 2005 by the first amendment to the Intellectual Property Law (see Section 2), there is no visible trend break in the number of filings. The number of fillings begins to rise already in 2004 ahead of the amendment.

[17] For patents the examiner fee is $427.000 Chilean pesos (approx. US$ 900 dollars) and for industrial designs and drawings it is $287.000 (approx. US$600 dollars).

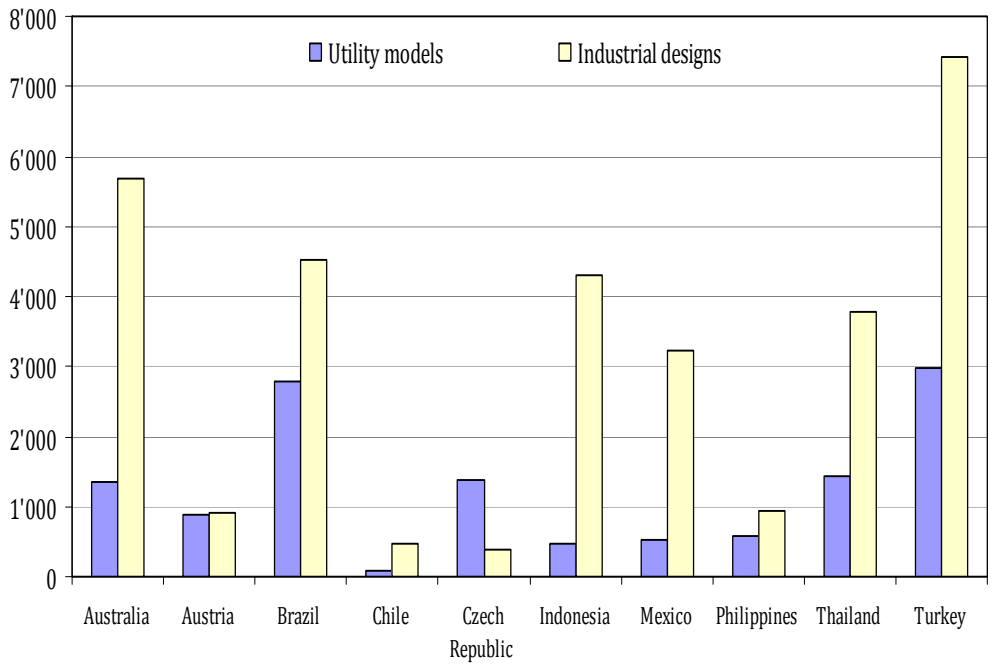
Figure 1: # patent, utility model, design filings (1991-2010)



From mid-2009 to 2010, patent filings dropped sharply due to Chile's accession to the Patent Cooperation Treaty (PCT), effective as of June 2, 2009. Instead of directly filing in Chile, most non-resident applicants opted for a PCT international application, affording them up to 18 months to form a decision on whether to apply for protection in Chile. This transitional filing decline came to an end at the beginning of 2011, which is not covered by our data, as non-resident applicants began to enter the PCT national phase in Chile. It is important to keep this PCT accession effect in mind when looking at patent filing figures for 2009 and 2010 in the remainder of the analysis.

Industrial designs and utility models are far less popular in Chile. The number of annual utility model and industrial design filings increased from 17 to 62 and 131 to 451 between 1991 and 2008, respectively. Filing activity for these two IP forms are modest not only compared to patents, but also compared to other countries (see Figure 2).

Figure 2: Utility model and industrial design filings, 2008-2010 average



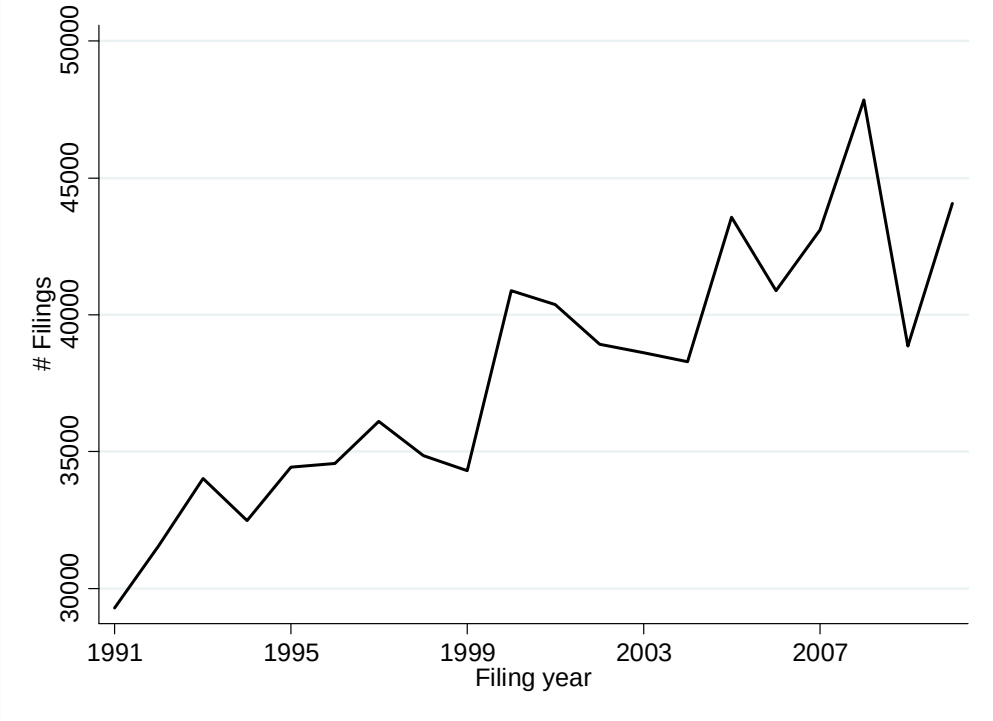
Note: The countries were selected mainly to illustrate greater use of utility models in different parts of the world; the selection is not representative; indeed, there are many countries showing limited use of these IP forms similar to Chile. In addition, it is important to keep in mind that country size influences the level of filing activity.

Source: WIPO Statistics Database.

In the case of utility models, one explanation for their limited use in Chile is that INAPI substantively examines utility models – as described in the previous section. Many other countries operate a simpler registration system without substantive examination; for applicants in those countries, the utility model system thus offers easy-to-obtain protection as an alternative to the patent system. In the case of industrial designs, one explanation seems to be that designers rely – more so than in other countries – on the copyright system in protecting their creative outputs. However, the empirical importance of this substitution effect is not clear and other factors such as the relatively high fees may also play a role.

Figure 3 presents the filing trend for trademarks, showing a marked increase of applications from slightly less than 30,000 per year in 1991 to more than 44,000 in 2010. This is a remarkably large number for a country of Chile's size.

Figure 3: # trademark filings (1991-2010)



As in the case of patents, Chile's rapidly growing economy can partly account for the marked increase in filings. However, the growth in trademark applications has been faster than the growth of real GDP. In addition, Chile exhibits among the most intensive use of trademarks in the world, as captured by the ratio of trademark filings to GDP (Table 1). What lies behind both the growing and absolute popularity of trademarks in Chile warrants further investigation.

Table 1: Trademark filings to GDP ratio, top-10 list in 2010

1	Paraguay	43,798
2	Republic of Moldova	35,415
3	Mongolia	32,413
4	Chile	20,388
5	Bulgaria	18,061
6	Luxembourg	15,592
7	Iceland	13,828
8	Costa Rica	13,155
9	Czech Republic	13,124
10	New Zealand	12,962

Note: The values shown are resident class count per 100 US$ billion of constant 2005 GDP in purchasing power parities, by country of origin. The use of class rather than application counts enables better comparisons across countries, as some countries operate a single-class filing system and others – like Chile – a multi-class filing system. (Unfortunately, available data do not allow for counts of unique marks). The use of origin rather than office data enables better comparison for those countries that are members of regional filing offices.

Source: WIPO Statistics Database.

4. Origin of applications

There are significant differences in the extent to which domestic and foreign residents use the four forms of registered IP in Chile. Figure 4 depicts the shares of resident and non-resident filings for patents, industrial designs, utility models, and trademarks. It shows that in 2008 Chilean residents accounted for only 7% of patent filings and 16% of industrial design filings, but 76% of utility model and 67% of trademark filings. For patents and trademarks, these shares have not varied significantly over the 1991-2010 period, except that the share of non-resident patent filings fell markedly in the last two years due to Chile´s accession to the PCT. In the case of utility models and industrial designs, shares were slightly more volatile over time, but this is largely due to the small number of filings which magnifies small changes in filing behavior over time. Still, the figure suggests that the share of resident filings of industrial designs fell during the first half of the 1990s.

Figure 4: Resident vs non-resident filings (1991-2010)

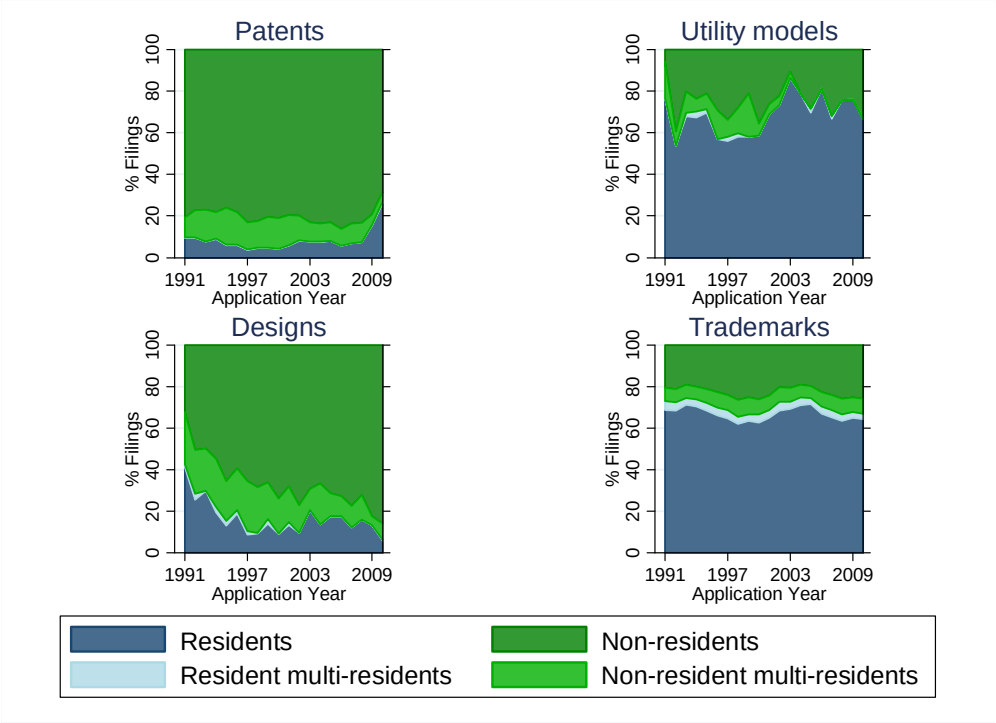


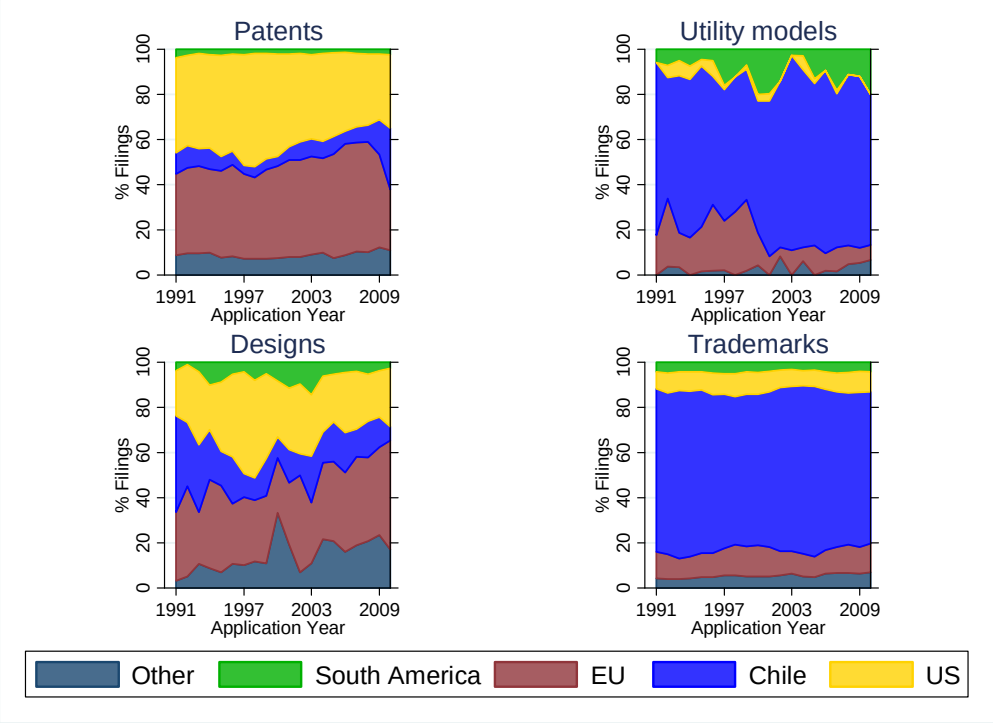
Figure 4 offers an additional breakdown. As the INAPI-WIPO database provides harmonized applicant names regardless of the origin of applications, we can identify applicants that file for IP rights through an entity resident in Chile as well as through an entity abroad. We refer to these applicants as multi-resident applicants. In most cases, these are foreign multinational companies that at times use their foreign headquarters

to file for IP rights in Chile and, at other times, use their Chilean subsidiaries.[18] It is important to point out, though, that not every multinational company is a multi-resident applicant; many multinationals file exclusively from abroad. These are then classified as non-resident applicants.

In the case of industrial designs, and utility models, on average less than 2% of filings between 1991 and 2010 are from Chilean multi-resident applicants. For patents this share is as low as 0.2%. In the case of trademarks, by contrast, Chilean multi-resident filings represent a slightly larger share of 3.4%.

Which jurisdictions are behind non-resident IP filings in Chile? Figure 5 shows that applicants from the United States and Europe account for the great majority of non-resident filings across all four IP forms. The share in total filings that is accounted for by other South American countries is relatively modest; for example, for trademarks they represent less than 5% of all filings between 1991 and 2010 whereas the US and EU combined account for around 20% of filings. In the case of patents, the combined share of all filings from the US and EU is on average above 80%. Other South American countries account for a mere 2% of total filings. The dominance of European and US patent applicants is largely explained by multinational pharmaceutical and chemical companies filing for patent protection in Chile, as shown in the next sections.

Figure 5: Origin of filings (1991-2010)



[18] For example, Pfizer Chile and Pfizer inc. are classified as a non-resident multiresident applicant if both entities file for patents at INAPI.

5. Applicant distribution

IP filings are unevenly distributed across applicants. Typically, a small share of applicants accounts for a large share of filings. How concentrated filings are across applicants differs for the four IP forms. One way to explore this is to look at the lists of top-10 applicants.[19]

In the case of patents (Table 2), the top-10 applicants are all foreign residents – in particular, US and European multinationals – in line with the large share of non-resident filings described above. In addition, 9 of the top-10 applicants are from the chemical, pharmaceutical, and consumer goods industries. The one outlier is the U.S. telecommunications equipment company Qualcomm, with a total of 639 applications between 1991 and 2010. As will be further discussed below, the strong presence of a company from the information and communications technology (ICT) sector seems unusual for a small middle-income economy with an industrial structure like Chile; it seems due to Qualcomm's specific business model and global IP strategy. Interestingly, Qualcomm's applications grew rapidly from 2001 to 2006 (with a peak of 100 filings in 2006), but fell sharply after 2007 – pointing to a change in Qualcomm's patenting strategy.

Table 2: Top 10 applicants -- patents (1991-2010)

Rank	*Name*	*# Filings*	*% Total*	*Industry*	*Country*
1	Procter & Gamble	1,894	4.31%	Consumer goods	US
2	Unilever	1,402	3.19%	Consumer goods	NL
3	Pfizer*	1,027	2.34%	Pharma	US
4	Bayer	940	2.14%	Pharma & Chemicals	DE
5	Hoffmann-La Roche	870	1.98%	Pharma	CH
6	BASF	807	1.84%	Chemicals	DE
7	Novartis	686	1.56%	Pharma	CH
8	Wyeth*	683	1.55%	Pharma	US
9	Boehringer Ingelheim	660	1.50%	Pharma	DE
10	Qualcomm	639	1.45%	Telecommunication	US
Total		9,608	21.86%		

* Pfizer and Wyeth merged in 2009

[19] The rankings should not be interpreted to suggest that companies with more IP filings are more innovative than others. This may not necessarily be the case as companies can choose between a range of different mechanisms to protect and appropriate returns to innovation, registered IP is only one such mechanism. Moreover, there is no one-for-one correspondence between the number of IP rights filed and the commercial value of the underlying inventions or their contribution to technological progress.

Overall, the top-10 applicants account for 21.9% of all patent filings from 1991 to 2010, suggesting a relatively high concentration of applications. This is confirmed by expanding the list of top applicants to the top-50 and top-100, which respectively account for 43.0% and 50.1% of all filings (there are over 9,200 distinct patent applicants in total).

Table 3 presents the top-10 patent applicants among Chilean residents.[20] At least three insights emerge from this list. First, among the top-10 applicants are six universities;[21] this pattern is similar to other middle-income countries, where academic institutions typically account for significantly larger shares of overall R&D spending than in high-income countries.[22] Second, the remaining top-10 Chilean applicants are from the mining sector, reflecting the importance of this sector in the Chilean economy. In fact, three of the four mining companies belong to the same company, Codelco. Patents applied for by companies in the mining industry are diverse in nature. Whereas Biosigma filed patents on micro-organisms and their use for extracting metals from ores (IPC classes C12 and C22), MI Robotic Solutions filed patents on robotic systems used in the mining industry (IPC class B25).

Table 3: Top 10 resident applicants -- patents (1991-2010)

Rank	*Name*	*# Filings*	*% Total resident*	*Industry*
1	Universidad de Concepcion	107	3.03%	University
2	Codelco	86	2.43%	Mining
3	Instituto de Innovación en Minería y Metalurgia*	71	2.01%	Mining
4	Universidad Tecnica Federico Santa Maria	52	1.47%	University
5	Universidad de Chile	44	1.25%	University
6	Universidad de Santiago Chile	39	1.10%	University
7	PUC Chile	35	0.99%	University
8	PUC Valparaiso	27	0.76%	University
9	MI Robotic Solutions	23	0.65%	Mining
10	Biosigma**	20	0.57%	Mining
Total		504	14.27%	

* Subsidiary of Codelco since 1998

** Subsidiary of Codelco since 2002.

[20] This excludes the Chilean entities of non-resident multi-resident applicants.

[21] The universities listed in Table 3 are all research oriented institutions. Krauskopf et al. (2007) show that scientific articles (co-) authored by researchers employed by these institutions are cited in US patents, especially in the biomedical field.

[22] See WIPO (2001), Chapter 4. The OECD reports that, in 2008, higher educational institutions accounted for 19.2% of spending on R&D in Chile and the government for 33.8%.

Third, the overall level of patenting by the top-10 Chilean applicants appears small. Over the 1991-2010 period, the top Chilean applicant – *Universidad de Concepcion* – filed only for a total of slightly over 100 patents. Mining company Codelco, together with its subsidiaries, filed 177 patents in total over the 20-year period. Taken together, the top-10 Chilean applicants account for only around 1% of all patent applications filed during 1991-2010. Yet, they account for a sizeable 14% of all filings by Chilean residents, pointing to a skewed distribution of filings among residents similar to overall filings.

It is important not to assume a one-to-one correspondence between the level of patenting activity and the level of innovation in Chile. The patent output of universities, for example, depends on a large number of institutional conditions. In addition, little is known about the precise importance of patent protection for the mining sector; technologies used in mining are heterogeneous and secrecy may well be a viable alternative for mining companies to protect new technologies from being copied.

In contrast to patents, Chilean companies dominate the list of top-10 trademark applicants (Table 4). Only three foreign multinationals are in this list. Six of the top-10 trademark applicants are from the pharmaceutical, consumer goods, and food product industries, which also dominate the list of top-10 patent applicants. In addition, three of the top-10 applicants are retailers – including top-ranked *Falabella* – and one is a telecommunications service provider, suggesting more widespread use of trademarks across economic sectors. This is also reflected in the slightly more balanced distribution of trademark filings: the top-10 applicants only account for 3.9% of all filings; the top-50 account for 11.2% and the top-100 for 15.4%. Still, due to large number of applicants (there are 142,500 distinct applicants in total), the distribution is nevertheless relatively skewed.

Table 4: Top 10 applicants -- trademarks (1991-2010)

Rank	*Name*	*# Filings*	*% Total*	*Industry*	*Country*
1	Falabella	4,334	0.57%	Retail	CL
2	Unilever	3,430	0.45%	Consumer goods	NL
3	Distribucion y Servicio*	3,344	0.44%	Retail	CL
4	Laboratorio Chile	2,889	0.38%	Pharma	CL
5	Laboratorio Recalcine	2,841	0.37%	Pharma	CL
6	Entel	2,722	0.36%	Telecommunication	CL
7	Carozzi	2,648	0.35%	Food	CL
8	Nestle	2,596	0.34%	Food	CH
9	Cencosud	2,473	0.32%	Retail	CL
10	Johnson & Johnson	2,359	0.31%	Pharma	US
Total		29,636	3.87%		

* Controlled by Walmart since 2009

Finally, Tables 5 and 6 present the top-10 applicant lists for utility models and industrial designs, respectively. In the case of utility models, it is interesting to note that the top-3 applicants are foreign multinationals, even though Chilean residents account for most utility model filings overall (see above). However, the relatively low total limits the extent to which one can derive generalizable patterns from this top-10 list. In the case of designs, they confirm the dominance of foreign applicants with all top-10 applicants – across a relatively wide range of sectors – coming from abroad.

Table 5: Top 10 applicants – utility models (1991-2010)

Rank	*Name*	*# Filings*	*% Total*	*Industry*	*Country*
1	Telefonica	35	2.84%	Telecommunication	ES
2	Unilever	16	1.30%	Consumer goods	NL
3	Multibras	10	0.81%	Consumer goods	BR
4	Osvaldo Froilan Vilches Perez	7	0.57%		CL
5	Falabella	7	0.57%	Retail	CL
6	Giampaolo Giorgi Guidugli	6	0.49%		CL
7	Banco Estado Chile	6	0.49%	FIRE*	CL
8	Quinones Farfan	6	0.49%	Business Services	CL
9	Nathurmal Dinani Kishor	6	0.49%		CL
10	Alejandro Eduardo Espinoza Gonzalez	6	0.49%		CL
Total		105	8.52%		

* Finance, insurance, and real estate

Table 6: Top 10 applicants – industrial designs (1991-2010)

Rank	*Name*	*# Filings*	*% Total*	*Industry*	*Country*
1	Unilever	302	4.94%	Consumer goods	NL
2	Philips	197	3.22%	Electronics	NL
3	Honda	190	3.11%	Motot vehicles	US
4	Sony	165	2.70%	Electronics	JP
5	Colgate-Palmolive	164	2.68%	Cosmetics	DE
6	Telefonica	124	2.03%	Telecommunication	ES
7	Dart Industries	114	1.87%	Manufacturing	CH
8	Procter & Gamble	98	1.60%	Consumer goods	US
9	Bticino	81	1.33%	Electronics	IT
10	Goodyear	74	1.21%	Manufacturing	US
11	Nokia	74	1.21%	ICT	FI
Total		1,583	25.91%		

Table 7 summarizes the distribution of filings across applicants by showing Gini coefficients for resident and non-resident applicants. The Gini coefficient lies between zero and one, the closer it is to one, the more unequal is the distribution. The table shows that the Gini coefficient for patents is 0.74, which reflects a highly skewed distribution of patent filings; the top 10% of applicants account for 74% of patent filings and the top 1% of applicants account for 50% of filings. Trademarks and industrial designs display a similar unequal distribution. Utility model filings, in contrast, are much more evenly distributed, the top 1% of applicants account only for around 8% of filings. While the filing distributions are similarly skewed for residents and non-residents with regard to trademarks, for patents the Gini coefficient for non-residents is more than double that for residents. This indicates a much more highly concentrated distribution of patent filings among non-residents, as Table 2 above already indicated.

Table 7: Gini coefficients of filing distributions (1991-2010)

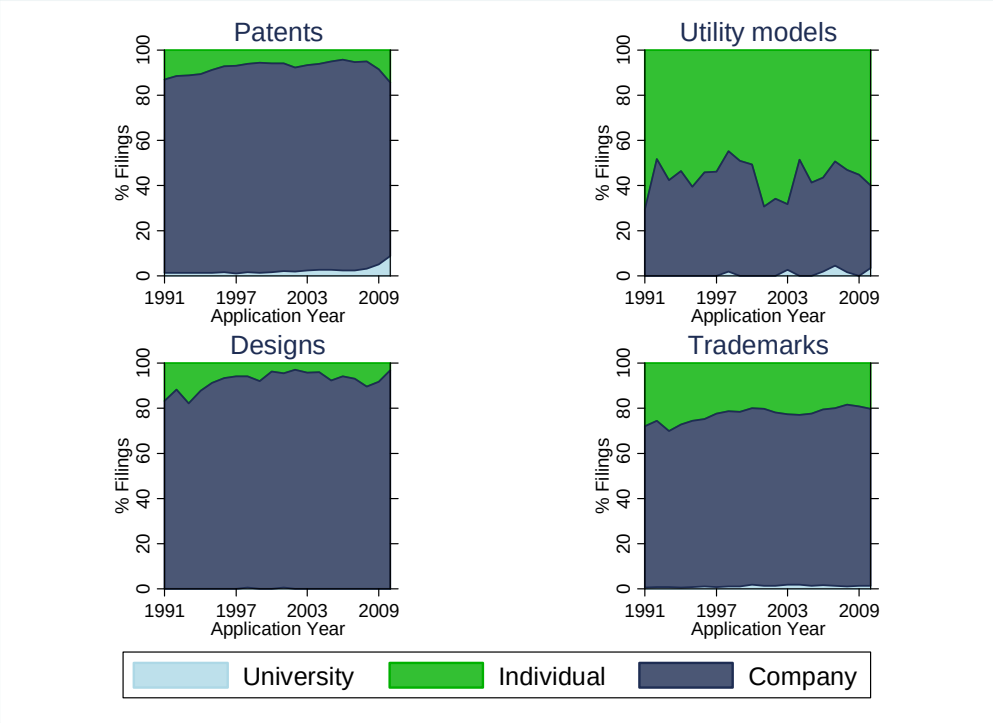
	Patents	*Trademarks*	*Utility models*	*Designs*
Residents	0.374	0.692	0.169	0.504
Non-residents	0.771	0.717	0.259	0.730
All	0.743	0.701	0.203	0.703

6. Applicant types

The INAPI database identifies applicants as belonging to one of the following three types: companies, universities, and individuals (see Appendix 2 which describes the construction of the database).[23] This allows some insight into who applies for different forms of IP. Notable differences exist. Figure 6 depicts the type breakdown for patent applicants as well as the applications filed by those applicants over time. It shows that companies dominate, with universities playing a relatively minor role. Individuals account for around 30% of all patent applicants, but only around 7% of applications. This reflects individual applicants filing, on average, substantially fewer patents than do company applicants. It is not clear what is behind patent filings by individuals. Some patents are co-assigned to companies and individuals, but as discussed in Section 10 below, the share is modest and hence does not fully explain why individuals file for patents. While there are individual inventors among applicants, probably the larger share of individual patent applicants is accounted for by employees or owners of companies that have not re-assigned the patent to the company. This may have a multitude of reasons; owners of small companies, for example, may prefer to hold a patent in their own name in case the company goes out of business or it may have tax advantages.

[23] The university category includes non-profit research institutes and government bodies.

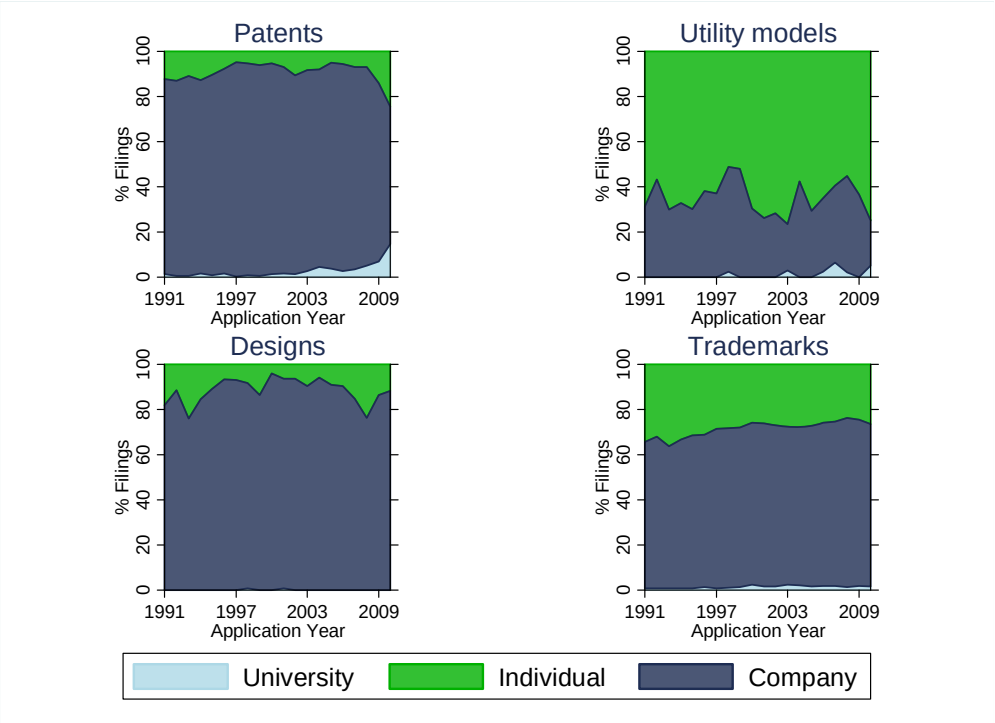
Figure 6: Applicant types (1991-2010)



Companies also dominate trademark filings, but individuals account for larger shares of applicants (43%) and applications (23%) than is the case for patents (Figure 6). In the case of trademarks, there is anecdotal evidence that suggests that individuals obtain trademarks for personal use. Still, similar mechanisms as in the case of patents may also be at play – notably, business owners preferring to register trademarks under their own name rather than their companies' name. Again, the average number of trademark filings per applicant is significantly higher for company applicants. Universities account for seemingly small shares of applicants and applications. However, one has to keep in mind that there were on average around 13,500 trademark applicants and 37,850 trademark applications per year; given the small number of universities, it is not surprising that their filings are small compared to the filings of all other applicants. In fact, as will be discussed further below, some universities intensively use the trademark system.

Figure 7 shows the breakdown for resident applicants (where we combine again resident and resident multi-resident applicants). The general pattern is very similar to Figure 6; however, individuals play a larger role among residents. For trademarks, for example, the average share of individuals in total resident filings is 28% whereas it is 23% in total filings. It is also noteworthy that most utility models are filed by individuals, which raises the question what they are used for.

Figure 7: Applicant types – residents only (1991-2010)



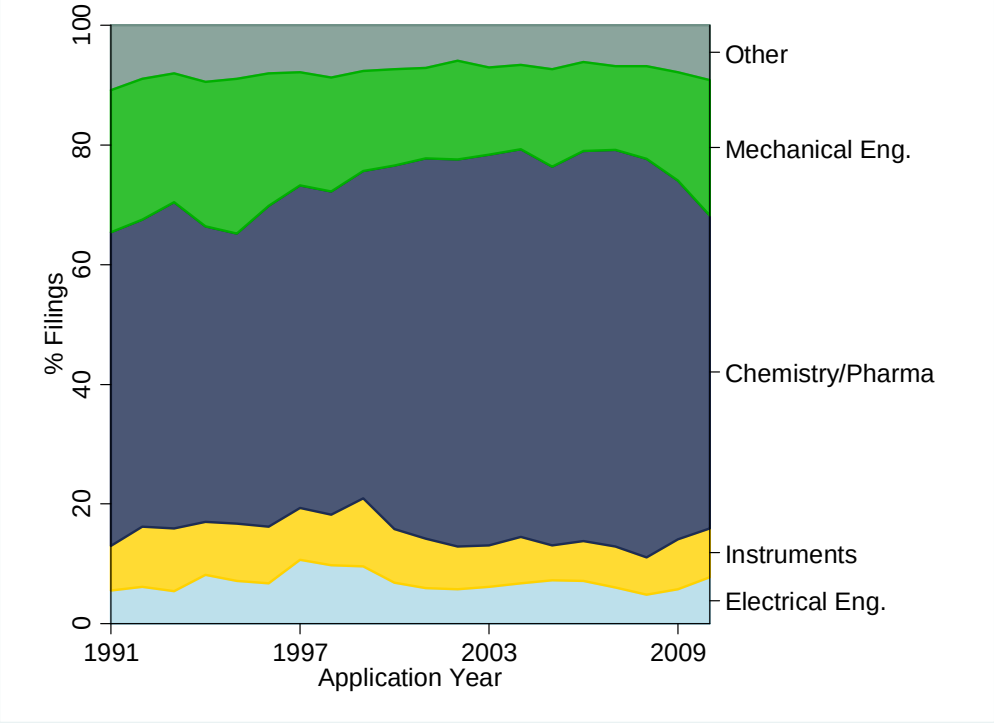
7. Filings by technology and class

Which economic sectors generate most IP rights? IP applications do not contain direct information on an applicant's sectoral affiliation, but it is possible to break down IP filings by field of technology (for patents) and by goods/services class (for trademarks). These breakdowns provide indirect information on the type of economic activity behind different IP applications.

Table 2 already illustrated the strong presence of the pharmaceutical and chemical sectors among the top-10 patent applicants. Figure 8 confirms the prominence of the technology fields associated with these two sectors in overall patent filings. From 1991 to 2010, they accounted for around 60% of all patent applications.[24]

[24] We map IPC class symbols into technology classes employing the concordance table by Schmoch (2008).

Figure 8: Patent (IPC) - technology mapping (1991-2010)



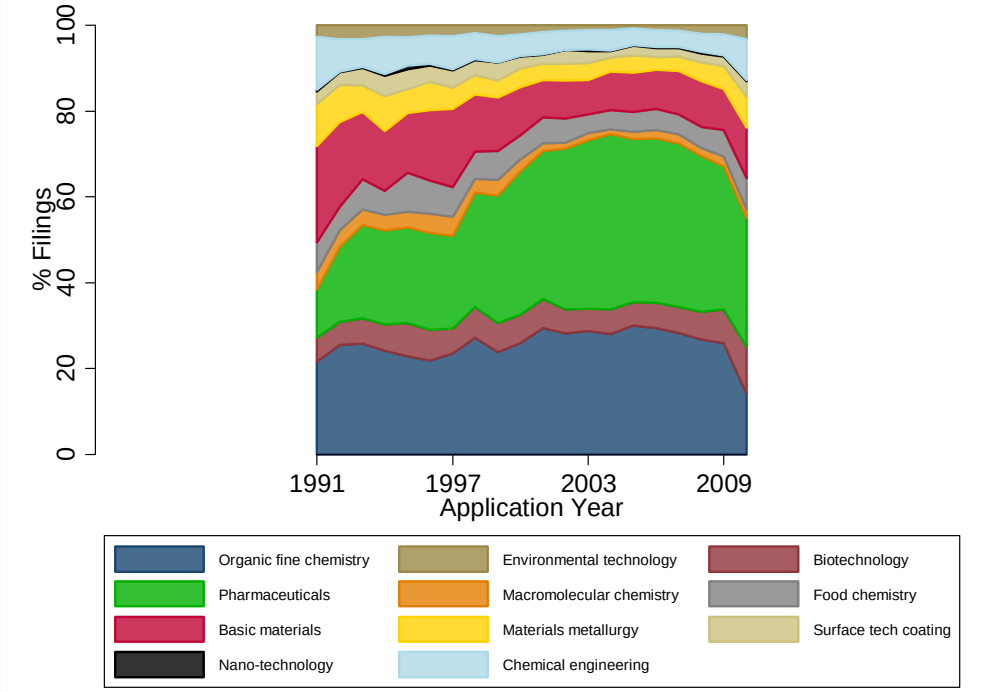
Note: The "Other" category contains furniture and games, other consumer goods, and civil engineering.

The technology breakdown depicted in Figure 8 differs markedly from that observed at the patent offices of high-income countries. Looking at patent filings worldwide, which are dominated by filings at high-income offices, the pharmaceutical and chemical sectors account for around 23% of all filings.[25] Other fields – notably those associated with information and communications technologies (ICTs) – have seen comparatively greater filing activity.

Figure 9 shows a breakdown for the broad chemistry/pharma category into 11 technology subcategories. The figure shows that organic fine chemistry and pharmaceutical patents account for over half of all filings over the 1991-2010 period. Pharmaceutical patents increased markedly from around 11% in 1991 to over 40% in 2004 reflecting the changes in the IP law in 1991.

[25] This share refers to all patent filings published between 1990 and 2010, as available in the WIPO Statistics Database.

Figure 9: Technology breakdown for chemistry/pharma (1991-2010)



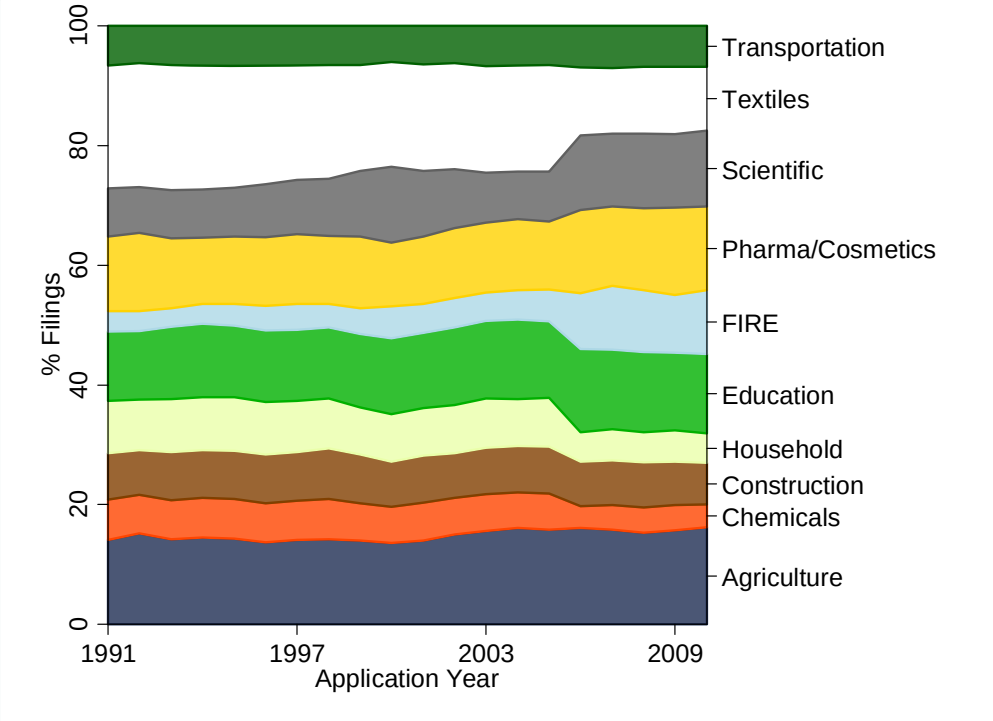
From an economic viewpoint, pharmaceuticals and chemicals fall into the class of so-called discrete technologies, which describe products or processes for which patent ownership is concentrated among one or a small number of firms. Complex technologies, in turn, include those products and processes consisting of many separately patentable inventions with widespread patent ownership. The latter technology class, which includes most ICT-related fields, has seen faster patent filing growth worldwide. With the interesting exception of Qualcomm (see above), this trend does not hold in Chile. This may partly reflect the imitative capacity of Chilean firms in the pharmaceutical and chemical industries, which does not appear to exist in most complex technology fields. However, precisely understanding what explains the technology breakdown of patent filings in Chile warrants further investigation.

Figure 10 presents the breakdown of trademark filings by groups of Nice classes associated with different economic activities.[26] It confirms what the list of top-10 applicants already suggested: trademark use is more widely spread across economic activity. Agriculture accounts for the largest share of trademark filings, with an average of 14%. The agriculture category includes trademarks held by vineyards (Nice class 33) and fruit producers (Classes 29 and 31), which both account for a sizeable share of

[26] Class groups were defined by Edital across product and service classes: Agricultural products and services: 29, 30, 31, 32, 33, 43; Chemicals: 1, 2, 4; Construction, Infrastructure: 6, 17, 19, 37, 40; Household equipment: 8, 11, 20, 21; Leisure, Education, Training: 13, 15, 16, 28, 41; Management, Communications, Real estate and Financial services: 35, 36; Pharmaceuticals, Health, Cosmetics: 3, 5, 10, 44; Scientific research, Information and Communication technology: 9, 38, 42, 45; Textiles - Clothing and Accessories: 14, 18, 22, 23, 24, 25, 26, 27, 34; Transportation and Logistics: 7, 12, 39.

agricultural activity in Chile. Pharmaceuticals make up a large share of trademark filings too, on average 12% between 1991 and 2010 – though far below the equivalent share of patents.[27] Interestingly, Figure 9 reveals a structural break occurring in 2006, with FIRE (finance, insurance, and real estate) more than doubling its filing shares at the expense of textiles and household equipment. As will be further explained below, an amendment to procedural rules on how to specify classes in trademark applications seems responsible for this compositional change.

Figure 10: Trademark (Nice class) - economic activity mapping (1991-2010)

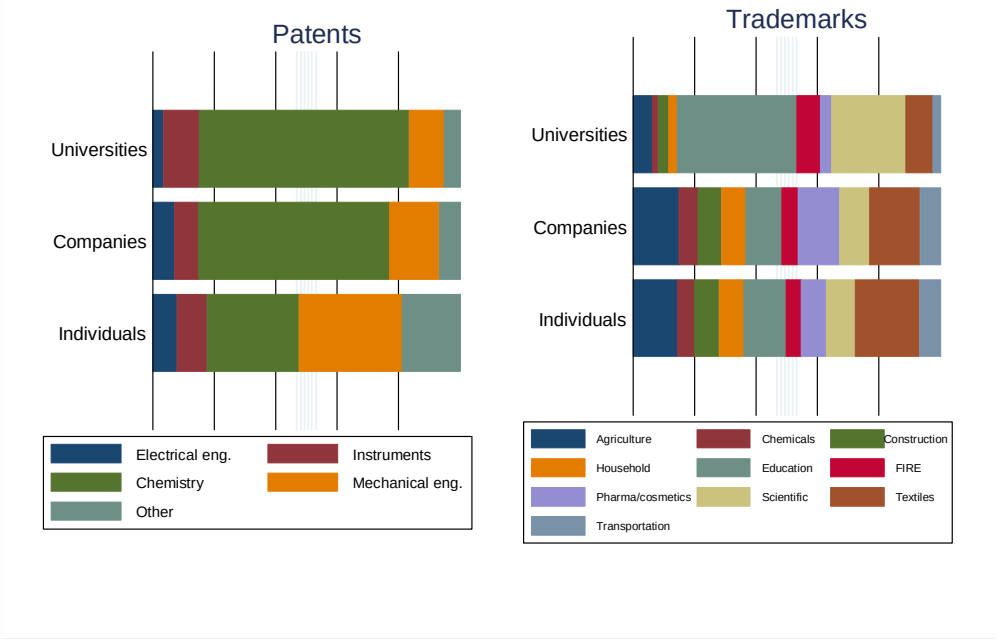


Notes: Agriculture: agricultural products and services; construction: construction and infrastructure; household: household equipment; education: leisure, education, training; FIRE: management, communications, real estate and financial services; pharma/cosmetics: pharmaceuticals, health, cosmetics; scientific: scientific research, information technology, communications; textiles: textiles - clothing and accessories; transportation: transportation and logistics.

Does the sectoral breakdown of IP filings differ according to the type and origin of applicants? Figure 11 presents the overall 1991-2010 sectoral breakdown for universities, companies, and individuals; Figure 12 does the same for residents, multi-residents, and non-residents. In interpreting these figures, it is important to keep in mind that the horizontal bars only show shares that refer to application volumes of sometimes markedly different magnitudes.

[27] Even in combination with chemicals, the average share only reaches 18%.

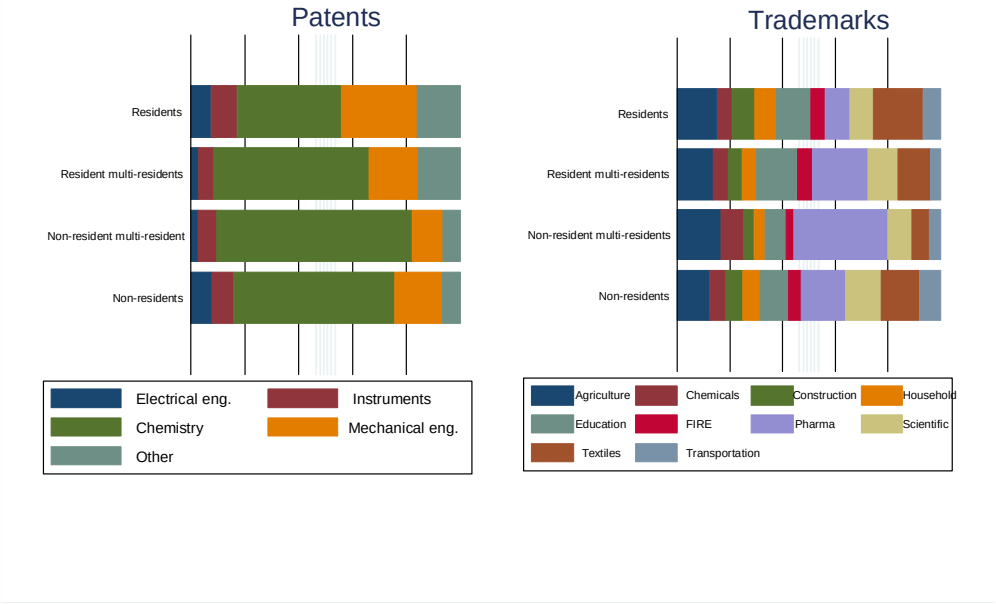
Figure 11: Patent (IPC) - technology & trademark (Nice class) - economic activity mapping by applicant type (1991-2010)



Note: For patents, the "Other" category contains furniture and games, other consumer goods, and civil engineering. For trademarks, see notes of Figure 10.

Several insights emerge from Figure 11. First, the pharmaceutical and chemical fields account for smaller patent filing shares in the case of individuals, but for a larger share in the case of universities. The latter finding may reflect the science-based nature of these two technology fields. The former may reflect the fact that most individuals that hold patents are owners of small businesses, which are usually not found in the chemical/pharmaceutical industry. Second, the sectoral breakdown of university trademark filings differs considerably from that of individual and company filings. It clearly reflects the focus of universities on education and scientific research, with the categories 'scientific research' and 'education and training' dominating.

Figure 12: Patent (IPC) - technology & trademark (Nice class) - economic activity mapping by resident (1991-2010)



Note: For patents, the "Other" category contains furniture and games, other consumer goods, and civil engineering. For trademarks, see notes of Figure 10.

When looking at patent and trademark filings from resident – excluding multi-resident – applicants in Figure 12, the pharmaceutical and chemical fields account for comparatively smaller filing shares than for non-residents. However, in the case of patents, they still represent the largest share, suggesting some level of innovative capacity among Chilean universities and firms in these technology fields. Most patents by Chilean companies in these fields are accounted for by companies in the mining industry such as Codelco and Biosigma, but also companies with a broader chemicals product portfolio such Sociedad Química y Minera which also produces fertilizers. For both patents and trademarks, multi-resident filing practices appear relatively more important in the pharmaceutical and chemical sectors. However, relative to all multi-resident applications, those from the pharmaceutical and chemical sectors appear to originate more frequently from outside of Chile.

8. Grant ratios and lags

What happens to IP applications once applicants file them with the IP office? Two interesting indicators in this context are the grant ratio – the share of patents applied for that was eventually granted – and the grant lag – how long a patent took to get granted. Figure 13 plots the grant ratio as well as grant lags for all patent applications since 1991 by year of filing. The figure shows a declining share of patents that has been granted. The share of granted patents is exceptionally high in 1991; as described above,

this coincides with the amendment of Chile's patent law. As described and further explained in Appendix 1.3, this amendment created a so-called pipeline mechanism whereby patents that were already granted or pending in another jurisdiction could be filed in Chile regardless of the patent's priority date. It seems likely that this mechanism accounts for the high grant ratio for the 1991 cohort of patents. After 1991, the share of patents granted leveled off from around 40% in 1992 to 20% in 2000. The significantly lower grant share in 2007 and 2008 is due to grant lags, i.e., most patents applied for in those years not yet having reached the grant stage.

The figure also shows that between 1992 and 1996, half of all granted patents were granted within five years of the application date and the other half within another five years. From 1998 onward, the share of patents granted within the first five years almost disappears and the overwhelming share of patents is granted between 5 and 10 years after application. However, in 2003, patents get granted faster again and the share of patents granted within 3 to 4 years increases substantially; however, the closer we get to 2010, the less reliable are the data as a larger share of patents still awaits the examination decision.

Figure 13: Patents -- grant ratio and grant lags (1991-2010)

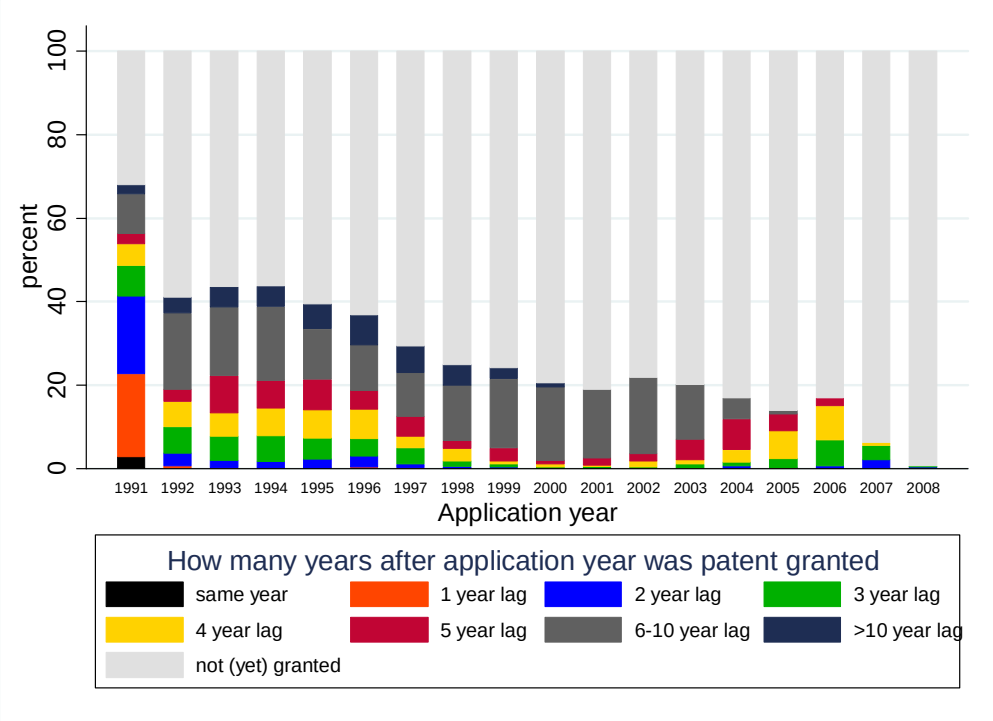
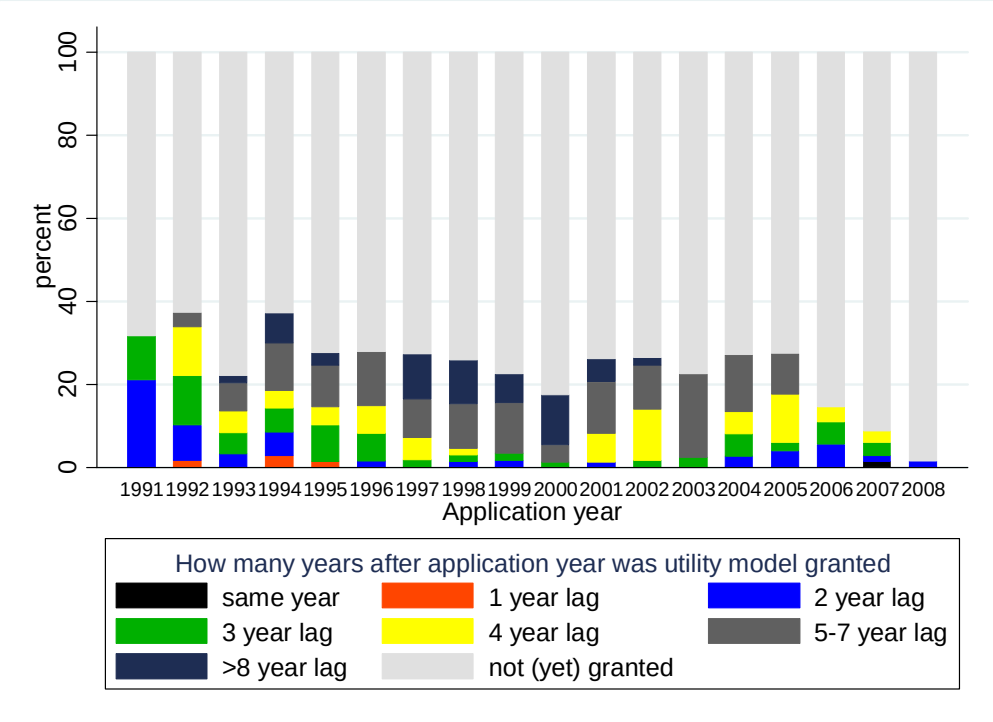


Figure 14 plots the grant lag and grant ratio by filing year for utility models. We already noted the low numbers of utility model filings in Section 3 above. Figure 14 suggests that relatively long grant lags – most frequently somewhere between 4 and 7 years – may partly be responsible for the low use of utility models. Moreover, the figure shows that only relatively small share of all utility model applications is granted. The relatively long grant lag and low grant ratio differ from the experience of other countries –

especially those that operate a pure registration system for utility models – and raises questions as to their precise role in the Chilean innovation system.

Figure 14: Utility models -- grant ratio and grant lags (1991-2010)



The low grant ratio for utility models stands in stark contrast to the much larger grant ratio – also compared to patents – for industrial designs shown in Figure 15. The figure also shows that grant lags are considerably shorter than for utility models and patents; most industrial designs are registered within 2-3 years from the filing date.

Figure 15: Designs -- grant ratio and grant lags (1991-2010)

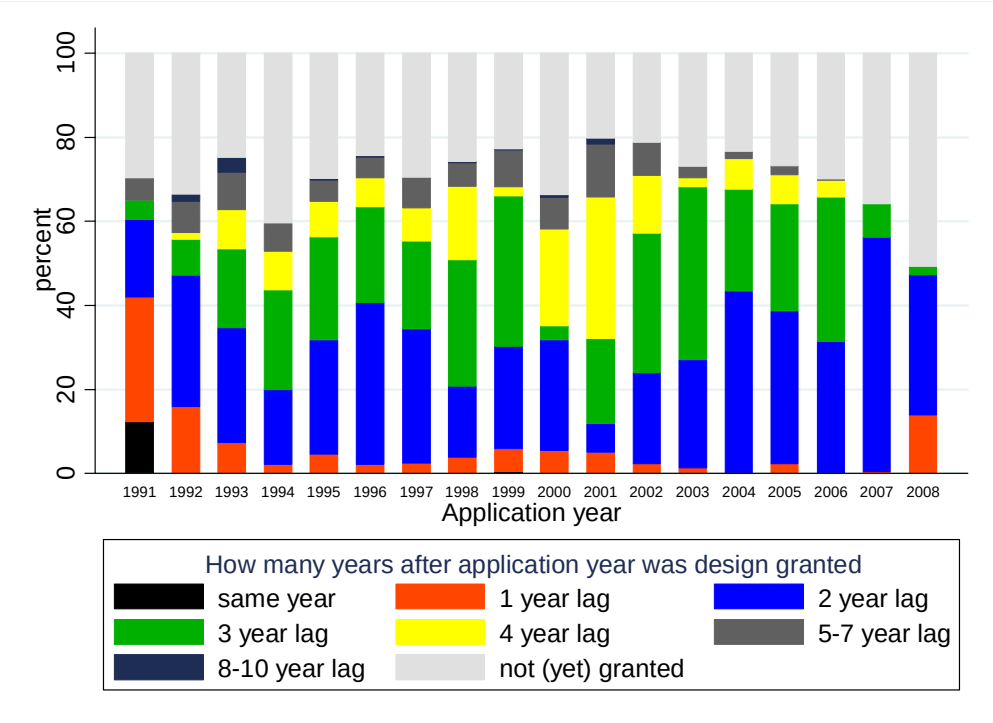
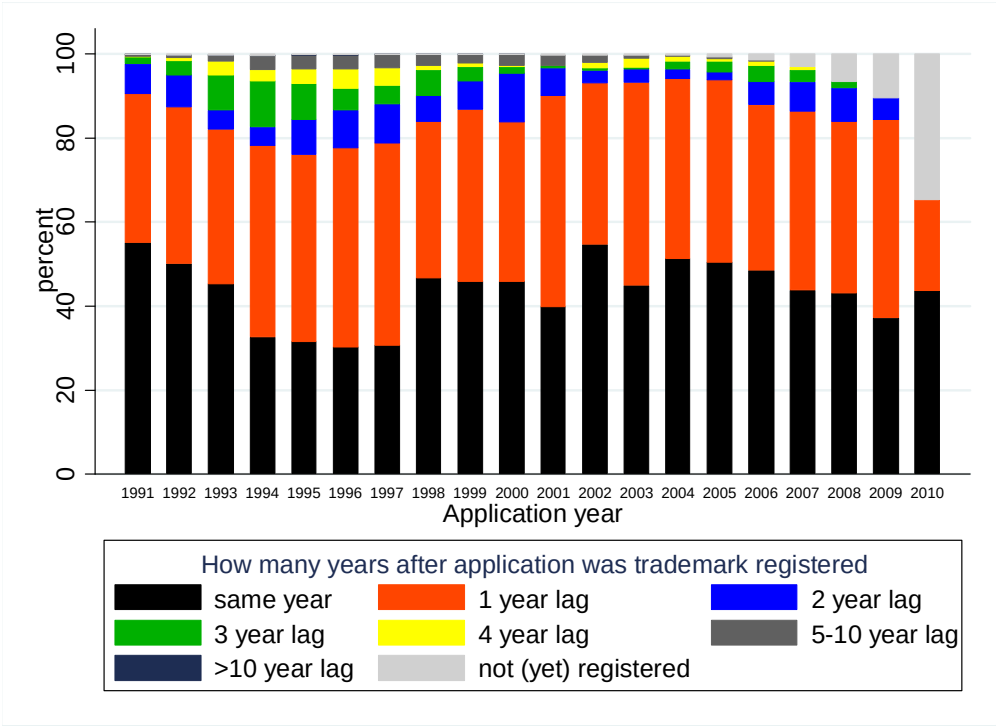


Figure 16 shows the registration ratio and registration lags for trademarks. Almost all trademark applications result in a registration, reflecting the fundamentally different nature of the examination process for this from of IP. Registration of trademarks occurred rapidly throughout the 1991-2010 period, mostly within 1-2 years after filing. The comparatively smooth granting process may partly explain the popularity of trademarks in Chile.

Figure 16: Trademarks -- grant ratio and grant lags (1991-2010)



9. IP bundles

Different forms of IP protect different subject matter and serve different public policy objectives. However, the commercialization of new products and technologies often entails the creation of complementary intangible assets that are protected by bundles of IP rights. It is therefore interesting to ask to what extent the same entities apply for only one or more forms of IP.

Figure 17 shows the share of applicants that applies for the different IP rights where we distinguish between applying for a single IP right and IP bundles. The left-hand-side pie chart shows that the overwhelming majority of applicants (93%) files only for trademarks. The second largest group consists of applicants that only file for patents (4%). Applicants with bundles, in contrast, are rare (2%). To obtain a better idea of the use of IP bundles, the right-hand-side chart shows the shares of applicants applying for more than a single IP right. The most common bundle consists of patents and trademarks (1.6% of all applicants). The second largest share of bundles consists of applicants with both trademarks and design rights (0.3% of all applicants). Applicants with both trademarks and utility models account for 0.15% of all applicants. The shares of the remaining bundle categories are negligible.

Figure 17: IP bundles (1991-2010)

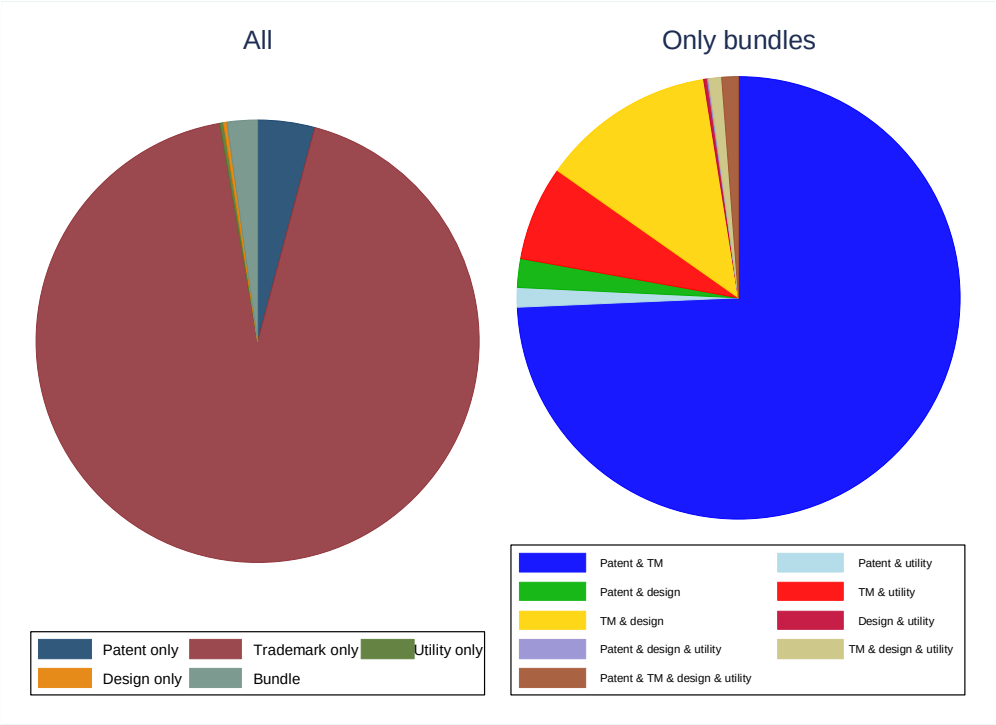
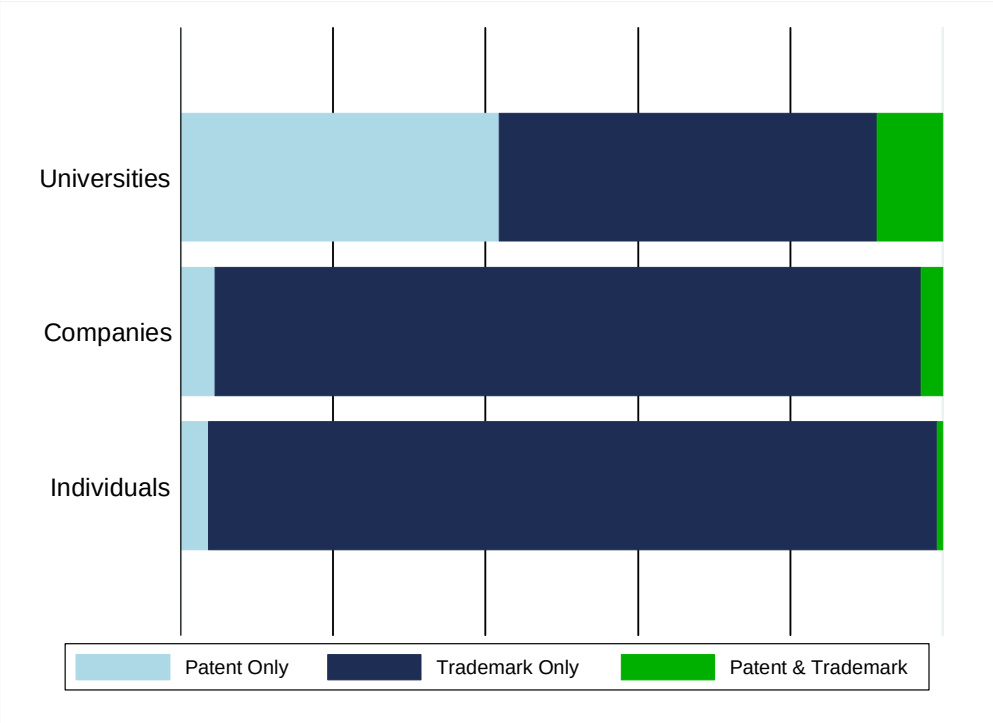


Figure 18 illustrates the presence of IP bundles by applicant types. Given the limited use of utility models and design rights in Chile, Figure 18 is limited to patents and trademarks. It shows that 9% of all university applicants have applied for at least one trademark and one patent over the 1991-2010 period. Strikingly, 42% of university applicants applied only for patents and 49% only for trademarks. The share of companies or individuals that only apply for patents is a lot smaller (5% and 4% respectively). Assuming that trademarks largely serve commercialization purposes, the large share of universities that only file for patents reflects again the research mandate of universities. Nevertheless, half of all IP active universities file only for trademark protection. Most of these trademarks relate to degree programs and the brand of universities more generally. This could indicate that some universities specialize in teaching and adopt a branding strategy that incorporates the use of trademarks. The share of universities with IP bundles is 11%. The IP bundles share is considerably smaller for companies, standing at 3% and it is close to zero for individuals.

Figure 18: IP bundles (patents & trademarks) by applicant type (1991-2010)



In interpreting Figures 17 and 18, it is important to keep in mind that the number of trademark filings far exceeds the number of patent filings. A high share of "trademark only" applicants therefore seems only natural. In addition, the different types of IP may not relate to the same underlying activity. This seems clear for universities, as described above, but it holds more broadly and points to an important caveat in this analysis: our data only show what share of applicants has applied for both patents and trademarks. This does not mean that the two IP rights protect indeed the same invention or product – what the IP bundle concept aims to capture. Better understanding how different IP forms complement each other would invariably require analyzing the presence of IP bundles at the invention, product or technology level. But matching especially patents to products is a complex undertaking.[28]

10. Co-assignment of patents

Figure 19 takes a look at co-assigned patents. Co-assigned patents are patents that are jointly owned by several assignees, for example a university that shares a patent with a private company.[29] Co-assigned patents are often the outcome of joint research (Belderbos et al., 2012). They have been shown to be relatively rare in OECD economies (Hagedoorn, 2003). Figure 19 shows that co-assigned patents also account for a small share of patent filings in Chile – on average less than 3% between 1991 and 2010. The

[28] In a companion paper that focuses on pharmaceuticals, we create a database that contains patents and trademarks at the product level (Abud et al., 2013).

[29] This is distinct from co-inventors, i.e., a situation in which a patent lists multiple inventors.

share is relatively stable over time although there is a small increase beginning in 2008. Despite their small share in total filings, co-assigned patents may be a particularly interesting object to study as they can reveal underlying patterns of research cooperation which might be difficult to observe otherwise.

Figure 19: Share of co-assigned patents (1991-2010)

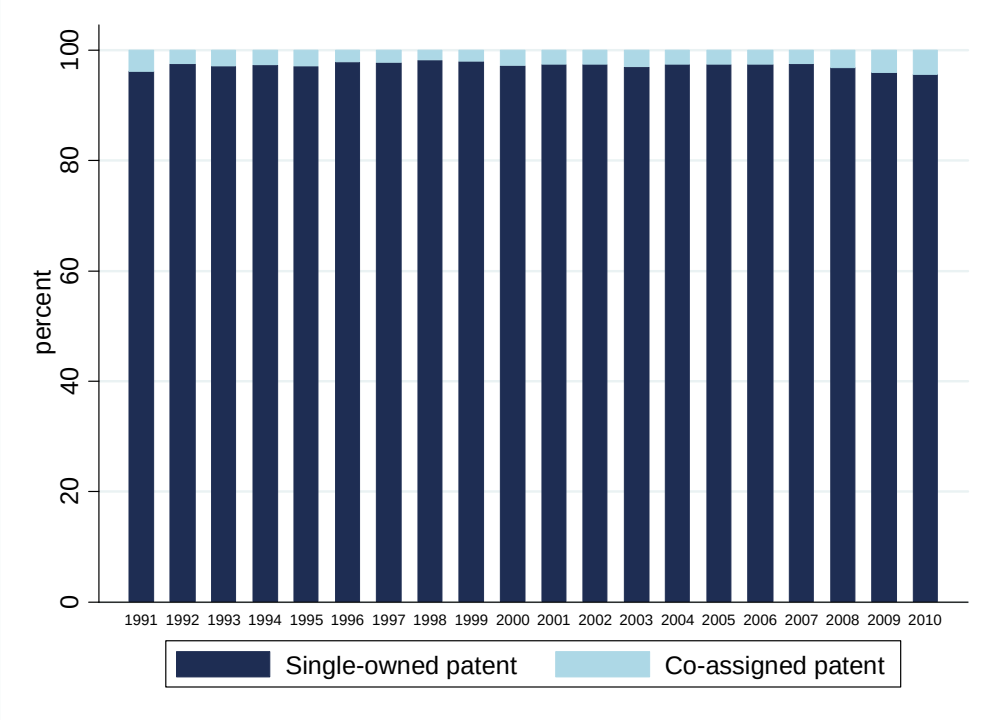
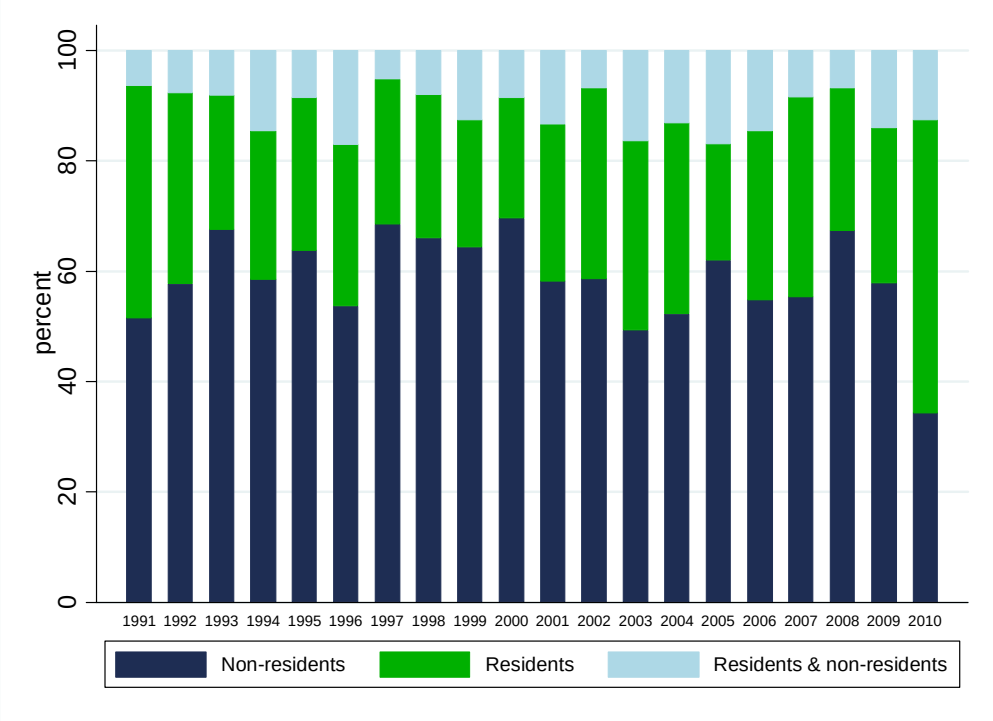


Figure 20 breaks down the set of co-assigned patents into applicant origin. The graph shows that most patents are co-assigned among non-resident companies, the average share of non-residents in co-assigned patents is 60%. The average share of patents co-assigned to residents and non-residents is relatively low at 8%. Since we are able to identify multi-residents, this captures collaboration between distinct domestic and foreign entities; in particular we avoid counting a patent that is co-assigned between, for example, Unilever Chile and a Unilever entity abroad.

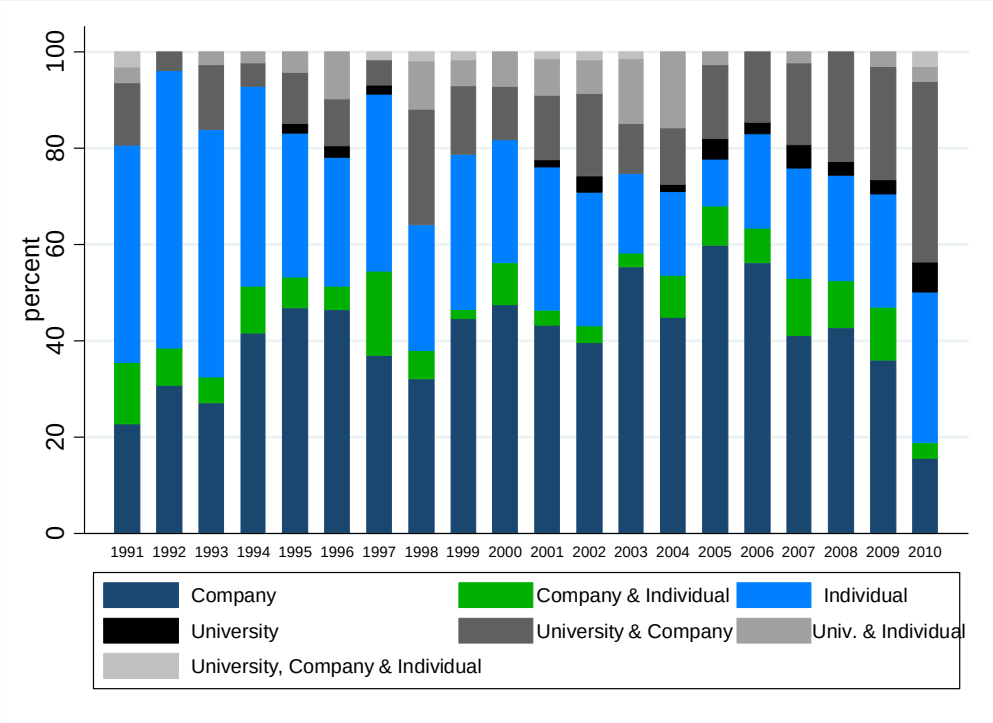
Figure 20: Share of co-assigned patents residents and nonresidents (1991-2010)



To gain more insight into any collaboration patterns underlying the co-assignment of patents, Figure 21 plots the share of patents co-assigned between different applicant types. Co-assignments involving universities account for around 20% of co-assigned patents over the whole 1991-2010 period. The share fluctuates considerably – between 4% in 1992 and 50% in 2010, though the PCT transition likely biases the shares for 2010 (see above). Figure 21 also shows that a sizeable share of patents is co-assigned among individuals. It is likely that these individuals are also co-inventors. Most patents are co-assigned between companies reflecting research collaboration across companies, potentially even product market competitors.[30]

[30] Benavente and Lauterbach (2007) find for their data from the 4th wave of the Chilean innovation survey that around 6% of innovative companies cooperate with product market competitors. The share of innovative companies that cooperate with universities is with 7% slightly larger.

Figure 21: Share of co-assigned patents by applicant type (1991-2010)



11. Patent filings abroad

In this section we combine data on patent filings by Chilean residents abroad with the INAPI database. We extracted from the EPO Patstat database (version September 2012) all patent applications that list a Chilean applicant or inventor.[31] To avoid double counting, we look at international filings at the equivalent – or patent family – level.

To begin with, we found a total of 1,236 patent families that list Chilean applicants. When we restrict the data to families with a priority date between 1991 and 2010, we are left with 903 patent families. We then cleaned and harmonized the applicant names associated with these patent families and matched them with the applicant names in the INAPI-WIPO database. Figure 22 plots the share of Chilean resident applicants that file for a patent both domestically and abroad. This share lies below 15 percent throughout the 1991-2010 perdiod, though there is a clear upward trend from 2001 onward. This is likely to reflect an increasingly successful export orientation of at least some Chilean companies.

[31] Note that the data coverage varies across jurisdictions. While Patstat provides complete coverage for example for the US, China, and all members of the European Patent Convention, filings are incomplete especially for middle income countries such as South Africa or Brazil.

Figure 22: Share of applicants filing only domestically and applicants filing both domestically and abroad (application year 1991-2010)

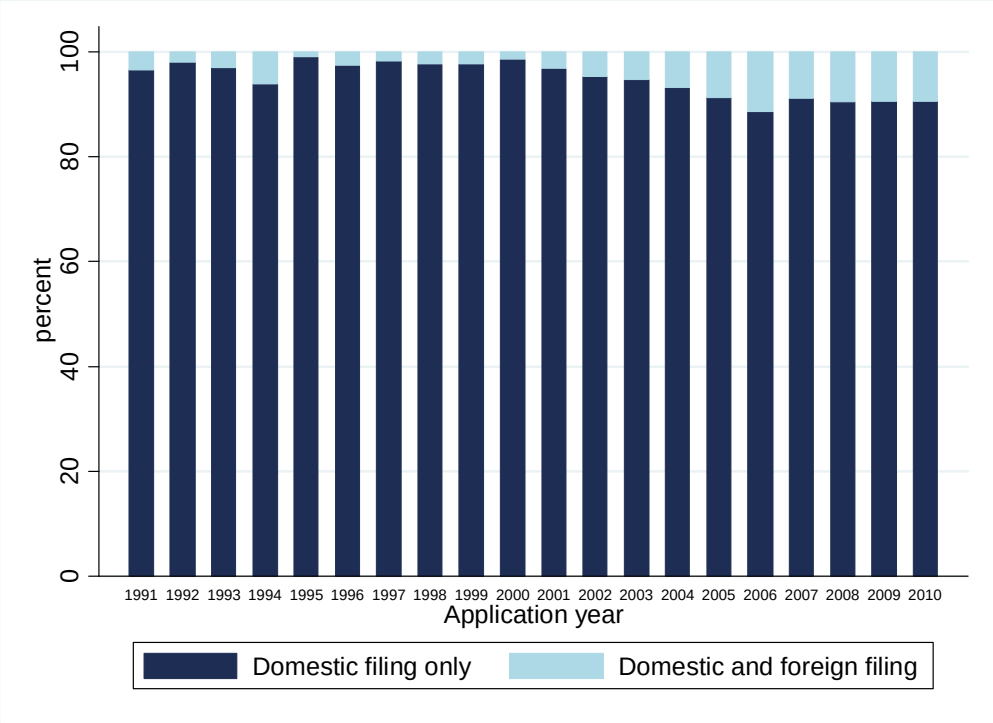
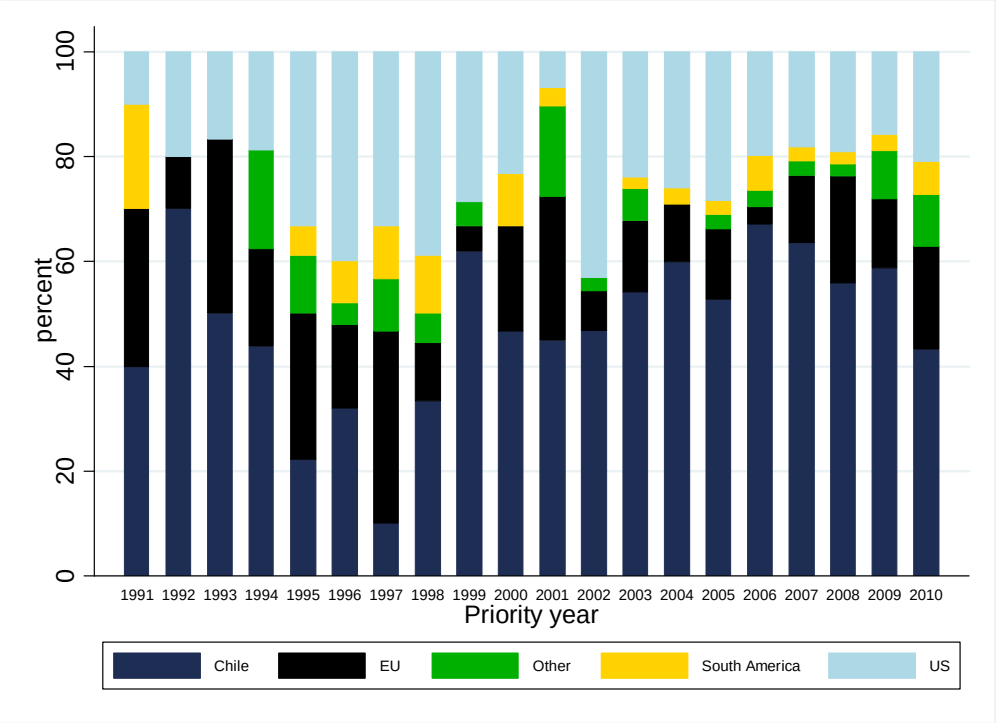


Figure 23 shows the distribution of all international patent families with at least one Chilean applicant according to priority filing authority. Interestingly, Chile accounts for almost half of all priority filings. This may suggest that half of the inventions underlying these patent families also originate in Chile and are considered sufficiently promising to seek patent protection abroad. The most important foreign offices of first filing are in the US and Europe, accounting on average for almost 42% of all priority filings. Other South American countries, in contrast, are rarely the jurisdiction of the first filing.

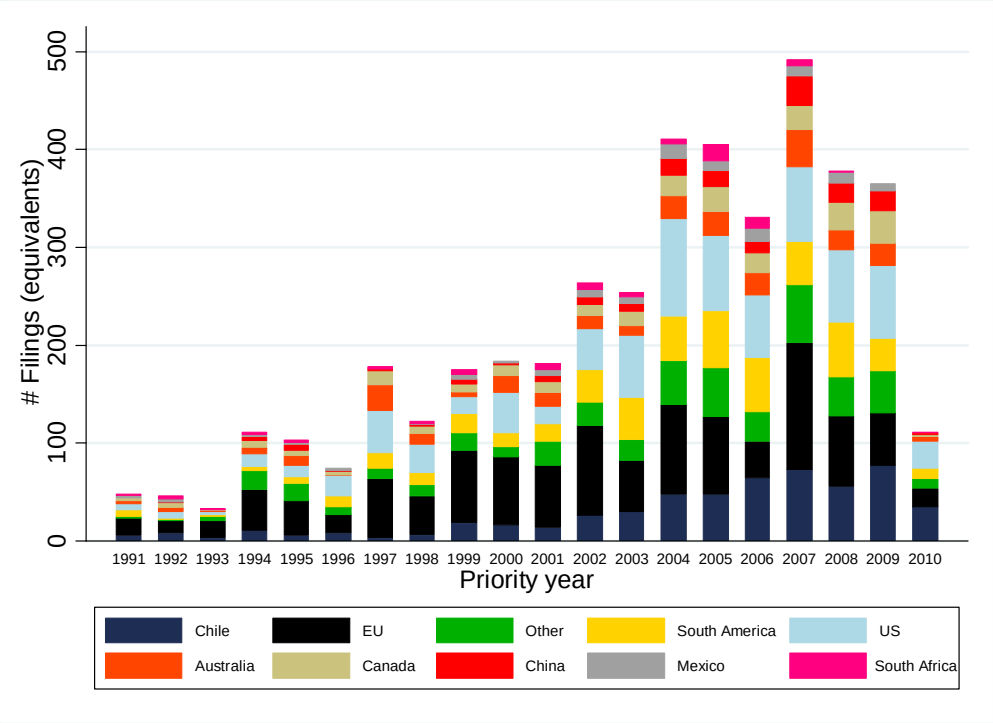
Figure 23: Office of priority filing of international applications by Chilean applicants (1991-2010)



To gain more insight into where Chilean applicants file patent applications, Figure 24 shows all offices where equivalents are filed (that is, Figure 24 shows all equivalents associated with priority filings). It shows that most filings abroad go to the EU and the US. Other important jurisdictions include Australia and Canada.[32] The figure also reflects the changing worldwide IP landscape: China, Mexico, and South Africa emerge from 2000 onward as important destinations for patents by Chilean applicants.

[32] The most important jurisdictions in the "Other" category are Korea and Japan.

Figure 24: Office of family filing of international applications by Chilean applicants (1991-2010)



To better understand what drives the choice of jurisdiction, Figure 25 plots the technology distribution by jurisdiction. There are some differences in the technology distribution across jurisdictions. Chemicals and pharmaceuticals dominate filings in most jurisdictions. As discussed in Section 7 above, most patents in this area are filed by Chilean companies in the mining industry and universities and those entities frequently seek patent protection abroad. There is also a relatively large share of patent filings in mechanical engineering in Canada, China, and other Latin American countries.

Figure 25: IPC-technology mapping of international applications by Chilean applicants by office of priority filing (1991-2010)

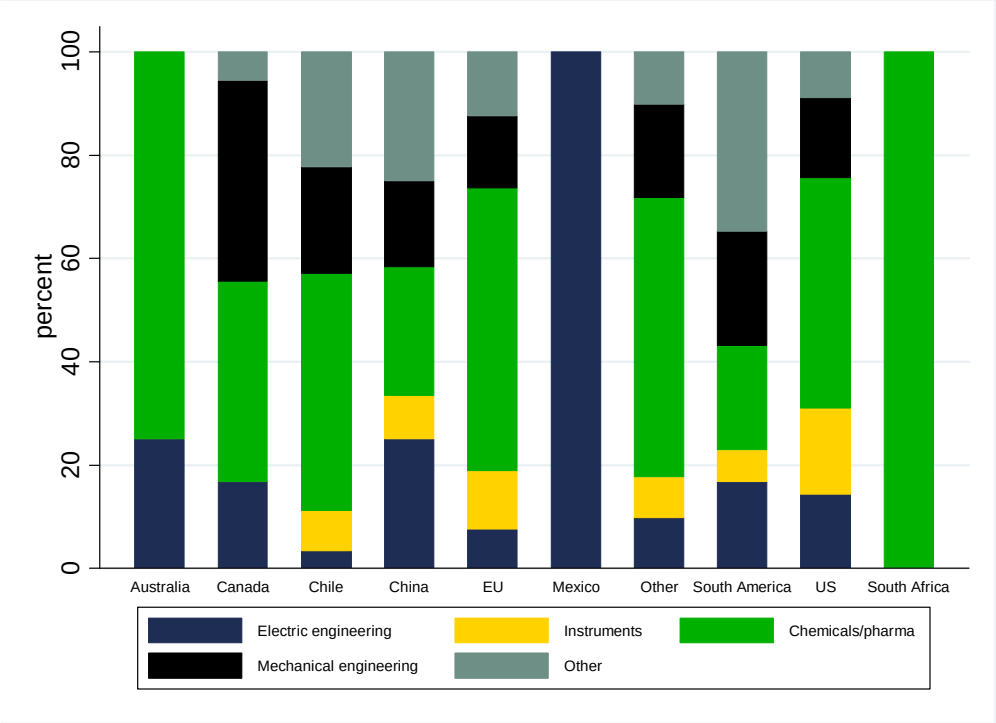


Table 8 lists the top 10 Chilean applicants filing abroad. The table bears similarity with the top 10 resident patent applicants (Table 3). The six universities that appeared in Table 3 are also among the top-10 applicants filing abroad. In addition, Biosigma and Codelco appear in both lists. Vulco and Virutex Ilko, in turn, emerge as top company filers abroad, even though they are not among the resident top-10 filers. Vulco is a mechanical engineering company that mainly serves the mining industry. Virutex Ilko is a consumer goods/chemicals company.

Table 8: Top 10 international Chilean applicants -- patents (1991-2010)

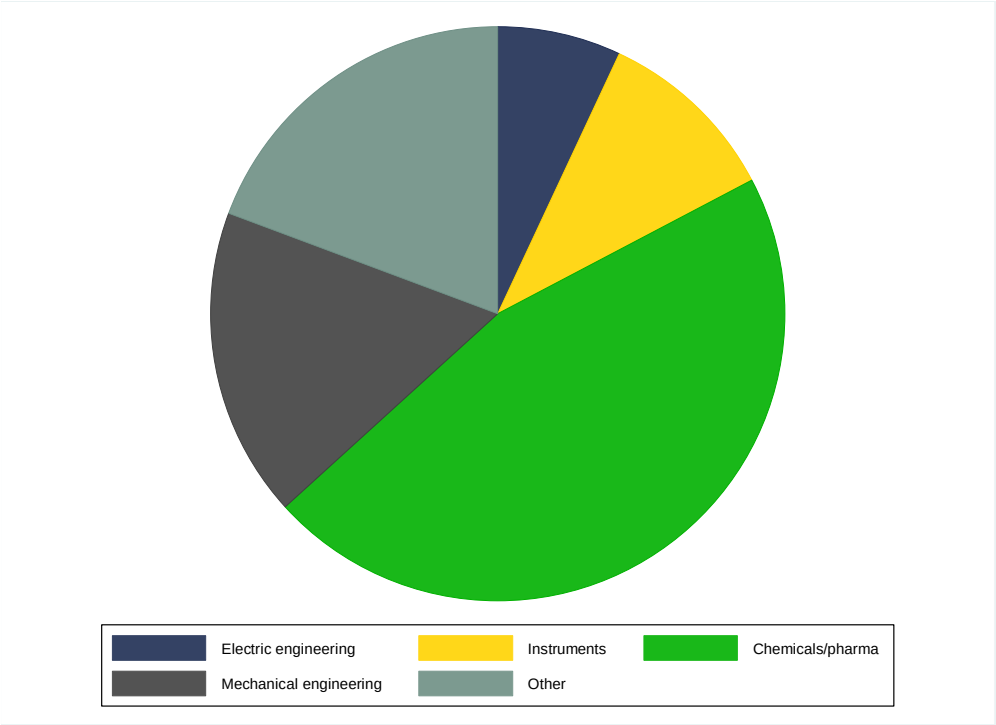
Rank	*Name*	*# Int. families*	*% Total abroad*	*Industry*
1	Universidad de Chile	35	2.17%	University
2	Biosigma*	27	1.67%	Mining
3	PUC Chile	24	1.49%	University
4	Universidad de Concepcion	21	1.30%	University
5	Universidad de Santiago Chile	19	1.18%	University
6	Universidad Tecnica Federico Santa Maria	15	0.93%	University
7	Codelco	15	0.93%	Mining
8	Vulco	13	0.81%	Mechanical engineering
9	PUC Valparaiso	11	0.68%	University

10	Virutex Ilko	9	0.56%	Consumer products
Total		189	11.53%	

* Subsidiary of Codelco since 2002.

Finally, we also extracted from Patstat all patent families that list a Chilean resident among the inventor(s) listed on a patent. We find 799 such patent families with a priority date between 1991 and 2010, accounting for 1,698 Chilean inventors. Figure 26 plots the technology distribution of the IPC codes listed on these patents. The resulting breakdown is similar to the one for patent families with Chilean applicants. The chemical and pharmaceutical fields account for almost half of the total. Mechanical engineering is the second largest field and accounts for around 18%. Most patents in the large "Other" category are related to civil engineering.

Figure 26: IPC-technology mapping of international applications with Chilean inventors (1991-2010)



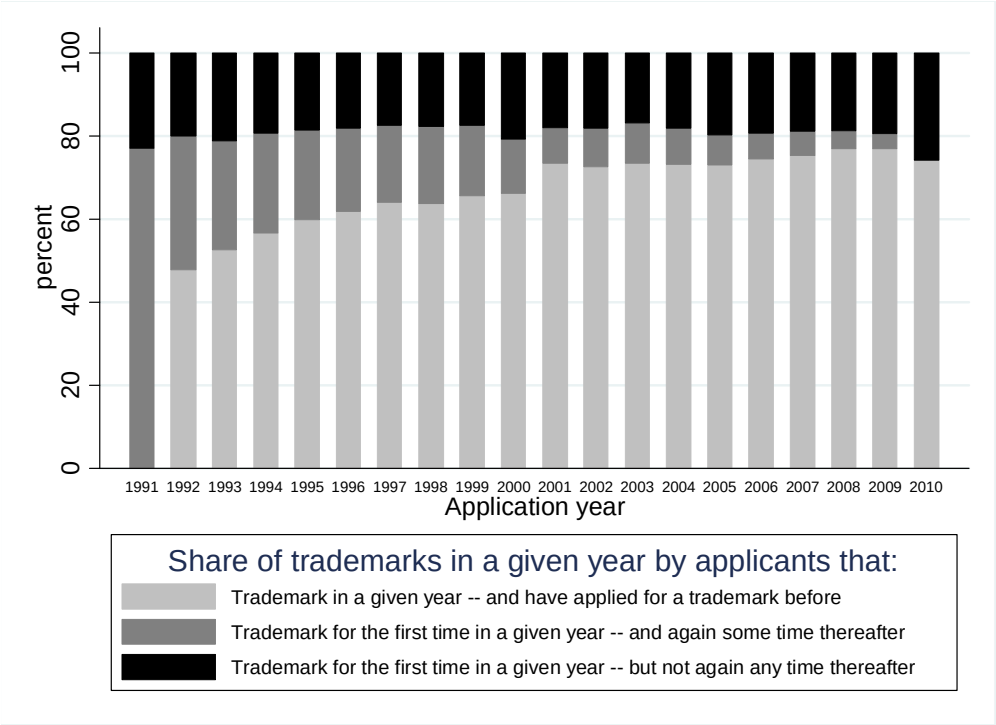
12. A closer look at trademark activity

This section takes a closer look at trademark filings from various angles. Figure 27a looks at persistence in trademark filings. The goal of the figure is to shed light on the

share of trademark filings that are filed by applicants that frequently use the trademark system.

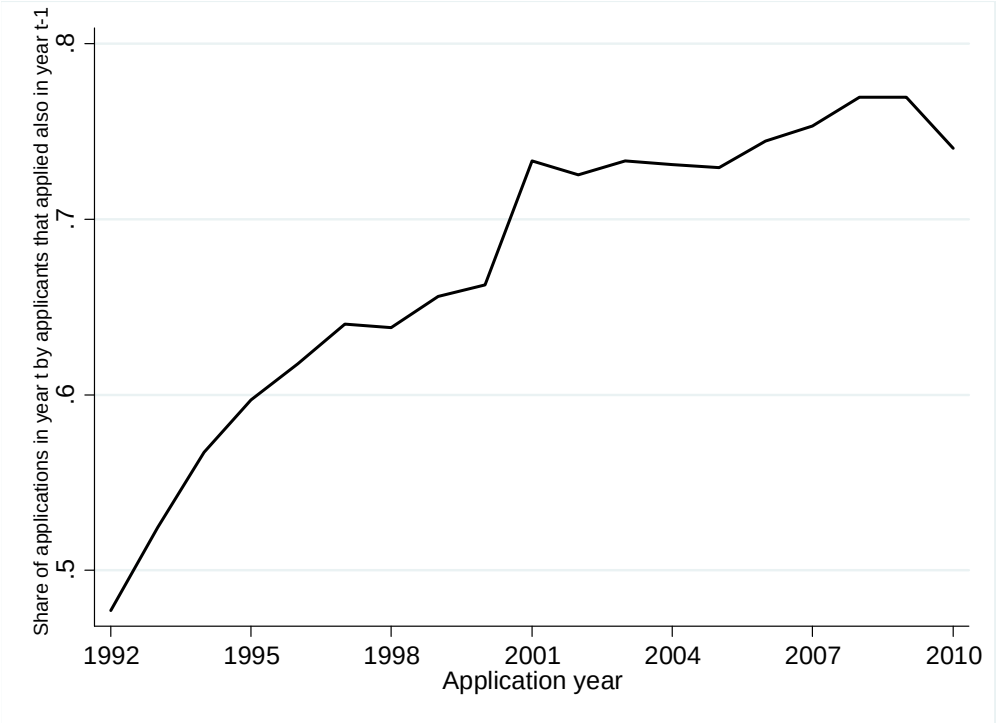
The figure distinguishes between three types of filings: (i) filings by "one-time" applicants that file for the first time in a given year and that do not file again throughout the period under study, (ii) filings by applicants that file for the first time in a given year – which can be interpreted as "entry" into trademarking – and that file again in a subsequent year, and (iii) filings in a given year by applicants that have filed for a trademark already in a previous year. The figure has to be interpreted with caution as it is affected by both left and right truncation of the data; in particular, the bars for the early and later sample years have little meaning. Still, the figure reveals a surprisingly stable share of one-time applicants over time of around 20%. This implies that the observed growth in trademark filings is not driven disproportionately by entry of such on-off filings. Most trademark filings come from repeat-filers suggesting that the underlying trademarks are used for some commercial purpose.

Figure 27a: Persistence in trademarking behavior (1991-2010)



Another way to look at this is to calculate the share of applications by applicants that filed at least one application in the previous year. Starting in 1992, this solves the truncation problem, though it introduces a stricter criterion of what are considered repeat applicants. Figure 27b shows that the share of applications by previous year applicants has consistently increased over the 1992-2010 period, from just below 50% in 1992 to almost 75% in 2010. In other words, repeat applicants have accounted for faster filing growth than non-repeat applicants. A closer look at the data reveals that this is due to an increase in the number of repeat applicants rather than an increase in the average number of filings per such applicant.

Figure 27b: Share of trademark applications in a given year by applicants that also applied for a trademark in the previous year (1992-2010)

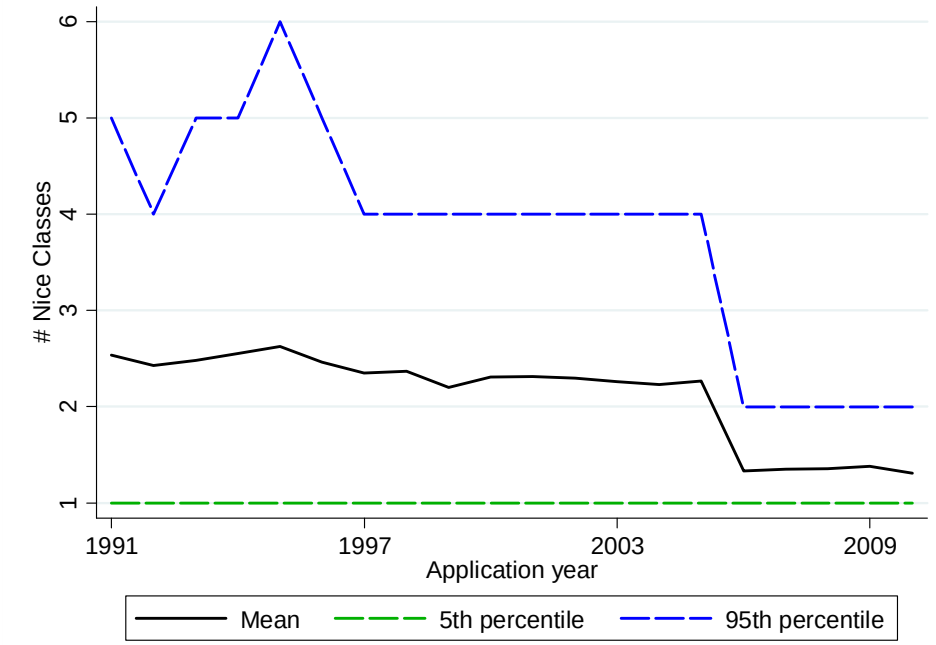


Combining the insights of Figures 27a and 27b, it appears that the rapid growth of trademark filings in Chile has been driven by a broadening applicant base and especially by a growing number of applicants that repeatedly file for trademarks. This pattern is consistent with a diversifying economy, though what precisely are the drivers of the shifting applicant base warrants further research.

Figure 28 shows the average number of Nice classes specified in a trademark application. It shows that on average, trademarks were filed in slightly less than 2.5 Nice classes until 2005. Between 2005 and 2006, the average number of classes drops sharply from 2.3 to 1.3. The figure also plots the top and bottom 5th percentile of the distribution of Nice classes per trademark filing. The top 5th percentile also drops sharply from 4 to 2 Nice classes in 2006. This suggests a strong shift in filing behavior, with most applicants moving from specifying two Nice classes to filing applications in a single class. It is noteworthy, however, that there is no discernible, contemporaneous jump in the total number of trademark filings (see Figure 2). One might have expected to see a jump as companies could have decided to file more trademark applications in fewer classes, but there is no immediate evidence for this.[33]

[33] Of course, we do not know the counterfactual, i.e., aggregate filings could have dropped unless applicants filed for more trademarks in fewer classes.

Figure 28: Average # of Nice classes per application (1991-2010)



Chile introduced in 2012 a multiclass system when the Trademark Law Treaty (TLT) came into force. Before that, applicants could only specify multiple classes within either product (Nice 1-34) or service (Nice 35-45) classes. Figure 29 shows the share of product and service filings in total filings over time. There is a clear trend over time with the share of service trademarks increasing from 24% in 1991 to almost 40% in 2010. This change reflects a general trend in the Chilean economy towards services.

Figure 29: Product and service classes – share of applications (1991-2010)

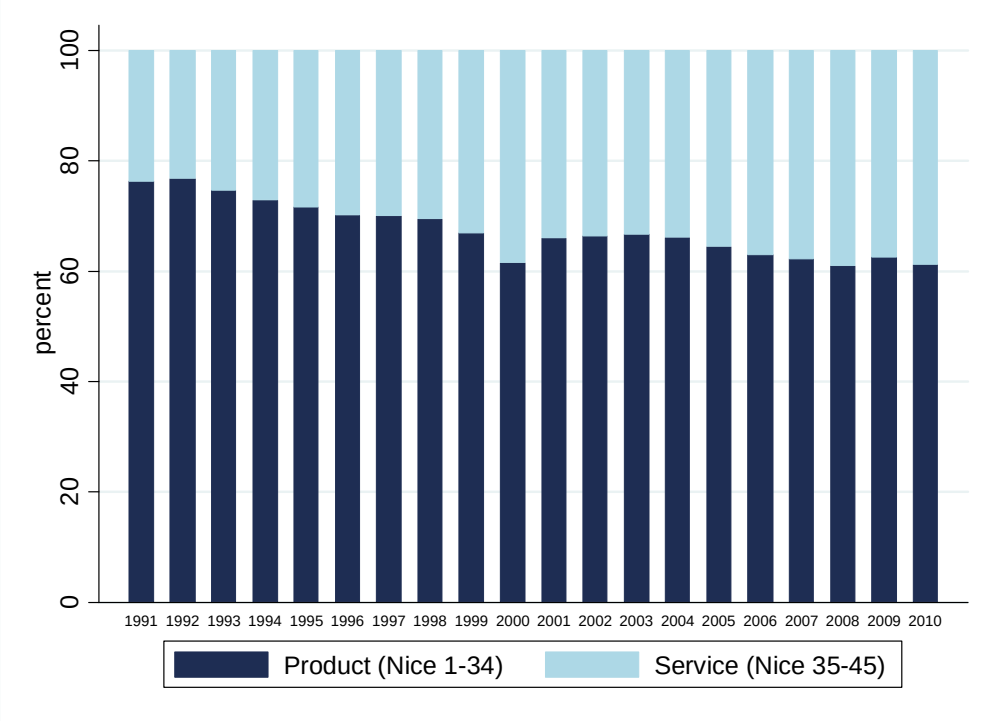


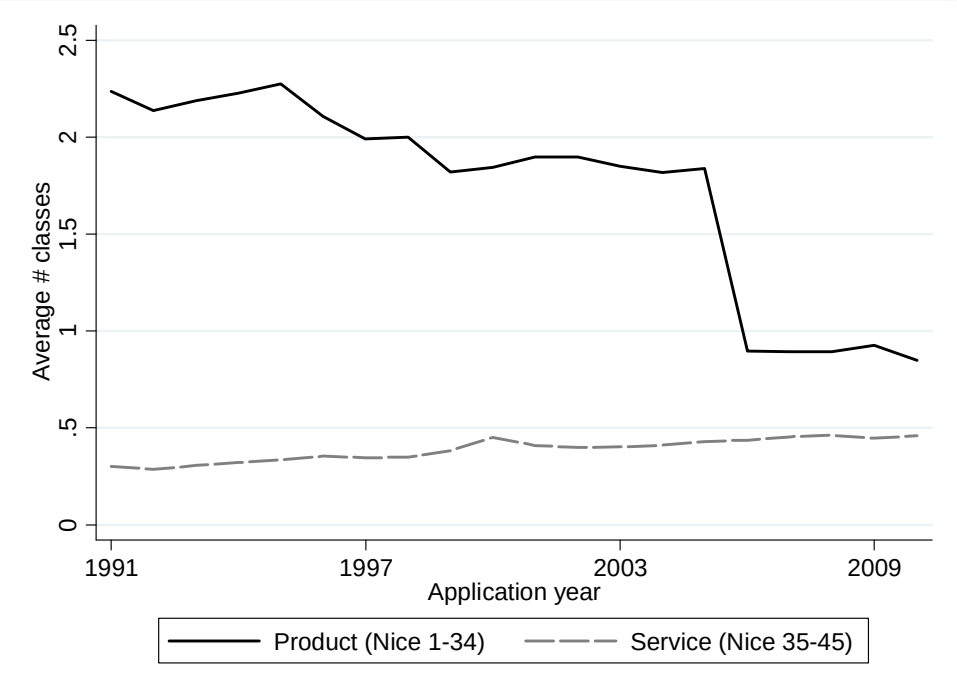
Figure 29 reveals that the drop in the average number of Nice classes per filing in 2005 that was shown in Figure 28 is in fact entirely due to a drop in the average number of product classes per filing. The average number of services classes steadily increased over time and does not show any visible break in 2005.

The drop in the average number of product Nice classes can be attributed to a modification of the application procedure for trademarks which was included in the 2005 amendment of the law.[34] The amendment established the obligation to specify the products that should be protected by each Nice class applied for.[35] Before 2005, trademarks could be filed for all products in a given Nice class without having to specify any products. Through this requirement, the amendment made it more difficult to apply for a larger number of Nice classes. In contrast to product trademarks, service trademarks were already subject to this requirement (having to specify the services that shall be covered by a given trademark class) prior to 2005. This means the 2005 amendment had no direct effect on the filling behavior of service classes. Nevertheless, the strong drop in reaction to this administrational change is surprising.

[34] Law 19.039

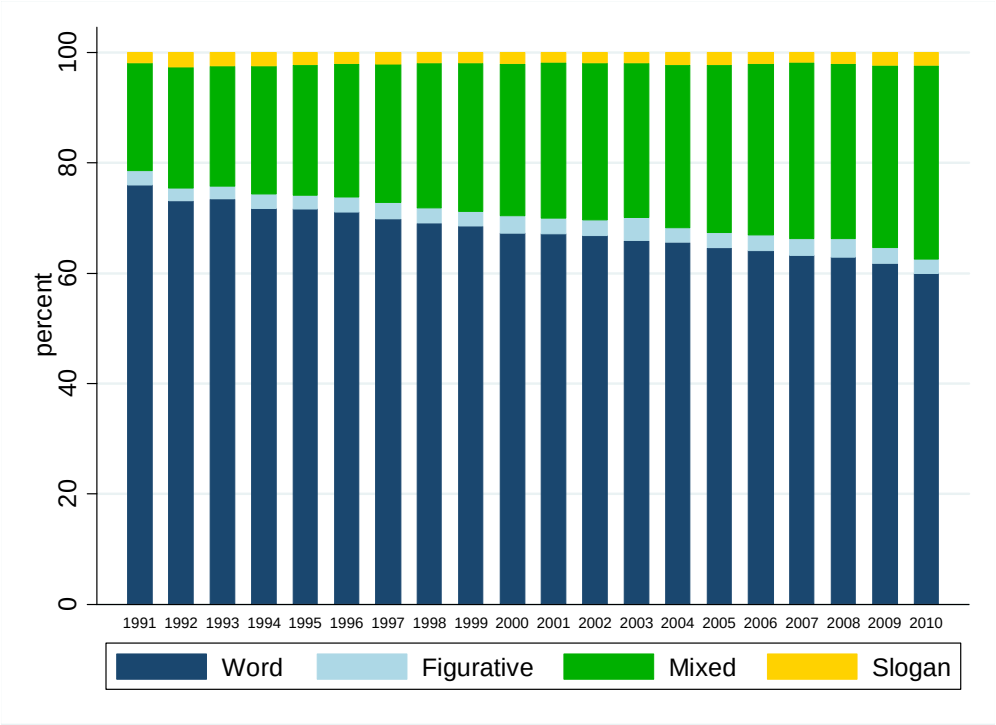
[35] Article 23 Law 19.039

Figure 29: Product & service classes -- share of applications (1991-2010)



Finally, Figure 30 takes a look at the type of trademarks filed. The figure shows the share of word, figurative, mixed, and slogan trademarks in total filings. The number of sound marks, appellations of origin and geographic indications is close to zero over the time period analyzed and hence excluded from Figure 30. Word marks account for the largest share of trademark filings, although the share of mixed (word and figurative) filings increased substantially over time – from 20% in 1991 to 35% in 2010. The shares of figurative and slogan marks remained relative stable over time.

Figure 30: Trademark types -- share of applications (1991-2010)



13. Conclusion

This report studies the use of IP in Chile using data constructed under a joint INAPI-WIPO project that contain the population of patent, trademark, utility model, and design filings over the period 1991-2010. The database contains harmonized applicant names across all four types of IP, which allows us to look at the use of IP from various angles.

Our analysis shows that the number of patent filings has more than tripled since the IP law was enacted in 1991. Nevertheless, like in most other middle income countries, patent use as reflected in the total number of filings – slightly over 3,000 in 2008 – is still relatively modest. In contrast, trademarks are used intensively. Filings increased from slightly less than 30,000 per year in 1991 to more than 44,000 in 2010. This puts Chile among the top trademarking countries relative to GDP worldwide. The use of utility models and industrial designs remains low throughout the two decades, even relative to countries of similar income levels.

Our data reveal that over 90% of patents are filed by non-residents. Most of these patents are filed by multinational pharmaceutical and chemical companies. It means that most patents filed in Chile – around 60% – are related to chemicals and pharmaceuticals, which contrasts with the technology composition of patent filings in developed countries. Industrial designs are also overwhelmingly used by non-residents, with only 16% of filings coming from residents. Trademarks, in contrast, are overwhelmingly filed by domestic entities and so are utility models. Trademarks are

widely used across the economy. Agricultural products account for the largest share of trademark filings, a category which includes wine and fruit products. There is also a large share of trademarks related to pharmaceuticals.

The great majority of patents are assigned to companies; a considerable number of Chilean universities file for patents and they are among the top resident patentees. Other top resident patentees are companies in the mining industry. Trademark filings come from both companies and individuals.

Looking at the origin of non-resident filings, the data show that the great majority of non-resident filings across all four IP forms come from the United States and Europe. Other South American countries, in contrast, account for only a small share of filings. For example, for patents they represent only 2% of all filings between 1991 and 2010, whereas the US and EU combined account for more than 80% of filings.

We also look at the joint use of different IP rights. More than 90% of applicants only apply for trademarks and less than 5% of applicants apply only for patents. Applicants that apply for more than a single type of IP right are rare; they account for only 2% of applicants. The joint use of different IP rights is limited to patents and trademarks as well as trademarks and design rights. A breakdown by applicant type shows that a large share of universities files for both patents and trademarks.

The data show that trademarks were filed on average in 2.5 Nice classes until 2005. Due to a change in the law in 2005, the average number of classes dropped sharply to 1.3 classes in 2006. This drop in the average number of Nice classes per filing is due to a drop in the average number of product classes per filing. The average number of services classes, in contrast, steadily increased over time. This is because the legal change in 2005 did not affect filings in service classes.

The INAPI-WIPO dataset also allows us to unveil co-assignment patterns in patent filings. Co-assignments are interesting as they reveal underlying research co-operations between universities and industry as well as among product market competitors. Like in other countries, co-assigned patents account for a small share of patent filings in Chile – on average less than 3% between 1991 and 2010. We find that most patents are co-assigned among non-resident companies and in fact there is little evidence for international cooperation. The share of co-assigned patents with resident and non-resident assignees is only 8%. Co-assignments involving universities account for around 20% of co-assigned patents, which suggests a significant amount of university-industry collaboration.

We also analyze international patent filings that have at least one Chilean assignee or inventor. We show that for half of the inventions underlying such international patent families the priority patent is filed with INAPI. The most important foreign offices of first filing are the US and Europe. Other South American countries, in contrast, are rarely the jurisdiction of the first filing. China, Mexico, and South Africa emerge from 2000 onward as important destinations for patents by Chilean applicants. International filings by Chilean residents in most jurisdictions are dominated by patents related to the mining industry, chemicals and patents filed by universities.

This analysis provides for the first time broad empirical evidence on the use of IP in Chile. It may assist policy makers in Chile in their efforts to better understand the nature of innovative activity in Chile and to refine innovation and IP policies.

Our analysis reveals some innovative capacity in the mining industry, which covers a wide range of different technologies, and Chilean universities. Our analysis also reveals low use of utility models and registered designs – even in combination with patents or trademarks. While utility models are mainly assigned to Chilean individuals, registered design filings are dominated by foreign companies. There is no apparent explanation for this pattern. This may motivate closer scrutiny, in particular exploring whether these two IP rights fulfill their purpose or whether they overlap with other IP forms in a way that offers little benefits to their owners.

Patent filings in Chile predominantly relate to pharmaceuticals and chemicals and are assigned to large US and European pharmaceutical multinationals. Trademarks, in contrast, are widely used by domestic companies and individuals. The exceptionally large number of trademark filings for an economy of the size of Chile invites further research.

More broadly, this study offers an example of empirical research that can be conducted on the use of IP in middle income economies once an appropriate data infrastructure has been put in place. It also shows the importance of including other IP rights beyond patents in this type of analysis and of analyzing the use of the different forms of IP in combination rather than isolation.

The descriptive evidence provided in this study provides useful insights in better understanding the role of IP in Chile's economy. Of course, descriptive evidence can only go so far in fully evaluating the effects of IP policy choices on applicant behavior and economic performance. Deeper analysis on the basis of the newly available data infrastructure is needed. Indeed, two analytical studies – on the incidence and effects of trademark squatting as well as on the role of patents in the domestic pharmaceutical sector – are currently under way and will be made available separately.

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Appendix 1: The IP system in Chile

Appendix 1.1: Application Procedure for Trademarks

The registration of marks distinguishes between marks for goods, services, commercial establishments, industrial establishments, slogans, and geographical indications or appellations of origin. Applicants have to provide information about themselves and their potential legal representatives. The application form has to specify the requested trademark, the description of the mark and the requested Nice class(es).

The procedure for registering a trademark in Chile has two stages: (i) the filing of an application, its formality examination and publication in the Official Gazette; and (ii) a substantive examination. In case of opposition, the case is evaluated in parallel with the substantial examination stage. The application fee for a trademark is around USD$ 85 per class. Before 2012, applicants could only apply for product or service classes, but not for a combination of both.

Formality examination
The formality examination ensures that an application meets formal requirements, but does not provide any assessment of the application's merits. If an application meets the formal requirements, it is published in the Official Gazette for which a publication fee is charged. The publication cost depends on the size of the application; on average it costs USD$38. After publication, third parties have 30 days to file an opposition. If no opposition is filed, the procedure passes on to the substantial examination stage.

Opposition
The opposing party has to be represented by an attorney. All information related to the opposition is publicly available. The applicant has 30 days to respond to the opposition.

Substantive Examination
After the 30 day period to file an opposition, the application is substantively examined. The examiner carries out searches for similar marks within the Nice class for which coverage is requested as well as related classes. However, a search can also be carried out in all related classes to determine the existence of trademarks that can create confusion. In Chile, trademark examiners must identify all possible causes for rejection. Different grounds for rejection are not mutually exclusive and can be invoked in combination. However, a single ground is sufficient to reject a trademark application.

If an application successfully passes the substantive examination, the trademark is registered. At this point, another fee of around USD$170 per class is payable. If a trademark is rejected, the applicant can file an appeal to the Industrial Property Tribunal within 30 days.

Cancellation of Trademarks
The procedure to cancel a registered trademark is similar to the opposition procedure. The owner of the trademark has 30 days to respond. INAPI opens a 30 day term for both

parties to present evidence. This period may be extended for 30 days. If INAPI cancels the trademark, it will be considered invalid counting from its grant date.

Appendix 1.2: Intellectual Property Rights Enforcement

According to Chilean law, IP infringement can be sanctioned by both civil and criminal courts, depending on the type of infringement. IP rights are enforced in civil or criminal courts.

The Chilean industrial property law considers the following as acts of infringing of:

a) A trademark:
    a. Commercial use in bad faith of a trademark equal or similar to another trademark that is already registered for the same products, services or establishments related to the registered trademark;
    b. Commercial use of a non-registered, expired, or cancelled trademark, falsely indicating that it is a registered trademark;
    c. Commercial use of packaging that contains a trademark without the right to use it or without having deleted the trademark before using the packaging.
b) A patent:
    a. Commercial use of a patented invention in bad faith.
    b. Commercial use of a patent on a non-patented object or of an expired, or cancelled patent;
c) Integrated circuit topographies, utility models, industrial designs and drawings: [36]
    a. Commercial use in bad faith of a registered integrated circuit topography, utility model, industrial design or drawing.
    b. Use of an integrated circuits topography right, utility model, industrial design or drawing for commercial purposes despite of the absence of a registered right.

Criminal enforcement
All offenses are punishable with fines between US$2,125 and US$85,000. In case of repeated offenses, fines can double (they are capped at US$170,000). Both compensatory damages and the payment of reasonable attorney and court costs are available. All material that enabled infringement as well as all infringing goods can be seized and destroyed.

Civil Enforcement
The holder of an infringed IP right can, in all cases, file a civil claim requesting:

- the cessation of the infringing acts;
- the adoption of measures to prevent the continuation of the infringing acts;

[36] Article 61 and 67 Law 19309

- publication of the judgment at the expense of the losing party in a newspaper chosen by the winning party.[37]

Damages can be calculated based on tort law or by determining them through a) lost profits, b) profits earned by the infringer as a result of the infringing acts, or c) forgone royalties.[38]

According to the law, entities that produce or market infringing products are liable for damages only if they are aware of the fact that they are infringing an IP right.

Civil remedies, except for those considered as "restitution actions" can be obtained in criminal procedures. This and the fact that criminal procedures are generally faster and carried through by a government prosecutor (with or without the help of a private attorney), make criminal claims more common than civil claims.

Appendix 1.3: Restrictions on patentability[39]

According to Chile´s Industrial Property Law, inventions, in all technical fields can be protected if they are new, involve an inventive step and are capable of industrial application. Patent protection lasts for 20 years from the date of application and can be extended in cases of unreasonable delays in the examination process.

Patents cannot be obtained for:

- Discoveries, scientific theories and mathematical methods.
- Plant varieties (although protection is granted through a plant variety protection system in accordance with UPOV 91) and animal breeds.
- Economic and mental methods related to purely mental or intellectual activities or to games.
- Methods of surgical or therapeutic treatment of the human body or animals, as well as diagnostic methods, except for products intended to implement one of these methods.
- Inventions contrary to the law, *ordre publique*, and national security. The 2005 amendment also excluded all those inventions that harmful to health, the environment and the life of persons, animals and vegetables.
- A new use unless it solves a technical problem with no prior equivalent solution and the invention is physically modified to achieve this solution.
- Living organisms as found in nature and biological material as found in nature even if isolated. Procedures using biological material that is properly disclosed are patentable.

Relevant modifications to the patents system

[37] Article 107, Law 19,039
[38] Article 108, Law 19,039
[39] More details in Articles 37 and 38 of Law 19039.

Since its enactment, the Industrial Property law has undergone two major amendments, which adapted the national legislation to the standards set forth in the TRIPS Agreement and several Free Trade Agreements signed by Chile.

The 2005 amendment
Although most of the standards set in the TRIPS agreement where introduced in 1991 with the enactment of Law N° 19.039, some important changes were needed and approved in the 2005 amendment. The following are the main modifications:

- Period of protection: until 2005, patents were granted for a period of 15 years from the date of grant.
- Elimination of pipeline patents: the 1991 law made patents available in all fields of technology, including pharmaceuticals. Pipeline patens or "revalidas" were allowed. According to the law, and regardless of the date of priority, patents granted or pending in another jurisdiction could be filed in Chile, and granted for the remaining statutory validity period in the country of origin or 15 years from the date of approval whichever is shorter. Pipeline patents were eliminated from the system in 2005.
- Elimination of so-called improvement patents: prior to the 2005 amendment, patents were also granted for improvements to inventions, as long as they were new, well-known and relevant. For improvements to be patented the authorization of the original inventor was required and the patent was granted only for the remaining lifetime of the original patent.
- Elimination of precautionary patents: precautionary patents were granted for a period of one year in cases where public experimentation was required. These patents were replaced by a grace period of one year. The grace period applies to all public disclosures made or authorized by the inventor or as a consequence of unfair practices.
- International exhaustion: the 2005 amendment introduced the possibility of parallel imports, giving continuity to the international exhaustion doctrine that had been applied by the antitrust authorities.
- Compulsory licenses: rules regarding compulsory licenses where introduced to reflecting the provisions of the TRIPS Agreement.
- Revocation procedures: the 2005 amendment reduced the time to file a claim for revocation from 10 to 5 years since the date of grant.

The 2007 amendment
- The 2007 amendment included extensions of the patent term for unreasonable delays in the processing of a patent application or in the processing of a sanitary permit for pharmaceutical products protected by a patent. Extensions are available to all patents, for all unjustified delays provided that the granting of the patent occurs 5 years after the filing date, or the request for examination occurs 3 years after the filing date. The Industrial Court is responsible for deciding on such unjustified delays on a case by case basis. The Industrial Court is a court of first instance, whose decisions can be appealed.
- The 2007 amendment introduced a so-called Bolar exemption.

Appendix 1.4: Application procedure for patents, utility models, industrial designs, drawings and integrated circuit topographies

Application requirements
There is a single application form for patents, utility models, industrial designs, drawings and integrated circuits. In addition to this application form, the applicant must file a technical form, a descriptive report, the claims and if applicable technical drawings.

The technical form must include a summary of the invention, its scope and the problem that it aims to solve.[40] In the case of integrated circuit topographies, industrial designs and drawings the technical form is not required.

The descriptive report is a document that contains a detailed and complete description of what shall be protected. For patents and utility models, this document has to contain a description of prior art, a description of any included drawings, a detailed description of the invention and an example of an application.[41] For industrial designs, the descriptive report must describe the industrial object in question and its application. Also, a description of the drawings and a detailed description of the geometrical characteristics of the design (describing proportions or dimensions) must be enclosed. In the case of drawings, the descriptive report must describe the industrial drawing. The claims describe the invention for which protection is sought.[42] No claims need to be filed for industrial designs, drawings and integrated circuit topographies.

The technical drawings include flow charts, graphs and schemes. Drawings must omit any kind of label or explanatory text. The explanatory text of each drawing must be included in the descriptive report.[43] The drawings of industrial designs shall contain at least a top plan view, elevation, profile and perspective. Other views may be required, depending on the complexity of the design.[44]

There is an application fee of USD$ 85 (1 UTM).[45] This payment is the same for patents, utility models, industrial designs, drawings and integrated circuits.

There are two stages in the application procedure: (i) the filing of an application, formality examination, and publication in the Official Gazette; and (ii) substantive examination.

Formality Examination

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[40] See article 38 Law 19309
[41] See article 39 Law 19309
[42] See article 41-44 Law 19309
[43] Article 46-48 Law 19309
[44] See article 54 Law 19309
[45] Unidad Tributaria Mensual: an amount of money determined by law and expressed in Chilean pesos which is permanently updated by the Consumer Price Index (IPC) and used as a tax measure.

Once the application is submitted, INAPI performs a formality examination of the application, verifying that the required documents have been filed and that the application satisfies the minimum formal requirements.

INAPI informs the applicant if the formal requirements are not met. The applicant has 60 working days to amend or correct the application. If such an amendment or correction is not made within this period, the application will be considered as void.[46.]

If the formal requirements are met, INAPI publishes an extract of the application in the Official Gazette. In order to do so, a publication fee is required. The cost of the publication depends on the application's size. All the records of the application will be public as from the publication date. There is no legal requirement for a minimum delay between application and publication.[47] If no request for publication is made within the 60 days period, the application is considered abandoned. If the applicant wants to resume the application after the 60 day period, the applicant must request the reopening of the application and request publication within 120 working days, counting from the date on which the application was declared abandoned. Otherwise, the request is definitely considered abandoned. After publication, third parties have 45 days to file an opposition. If no opposition is filed, the procedure passes on to the substantial examination stage.

Opposition
The opposing party needs to be represented by an attorney to file the opposition, so attorney fees may apply. All information related to the opposition is publicly available.

The applicant has 45 days to respond to the opposition. If there are substantial, relevant and controversial facts, INAPI will send a notification to the applicant.

The complainant has 45 days to present relevant evidence and may obtain an extension of another 30 days. The parties are entitled to present any type of evidence except for testimonials.

Substantive Examination
If there is no opposition or if the application survives opposition, the applicant has 60 days to pay the examination fee.[48] If the payment is not made, the application is considered abandoned.[49] The examination fee varies depending on the intellectual property right. In the case of patents the fee is $427.000 Chilean pesos (approx. US$ 854

[46] Article 45 Law 19039
[47] Some countries have a term of 18 month from the application date to the publication of the application.
[48] Article 8 Law 19039
[49] As in the publication stage if the applicant wants to resume the application after the 60 days period, the applicant must request the application´s reopening and pay the examination fee within 120 working days, counting from the date the application was considered abandoned. Otherwise, the request is definitely considered abandoned. (Art 8 Law 19039).

dollars); in the case of utility models it is $343.000 (approx. US$ 686 dollars) and for industrial designs and drawings it is $287.000 (approx. US$ 574 dollars).[50]

Once the examination fee has been paid, INAPI assigns the application to an examiner according to the technical area of the application. The examiner has 60 working days to issue the examination report.[51] The examination report contains a technical analysis of the application, intended to verify whether the application meets the statutory patentability requirements set forth in Law 19.039. If the examiner comments on the application, the applicant has 60 days to respond the examiner. If there are no comments and the application meets the statutory requirements, the right is granted.

Once the application has been granted, the applicant has to pay the grant fee. The final payment depends on the effective term of the IP right. For patents, the effective term is 20 years. Once the application is granted, the applicant must pay 3 UTM (approx. US $255 dollars). After ten years counting from the filling date the applicant must pay 4 UTM (approx. US $340 dollars) to renew the patent.

For utility models, industrial designs, and drawings the effective term is 10 years. Once the application is granted the applicant has to pay 1 UTM (approx. US $85 dollars). After five years counting from the filling date the applicant must pay 2 UTM (approx. US $170 dollars) to renew the right. In case of non-payment within that period, the application is considered abandoned.

Revocation of Patents
Requests for revocation have to be submitted to INAPI. In the case of patents and utility models, revocation may be sought in respect of all or individual claims. The IP right holder has 60 days to respond. INAPI requests a report by one or several experts. The experts are appointed jointly by the parties or, in case there is no agreement, by INAPI. Once the expert report has been issued, the parties have 60 days to respond. In case there are controversial issues, there is another 45 day term to present additional evidence (with the possibility of second extension of 45 days). If INAPI revokes the IP right, it is considered void *ab initio*.

[50] These values have been adjusted on January 2012.
[51] Art 7 of Law 19039

Appendix 2: The INAPI-WIPO Intellectual Property database

Appendix 2.1 Introduction

The objective of this appendix is to explain how we transformed the raw data provided by INAPI into a database that can be used for statistical and economic analysis. We discuss various challenges posed by the data and how we tackled them.

Appendix 2.2 Description of the Raw Data

This section describes the raw data that were obtained from INAPI in June 2011.

2.2.1 Characteristics of the raw data

The raw data provided by INAPI contain the population of published trademark, patent, industrial design, and utility model applications filed between 01/01/1990 and 10/06/2011. This includes all applications that have been published, although there are also records without a publication date.

Structure of files:

The raw data were provided in.csv format. We obtained a total of sixteen data files that contain the patent, industrial design, utility model and trademark data. The patent data files contain patents, industrial designs, and utility models.[52] For ease of exposition, the discussion and tables, therefore, subsume utility models and designs under the patent category (for a breakdown see Table A15).

For both patents and trademarks, the different data files can be linked by a common identifier.

The most relevant information for the construction of our database is the applicant information (contained in "applicants.csv") and the data on trademark and patent applications (contained in "trademarks.cvs" and "patents.csv"). Both files contain five variables each:

- Sol_nro (numeric 10): Application number (unique identifier of filing)
- Pro_cod (numeric 10): Internal code
- Pro_nom (varchar 120): Applicant name
- Pro_pais char(2): Applicant country
- Pro_direccion (varchar 150): Applicant address

Raw Data Description:

[52] The data also contain industrial drawings and precautionary patents.

Tables A1 and A2 show the raw patent and trademark data by application year. Table A1 shows that there are 778,095 trademark applications between 1990 and 2010. The number of applications has increased steadily up to 2008 (the figures for 2009 and 2010 may be still incomplete). The table also looks at applicants, which are counted by applicant names. These are the `raw' names as received from INAPI so they have not been cleaned or corrected. This means the figures in Table A1 are likely to over-count the number of unique applicants. The table shows that there is a total of 220,064 unique applicants, with their number also steadily increasing from around 11,200 in 1990 to 19,500 in 2008. The table distinguishes between residents and non-residents based on a country identifier in the data. It is possible that the same applicant files both with a Chilean and a foreign country identifier, in which case the applicant would show up both as a resident and non-resident.

In the trademark data, the applicant's RUT (tax identifier) is available (as reported by the applicant), which in principle could serve as a unique identifier of the applicant. Table A3 shows the raw data received from INAPI where we classify RUTs according to RUT length. According to the Modulo 11 algorithm, correct RUTs should have 9 digits. In our raw data, the last digit ("digito verificador") is often separated with a dash, which means correct RUTs should have 9 or 10 digits in our data. The table shows that about 36% of RUTs have a length different from 9 or 10. Moreover, in principle, RUTs are reported only by domestic entities (although foreign applicants may also apply for a RUT), hence the presence of RUTs for a non-negligible number of foreign applicants prompts questions. While the length of a RUT is an indicator of whether a given RUT is correct, the Modulo 11 algorithm allows us to verify if a given RUT is indeed valid. Table A4 shows that about 30% of RUTs are invalid. While this also implies that 70% of RUTs are valid, this does not mean that a valid RUT corresponds to the associated applicant. The correspondence between RUT and applicant name is verified in a separate step as discussed further below.

As mentioned above, there are no RUTs available for applicants of the other IP forms. Applicants are only identified through the name provided on the application form.

Appendix 2.3 Data challenges

The main challenges in the creation of our database are the identification of unique applicants and their RUT as a unique identifier (for entities registered in Chile). To identify unique applicants and RUTs, information on applicant names, the corresponding country of origin and RUT in case of domestic applicants was required.

There is an important difference between the trademark and patent data: while trademark applicants are required to provide a RUT, this is not the case for patent applicants. This implies that there is no information on RUTs in the patent data regardless of the nationality of the applicant. While trademark applicants are required to provide a RUT, this does not automatically imply that the RUT provided is valid and/or belongs to the applicant name provided on the application form. While in

principle the RUT is only applicable to companies registered in Chile,[53] as shown in Table A3 foreign companies may still report a RUT, which is in most cases either that of a Chilean legal representative or an artificial RUT assigned by Chilean administrative bodies to foreign companies (this RUT does not uniquely identify the foreign company instead it is that of for example INAPI). In both cases, there is no unique correspondence between the RUT and the foreign applicant.

Therefore, there are two distinct problems. First, we need to identify unique applicants. The second problem consists in assigning a valid RUT to each domestic applicant where the RUT is unique in the sense that it is only assigned to a unique applicant. However, an applicant may still be found to have more than a single RUT, as will be explained in more detail below.

2.3.1 Identification of unique RUT for each applicant

The first problem consists in the identification of unique applicants. The problem arises among other for the following reasons:

a) Same name written in multiple ways

There is no standard format to enter the name of an applicant. This implies that it is not possible to identify automatically the different applications made by the same entity. Also, there is no unique way of spelling an applicant name or the legal form of companies. For example, the same company can be registered as “sociedad anonima”, “sa” or “soc anom”. Applicant names may also appear in various shuffled forms, such as ”Jaime Ignacio Mendez Reveco” who can also be found as ”Mendez Reveco Jaime Ignacio.” A problem also arises in the case of abbreviations and acronyms, such as “Pontificia Universidad Catolica de Chile” which can be found also as “PUC”.

b) Spelling mistakes

Due to the lack of an automatic spell check, applicant names may be misspelled. This applies equally to foreign and national applicants. This may involve minor omissions such as in the example of “Tresmontes Lucchetti sa” which also appears as “Tresmontes Luchetti sa” or “Tresmontes Lucheti sa”. It may also involve cases were names can only be guessed due to numerous misspellings. For example the name “Garrido Badilla Aide” was found also as “Garrido Badilla Haydee”.

c) Names contain additional information

Applicant names may contain additional information beyond the name. Companies may for example provide information on their legal registration form. A large number of foreign applications contain information about their geographic origin (e.g. “sociedad anonima organizada en conformidad a las leyes del estado de Pennsylvania”). Also, in some cases there is information on the designation of the origin of a trademark or the

[53] Foreign companies can still obtain a RUT.

percentage of ownership in case of jointly owned patents (e.g. "34 Universidad Catolica Chile 36 Rossana Ginocchio 20 Cimm 10 Miguel Herrera Marchant").

d) Name changes over time

There are several reasons why company names change over time. It can be the result of a merger, the acquisition by another company or simply a decision by the company to change its trading name. INAPI´s database does not keep track of such changes which means that different applications by the same company cannot be identified in case it has changed its name. For example, the company "Luchetti s.a." was bought by "Corpora Tres Montes s.a." in 2004. After the acquisition the company was re-named "Tresmontes Luccetti s.a.". Another example is the company "Bellsouth Chile s.a." which was renamed "Telefonica Moviles Chile s.a." after its merger with "Telefonica".

e) Multiple applicants

INAPI´s application form does not allow more than one applicant name. This means that in the case of the co-assignment of a patent or trademark, the names are written in the same field. This situation makes it necessary to separate for each application the different applicant names in order to identify each unique applicant. Due to the lack of a standardized way of separating names (e.g. "Astrazeneca ab Astex Therapeutics ltd"), such fields have to be split manually.

f) No records of re-assignments of IP right

There is no record of the changes of IP owners. This means that is not possible to know if an IP right is sold to another company or individual, and hence in our database, IP rights remain with the original assignee. This is a data problem that we are unable to address without additional information.

2.3.2. Identification of unique RUT for each applicant

The second problem, which is closely related to the first, is that in principle RUTs should uniquely identify domestic applicants. This may not be the case *inter alia* for the following reasons:

a) No RUT

There is no RUT available in the patent data. This problem applies to a few trademark applications too as shown in Table A3.

b) Invalid/incomplete RUT

At the moment of application, INAPI does not verify that the RUT reported by an applicant is valid. Also, there is no standardized format for reporting RUTs. For example in some cases the "digito verificador" is separated by a dash whereas in other cases is not. This makes it difficult to verify and if necessary correct RUTs.

c) Multiple RUT

There are some cases in which the same applicant has reported more than one RUT in different applications. It is possible that Chilean companies have more than a single RUT, which means that the reporting of several RUTs is not necessarily an error. However, different RUTs may belong to different entities or even individuals (e.g. the owner of a company using his personal RUT and the company´s RUT in different applications).

d) "Special" RUT

There are RUTs that are shared by several different applicants. This situation arises because instead of using their own RUT, applicants may use the RUT of their legal representative or the RUT of an institution (e.g. INAPI, Ministerio de Economía). This explains to some degree why the raw data also contain RUTs for foreign applicants. Foreign companies usually do not have a RUT so in many cases they use the RUT of their legal representative. For example, companies such as "Merck", "Xerox" or "Adidas" share the same RUT in the raw data, where the RUT belongs to the law firm "Sargent & Krahn ltda".

e) Same RUT shared by multiple applicants

Finally, there are cases were a RUT that is not that of a legal representative or institution is shared by multiple different applicants. This may reflect data entry errors since there is no apparent explanation for this pattern as the different applicants that share the same RUT do not seem to belong together.

Appendix 2.4 Data Base Design

This section describes the procedure used to construct the INAPI patents and trademark database. We applied a combination of automated cleaning algorithms and extensive manual cleaning of the data. The objective of the procedure was to obtain an "applicant dictionary" that uniquely identifies applicants that may appear in the database in various incarnations and the associated valid RUTs through a unique applicant identifier (ID).

2.4.1 Trademark Data

We begin the construction of the database with the trademark data. The main reasons for proceeding in this way are that (a) RUTs are only available in the trademark data and (b) the number of applicants by far exceeds that of the patent data. Since often patenting entities also obtain trademarks, by cleaning the trademark data we are likely to indirectly clean a substantial part of the patent database. Note that we make simultaneous use of both applicant names and RUTs to identify unique applicants as well as unique RUTs.

a) Cleaning and standardization of applicant names

As a first step, we standardize applicant names. This means for example removing blanks, removing special characters, correcting generic spelling mistakes, standardizing company registration forms, dropping designations of origin etc.

b) RUT correction

In a second step, we apply the Modulo 11 algorithm to verify whether RUTs are valid. In case we find a given RUT to be invalid, we attempt to correct it. We also mark all RUTs that belong to `special' entities (see d) in Section 2.2.2 above), such as law firms or INAPI etc. In these cases, the marker indicates that the RUT does not belong to the applicant name, but instead to a `special' entity. For this purpose, we compiled a list of such `special' entities.

c) Identification of unique applicants

Having cleaned applicant names and corrected RUTs, we proceed with the identification of "unique" applicants. Unique means that while a given applicant name may show up in different ways, we associate the different names to a single applicant. To help the identification of unique applicants, we divide the data in four "data types":

1. Unique "RUT + applicant name + country" combinations; these are seemingly clean entries. It may still occur, however, that a RUT or applicant name exists in a slightly modified form in the database.

2. RUT duplicates, i.e., cases where RUTs have different "applicant name + country" combinations.

3. "Applicant name + country" duplicates, i.e., applications with same "applicant name + country" combinations, but that have different RUTs.

4. Applications with same "applicant name + RUT" combination but that report different country codes.

For each data type we create a tailor-made algorithm that cleans applicant names further and that searches for variations of a given applicant name in the trademark database. These cleaning and matching algorithms allowed us to identify unique applicants whose names appear in various forms in the database.
We then create an artificial identifier (ID) to mark the different applicant names that belong to the same applicant.

d) Misspelled RUTs corrections

We correct RUTs associated with the different incarnations of the same unique applicant during the cleaning process described above under Step c). For example, we find that often RUTs of the same applicant differ slightly, which results in "applicant name + country" duplicates. However, often this is due to differences in few digits, commonly only the last or the two last digits of a given RUT. We correct such misspelled RUTs at various stages of Step c) described above.

e) Identification of unique ID for each unique applicant

In a last step, we combine the four different data types and check the data manually to ensure that there were no cases in which the same person was assigned different IDs, that is to ensure "ID + RUT" combinations are unique (unique in the sense that a given RUT is associated only with a single ID; a given ID may nevertheless have several unique RUTs). We did this for all Chilean applicants and for foreign applicants that appear most frequently in the data. The outcome of this procedure is a dataset provided in Table A5.

f) **Multiple assignees**

In the case of jointly owned trademarks we split names manually as there is no standard character that would allow separating names automatically. This is done as we check RUTs as explained in detail under b) in Section 3.3 below.

2.4.2 Patent Data

As a next step, we clean the patent data. The main challenge with regard to the patent data (which also contain industrial designs & drawings and utility models) is the absence of RUTs. The merging of the INAPI database with the different INE databases requires the identification of applicants by RUT. This means that apart from cleaning the patent data and identifying unique applicants, we also had to retrieve RUTs for resident applicants.

The patent data poses an additional challenge, which is the frequent co-assignment of patents to several assignees. As explained in more detail in the Appendix, when there is more than one owner of an IP right, all names were recorded in the same applicant field. 12% of applicant names in the raw patent data contain several applicant names.
To clean the data and to address these two challenges we proceed as follows:

a) Cleaning and standardization of applicant names

We apply the same procedure as for trademarks, that is, we clean and standardize applicant names.

b) Multiple assignees

In the case of joint/co-assigned patents we split names manually as there is no standard character that would allow separating names automatically.

c) Identification of unique applicants

As with trademarks, we identify different incarnations of the same applicant by using a matching algorithm and combine the different incarnations into a unique applicant ID.

d) Retrieve RUT and ID from Trademark Data

Due to the lack of RUTs in the patent data, we retrieve RUTs from the trademark data. This obviously implies that RUTs are only found for patent applicants that have also applied for a trademark. We search for all names of patent applicants in the trademark `dictionary' described above. We first apply a matching algorithm and then search for all unmatched patent applicant names manually in the trademark dictionary. Whenever a patent applicant was found in the trademark data, we retrieve the corresponding RUT as well as the ID to ensure consistency between our patent and trademark databases.

e) Assign ID to unique applicants not found in the trademark database

Patent applicants that were not found in the trademark data were assigned a new ID (which does not exist in the trademark data), which serves as a unique identifier. An example of the outcome of this procedure is provided in Table A6.

Appendix 2.5 Combining Trademark and Patent Data

Having created the trademark and patent "dictionaries", in a next step we combine the two databases to create a single "applicant dictionary" in the following way:

a) Merge Trademark and Patent dictionaries

We combine the patent and trademark datasets to create a single file that contains all "ID + applicant name + RUT + country" combinations. Since we have already searched for all applicants that apply for both trademarks and patents in the construction of the patent dictionary, in principle, no further adjustments are needed when combining the two datasets.

b) RUT verification

So far, we have only applied some corrections to RUTs to ensure they are valid, and made minor adjustments in the case of relatively obvious misspellings. However, we have not yet verified whether a valid RUT indeed belongs to the applicant name in the INAPI database. To do this, we adopt a two-pronged approach:

Verification of "applicant name + RUT" correspondence:

RUTs are registered with the Servicio de Impuestos Internos (SII). It provides a web-based check that allows verifying whether a given RUT exists and what the name is that is associated with that RUT.[54] We check all RUTs in our database using the SII website and retrieve the name for given RUT (which corresponds to the "nombre o razón social" associated with a given RUT) from the website. This allows us to verify whether the applicant name with a given RUT in our database indeed corresponds to the name registered with SII for the same RUT.

In addition, this check helps us identify cases where trademarks have been applied for jointly. That is, the website returns a single name for a given RUT. This means that cases

[54] https://zeus.sii.cl/cvc/stc/stc.html

where trademarks are owned jointly, the list of names will differ from the name obtained from the website. This helps us single out cases of jointly owned trademarks, which is an issue that we have neglected so far (we only corrected names for jointly owned patents). Since the website provides us with an "applicant name + RUT" combination, we can associate a RUT with one of the applicant names in case there are several applicant names. This allows us to manually split names in the case of joint trademark applications. We create new entries for the other names and assign them either an existing ID in case the same name already exists in the database (we searched for them manually) or a new ID in case the name does not yet exist.

Finding missing RUTs:

The website check is only feasible for applicants that report a (valid) RUT. However, we have a substantial number of cases where RUTs are either invalid or not available at all (mostly patents). To complement the data, we obtained additional data from a private company specialized in data provision called Transunion.[55] We obtained RUTs for applicant names without (valid) RUT as well as for all other applicant names in our database regardless of whether we had already verified the "applicant name + RUT" correspondence. This provides us also with the possibility to double check the data for which we have verified "applicant name + RUT" combinations.

Similarly to the SII-based check, obtaining RUTs for names for which we previously did not have RUTs allows us to correct cases of joint trademark applications.

c) Manual correction

Having verified "applicant name + RUT" combinations in these two ways and having corrected cases of joint trademark applications, we conduct a final extensive manual data check to ensure our ID identifies unique applicants.

d) Applicant type

Finally, we create a variable that identifies the "applicant type" to distinguish between applicants that are registered companies, universities, research institutions, government entities, or individuals.

The outcome of the data construction described above is an "applicant dictionary"' that allows us to uniquely identify applicants and provides their unique RUTs in case of domestic applicants ("unique" in the sense that the RUT is not shared by any other applicant in the dataset). An extract of the "applicant dictionary" is provided in Table A7.

Table A8 shows the number of unique applicants in the patent and trademark dictionary. Comparing these figures with Tables A1 and A2 shows that the cleaning of the raw data resulted in a reduction of about a third in unique applicant names in the trademark data (220,064 unique applicant names in the raw data and 146,092 unique applicant names in the cleaned data) and of about 28% in unique applicant names in the

[55] http://www.transunionchile.cl

patent data (15,151 unique applicant names in the raw data and 10,943 unique applicant names in the cleaned data).

Table A9 shows the available data on applicants' RUTs. The table only contains data on resident applicants as in principle only Chilean applicants report a RUT. The table shows that for about 82% of Chilean applicants we have at least one valid and verified RUT (see b) above on RUT verification). This share is substantially larger in the case of trademarks than patents, although this is a consequence of the fact that RUTs were entirely absent in the raw patent data. Having said this, after the cleaning of the data, we have a valid and verified RUT for around 66% of patent applicants – in only about 27% of cases is the RUT still entirely missing or belongs knowingly to an entity different from the applicant (e.g. law firm).

Finally, Table A10 looks at the cleaning/matching success based on the number of filings of trademarks and patents for which we have at least one valid/verified RUT for the applicant. To detect possible patterns over time, we tabulate the data by application year. The data on trademark filings show that we have a valid RUT on average for around 87% of all filings. This is above the 82% of applicants shown in Table A9, as would be expected. Moreover, we detect an increase in the number of filings that can be assigned a valid RUT over time. While the share is less than 80% in 1990, it climbs to over 90% by 2009. The patent data show that we are able to assign a valid RUT to even higher a share of filings by domestic applicants (88.3%). This is remarkable given that we were able to obtain a valid RUT for only 66% of all domestic patent applicants and that the raw data do not contain RUTs. The pattern over time is less conclusive in the case of patents. While the share of filings with a valid RUT increases until 2002, it then drops to reach in 2010 approximately the same level as in 1990. Overall, Table A10 underscores that the procedure adopted results in almost 90% of filings of both patents and trademarks with at least one valid/verified RUT.

Table A11 summarizes the outcome of the cleaning procedure in terms of applications of both trademarks and patents. It shows that we have a total of 778,095 trademark applications over the period 1990-2010. In the raw data, about 70% of these applications were filed by residents (546,850 applications). The percentages show that the applications of residents and non-residents exceed the total slightly as there are a few applications with resident and non-resident applicants. This is not the case with regard to patent applications. The table shows that in the raw data there are a total of 49,480 applications. In the case of patents, more than 90% of filings come from non-residents in the raw data. When we compare these figures with the cleaned data, we note that the figures change substantially. For both patents and trademarks, the number of applications by residents increases substantially. The main reason for this is that residency is now defined at the level of the artificial unique applicant identifier (ID in Table A7). Hence, any ID that has at least one Chilean country code is considered to be a resident and hence all applications that belong to the ID are considered to be of resident origin. This increases the number of trademark applications by residents from 70% to around 77% and that of patent applications from around 10% to 23%.[56] The table also

[56] Obviously we still have the information at the trademark and patent level, that is we are still able to disentangle within a given ID which patents report a Chilean and which

contains the number of applications for which the applicant is a resident and reports at least one valid/verified RUT. We know from Table A10 that these applications account for slightly less than 90% of trademark and patent applications. Table A11 now shows that this corresponds to around 68% of total trademark and 36% of total patent applications.

Appendix 2.6 Trademark Data

This section describes the construction of the bibliographic trademark information. This information is joined with the applicant data through a unique application number.

2.6.1 Nice classes

The raw data contain Nice classes. Apart from a number of erroneous data entries, the data also contain two additional classes (50 & 51) that are not part of the Nice classification. We drop these two artificial classes and map the 45 Nice classes into 10 categories of economic activity. Table A12 shows the classification and the number of trademark applications mapped into the classification of economic activity.

2.6.2 Priority information

The raw trademark data provide us with priority information in the form of priority numbers, priority filing dates, and the priority authorities. The main data challenge consists in the lack of consistent recording of priority numbers. Priority numbers are often only partly recorded making it extremely difficult if not impossible to retrieve the corresponding priority filing. This means that we do not include the priority filing number in the database. With regard to the priority authority and date, which we include in the database, there are a number of erroneous entries, which we attempt to correct. Priority information is available for less than 2% of applications.

2.6.3 Trademark type and use

The raw data also provide us with information on the type of trademark. The data distinguish between Denominativas, Figurativa, Mixta, Propaganda, Sonora, Origen, Geografia (see Table A13). In addition, we also have information on the type of product/service covered by a given trademark (see lower panel in Table A13).

2.6.4 Application, publication and registration date

We have the application, publication, and registration dates of trademarks. The data on the different dates did not require substantial cleaning other than the correction of a

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a foreign residency. Whether the data is considered at the ID- or IP-level depends on the purpose of the analysis.

number of erroneous entries (such as applications where the registration date predates the application date).

2.6.5 Legal status

The data also offer some information on the legal status of trademark filings. The information is summarized in Table A14.

Appendix 2.7 Patent Data

This section describes the construction of the patent-level information. We obtained raw data from INAPI that contain bibliographic and legal status information at the patent level. The patent data files contain data on invention patents, utility models, industrial designs and drawings (as well as "patente precausional" and industrial drawings). These different types can be identified through a marker in the raw data. Table A15 shows that 86% of the applications represent invention patents. While industrial designs account for almost 12%, utility models account for a mere 2%.

2.7.1 IPCs

The main challenges with regard to IPCs are erroneous data entries and the use of different versions of the classification system. The IPCs contained in the raw data are classified using versions 4, 5, 6, 7, and 8 of the IPC classification system.

In a first step, we separate the invention patent and utility model data from the industrial designs because industrial designs are classified according to the Locarno classification. In a second step, we correct some data entries where the error is relatively obvious. In a third step, we harmonize all IPC codes to version 8 of the classification (because the code that maps IPCs into technology classes is based on version 8 – see below). This is done on the basis of a conversion code that translates older IPC versions into Version 8. We face the additional problem that for some entries, the raw data indicate a version 0, which does not exist. In this case, we re-classify these entries according to the filing year. That is, filings between 1990 and 1994 are classified as version 6, filings between 1995 and 1999 as version 7, and filings from 2000 onward as version 8.

The corrected and harmonized IPC class symbols are mapped to technology categories using a concordance table developed by the Fraunhofer ISI and the Observatoire des Sciences et des Technologies in cooperation with the French patent office.[57] The concordance table groups IPCs into five broad technology classes: (a) Electrical engineering, (b) Instruments, (c) Chemistry, (d) Mechanical engineering, (e) Other fields

[57] Schmoch U. (2008): `Concept of a Technology Classification for Country Comparisons,' WIPO, available at http://www.wipo.int/edocs/mdocs/classifications/en/ipc_ce_41/ipc_ce_41_5-annex1.pdf (accessed February 2012)

(including (i) furniture, games, (ii) other consumer goods, and (iii) civil engineering). Each of these technology classes is broken down into a varying number of subclasses. Table A16 provides an overview.

2.7.2 Priority Information

In principle, the INAPI raw data provides us with priority information in the form of priority patent numbers, priority filing dates, and the priority authorities. As with the trademark data, the main data challenge consists in the lack of consistent recording of priority patent numbers. Priority numbers are often only partly recorded making it extremely difficult if not impossible to retrieve the corresponding priority filing. As for trademarks, due to the lack of reliable information, we drop priority filing numbers from the database. With regard to the priority authority and date, there are a number of erroneous entries, which we attempt to correct.

2.7.3 Application, grant, and lapse date

We also incorporate the application, grant, and lapse date of patents, utility models, and industrial designs (and "patente precausional" and industrial drawings). The construction of the dates required some corrections, in particular to ensure the consistency of the different dates (i.e., that the lapse date does not predate the application date etc.). The main limitation of the available data is the lack of reliable information on publication dates. We attempted to construct the publication date from the information in the legal status table. This still resulted in error-prone data, which led us to exclude the publication date from the database.

2.7.4 Legal Status

Table A17 shows the summary legal status information for the patent, utility mode, industrial design (and "patente precausional" and industrial drawings) data. While not shown in Table A17, the full legal status table is available to us, which provides more detailed information on the granting process and renewal decisions.

Table A1: Trademark Data- Raw Data Description

	All		*Residents*		*Non-residents*	
Application Year	# Applications	# Applicants	# Applications	# Applicants	# Applications	# Applicants
1990	20,627	11,271	15,206	8,215	5,421	3,069
1991	29,291	14,615	21,351	10,487	7,941	4,145
1992	31,556	14,480	22,840	10,259	8,720	4,236
1993	34,041	15,746	25,321	11,561	8,722	4,200
1994	32,480	15,482	23,977	11,200	8,506	4,302
1995	34,428	15,262	24,860	10,739	9,573	4,533
1996	34,575	15,524	24,151	10,661	10,426	4,883
1997	36,119	16,060	24,788	10,705	11,333	5,372
1998	34,847	15,819	22,826	10,208	12,023	5,626
1999	34,293	14,929	22,847	9,858	11,448	5,080
2000	40,889	16,669	27,273	11,105	13,620	5,579
2001	40,376	16,125	27,735	10,939	12,641	5,195
2002	38,924	15,818	28,273	11,350	10,652	4,483
2003	38,611	15,957	28,126	11,514	10,486	4,466
2004	38,293	16,322	28,570	11,946	9,724	4,396
2005	43,555	18,462	32,391	13,365	11,165	5,119
2006	40,876	17,908	28,755	12,575	12,129	5,356
2007	43,259	18,291	29,662	12,511	13,600	5,802
2008	47,971	19,501	32,013	12,895	15,963	6,628
2009	38,920	17,121	26,378	11,235	12,543	5,903
2010	44,164	18,699	29,507	12,681	14,657	6,044
Total*	778,095	220,064	546,850	154,856	231,293	65,777

* Total of applicants (applicant name) counts each applicant only once

Table A2: Patent Data- Raw Data Description

	All		*Residents*		*Non-residents*	
Application Year	# Applications	# Applicants	# Applications	# Applicants	# Applications	# Applicants
1990	681	433	104	81	577	353
1991	925	561	144	125	781	437
1992	1,258	713	188	150	1,070	563
1993	1,457	836	195	154	1,262	682
1994	1,727	1,016	227	193	1,500	823
1995	1,884	1,024	187	159	1,697	867
1996	2,181	1,226	215	180	1,966	1,049
1997	2,730	1,233	149	134	2,581	1,100
1998	2,972	1,374	189	172	2,783	1,202
1999	2,951	1,285	200	163	2,751	1,123
2000	3,247	1,370	199	175	3,048	1,199
2001	2,892	1,256	236	198	2,656	1,059
2002	2,552	1,084	249	206	2,303	878
2003	2,407	1,031	249	188	2,158	843
2004	2,884	1,148	263	203	2,621	945
2005	3,075	1,199	307	217	2,768	982
2006	3,419	1,225	277	197	3,142	1,029
2007	3,609	1,377	311	238	3,298	1,139
2008	3,585	1,377	345	238	3,240	1,139
2009	1,938	976	335	250	1,603	726
2010	1,106	674	238	193	868	481
Total*	49,480	15,151	4,807	3,116	44,673	12,050

* Total of applicants (applicant name) counts each applicant only once

Data contains patents, utility models, industrial designs and drawings.

TableA3: Trademark Data - Raw data in terms of ruth lenght

	Total trademarks Applications		*Residents*		*Non-residents*	
Rut Lenght	#	%	#	%	#	%
11	404	0.32%	312	0.25%	150	4.09%
10	51,899	41.41%	51,498	41.43%	2,148	58.54%
9	28,290	22.57%	28,081	22.59%	791	21.56%
8	22,006	17.56%	21,917	17.63%	307	8.37%
7	21,399	17.07%	21,365	17.19%	61	1.66%
6	212	0.17%	202	0.16%	10	0.27%
5	19	0.02%	16	0.01%	3	0.08%
4	1	0.00%	1	0.00%	0	0.00%
0*	1102	0.88%	903	0.73%	199	5.42%
Total	125,332	100.00%	124,295	100.00%	3,669	100.00%

Note: Residents and non-residents do not sum to total because RUTs are not unique to applicant

* Zero means RUT field in raw data contained some invaliud character

Table A4: Trademark data - Raw data in terms of Valid RUT

Rut	Total trademarks Applications		Residents		Non-residents	
	#	%	#	%	#	%
Valid	51,899	70.54%	51,497	70.44%	2,144	88.52%
Invalid	21,680	29.46%	21,608	29.56%	278	11.48%
Total	73,579	100.00%	73,105	100.00%	2,422	100.00%

Note: Figures include only 9-10 digit RUTs

Table A5: Extract of the `trademark dictionary'

ID	Applicant Name	RUT	Special RUT	Country
182147	zermat internacional sa de cv	60805008*	1	MX
182147	zermat internacional sa de cv	883373006**	1	CL
182147	zermat internacional sa	883373006**	1	CL
112711	blanca alfaro patricio	108191988		CL
112711	patricio blanca alfaro	100746069		CL
111766	xstrata copper chile sa	883258002		CL
111766	xstrata norte exploraciones servicio ltda	766736807		CL
111766	xstrata chile sa	969720701		CL
167056	jaime alcibiades eduardo lavin mosquera			CL
167056	lavin mosquera jaime alcibiedes eduardo	2472403		CL
167056	lavin mosquera jaime alcibiades eduardo	24724034		CL

* Tesoreria General Metropolitana

** Serrano Weinstein Vermehren (lawfirm)

Table A6: Extract of the `patent dictionary'

ID	Applicant Name	Applicant split name	RUT	Special RUT	Country
I3049	igloo zone chile sa99 gynopharm sa 1	igloo zone chile sa			CL
I3049	igloo zone chile sa	igloo zone chile sa			CL
I6337	sapphire energy inc the scripps research institute	the scripps research institute			US
I6337	novartis ag the scripps research institute	the scripps research institute			CH
I6337	irm llc the scripps research institute	the scripps research institute			US
111561	sociedad quimica minera chile sa	sociedad quimica minera chile sa	930070009		CL
111561	sqm industria sa	sqm industria sa	930070009		CL
111561	sociedad quimica minera chile sa ajay north america	sociedad quimica minera chile sa	930070009		CL
175643	rp scherer technology inc	rp scherer technology inc	787733204*	1	DE
175643	rp scherer technology sa	rp scherer technology inc	787733204*	1	DE
175643	rp scherer gmbh novartis ag	rp scherer	60805008**	1	DE

Notes:

Applicants ID=111561 and ID=175643 were found in the trademark dictionary, applicant ID=I3049 and ID=I6337 were not and hence assigned a new ID.

As explained in Section 3.2 we split names in the case of joint/co-assigned patents. This means in the `patent dictionary' there are two distinct name variables for each applicant: the original name of the applicant (i.e. `Applicant name') and the split name of the applicant (`Applicant split name').
We based the id identification on the split name. In the case that the applicant name is not a joint/co-assigned case the applicant name is equal to the applicant split name.

* Clarke, Modet & Co. (lawfirm)

** Tesoreria General Metropolitana

Table A7: Extract of the `final dictionary'

ID	Applicant Name	Applicant new name	RUT	Special RUT	Country	Type
30120	astrazeneca ab nps pharmaceuticals inc	astrazeneca ab	797133000*	1	GB	company
30120	astrazeneca ab bayer schering pharma ag	astrazeneca ab	608050086**	1	SE	company
30788	astrazeneca ab bayer schering pharma ag	bayer schering pharma ag	797133000		DE	company
30788	bayer schering pharma ag epix pharmaceuticals inc	bayer schering pharma ag	607010005***	1	DE	company
384	universidad de magallanes	universidad de magallanes	711337008		CL	university
384	univ de santiago chile 50 univ arturo prat 15 univ de magallanes 10 pontif univ catolica valparaiso 25	universidad de magallanes	711337008		CL	university
3029	ginette c vidal	ginette c vidal	88608402		CL	individual
3029	vidal rojas ginette c	ginette c vidal	88608402		CL	individual
3029	ginette c vidal rojas	ginette c vidal	88608402		CL	individual
3029	vidal rojas ginette cecilia	ginette c vidal	88608402		CL	individual

* Sargent & Krahn (lawfirm)

** Tesoreria General Metropolitana

*** Subsecretaria de Economia y Empresas de Menor Tamaño

Table A8: Trademark & Patent Data - Cleaned Data Description (# Applicants)

	All		*Residents*		*Non-residents*	
Application Year	Trademarks	Patents	Trademarks	Patents	Trademarks	Patents
1990	8920	377	6841	94	2119	284
1991	11805	501	8763	134	3097	370
1992	11937	629	8785	156	3201	475
1993	12848	692	9704	154	3196	540
1994	12430	866	9245	201	3240	668
1995	12486	862	9016	174	3517	693
1996	12481	963	8869	186	3664	783
1997	12816	1025	8820	155	4052	872
1998	12774	1094	8573	185	4254	912
1999	12236	1019	8445	178	3842	845
2000	13362	1115	9240	188	4178	932
2001	13371	1042	9403	223	4020	822
2002	13163	906	9757	232	3455	674
2003	13120	864	9774	210	3401	655
2004	13464	945	10104	218	3407	729
2005	14736	1016	11025	212	3771	806
2006	14611	1025	10631	210	4037	817
2007	15075	1183	10590	253	4540	930
2008	16081	1198	10956	238	5188	960
2009	14215	914	9837	270	4427	646
2010	15930	639	11184	211	4808	432
Total*	146,092	10,943	108,071	2,997	38,816	8,010

* Total of applicants (applicant name) counts each applicant only once

** Sum of # resident and # non-resident applicants exceeds total # applicants as applicants may report a Chilean and foreign residency

Data contains patents, utility models, industrial designs and drawings.

Table A9: Trademark & patent data - RUT availability

Rut	Applicant		Trademarks		Patents	
	#	%	#	%	#	%
≥ 1 Valid	89,727	81.77%	88,896	82.30%	2,117	66.41%
`Special'	903	0.82%	902	0.84%	62	1.94%
Missing	1,029	0.94%	152	0.14%	879	27.57%
Corrected	17,990	16.40%	17,990	16.65%	128	4.02%
10-digit	77	0.07%	77	0.07%	2	0.06%
Total	109,726	100.00%	108,017	100.00%	3,188	100.00%

Notes: Resident applicants only

Data contains patents, utility models, industrial designs and drawings.

Table A10: Trademark & patent data with ≥ 1 valid RUT

Rut	Trademark applications		Patent applications	
	#	% of total	#	% of total
1990	13,494	79.01%	211	75.09%
1991	19,958	84.65%	332	88.30%
1992	21,272	84.58%	437	84.36%
1993	23,724	85.25%	519	89.18%
1994	22,474	85.28%	552	87.07%
1995	23,654	85.81%	587	85.20%
1996	23,087	85.50%	759	89.40%
1997	23,622	84.95%	1,146	92.49%
1998	21,356	83.06%	1,235	91.96%
1999	21,750	84.24%	1211	90.78%
2000	25,825	84.49%	1,324	93.31%
2001	26,600	86.33%	1,126	91.62%
2002	27,438	87.77%	992	91.01%
2003	27,920	90.18%	932	88.01%
2004	27,866	90.01%	1,075	88.19%
2005	31,408	89.55%	1,188	89.26%
2006	28,471	89.63%	1,168	87.95%
2007	29,555	90.37%	1,142	83.66%
2008	31,719	89.64%	1,084	83.58%
2009	26,386	90.67%	558	83.41%
2010	29,483	90.13%	244	73.05%
Total	527,062	87.09%	17,822	88.29%

Notes: Resident applicants only
Data contains patents, utility models, industrial designs and drawings.

Table A11: Summary trademark & patent data

	Raw data				*Cleaned data*			
	Trademark applications		Patent applications		Trademark applications		Patent applications	
	#[x]	% of total	#	% of total	#	% of total	#	% of total
Total	778,095	100%	49,480	100%	778,095	100%	49,480	100%
Non-resident	231,293	29.73%	44,673	90.28%	176,745	22.72%	38,340	77.49%
Resident	546,850	70.28%	4,807	9.72%	600,925	77.23%	11,222	22.68%
Valid RUT					527,062	67.74%	17,822	36.02%

Notes:

[x] Non-resident and resident applications do not sum to Total because applications may contain resident and non-resident applicants

Data contains patents, utility models, industrial designs and drawings.

Table A12: Trademark Nice Class and Economic Activity

Economic activity	*% Total*	*Nice classes*								
Agricultural products and services		*29*	*30*	*31*	*32*	*33*	*43*			
% of Total	**14.8%**	3.2%	3.8%	2.3%	2.3%	2.5%	0.7%			
Chemicals		*1*	*2*	*4*						
% of Total	**6.0%**	2.6%	1.7%	1.7%						
Construction, Infrastructure		*6*	*17*	*19*	*37*	*40*				
% of Total	**7.8%**	2.1%	1.8%	2.0%	1.5%	0.4%				
Household equipment		*8*	*11*	*20*	*21*					
% of Total	**7.8%**	1.7%	2.1%	2.1%	1.9%					
Leisure, Education, Training		*13*	*15*	*16*	*28*	*41*				
% of Total	**12.5%**	1.3%	1.3%	4.7%	2.2%	2.9%				
Management, Communications, Real estate and Financial services		*35*	*36*							
% of Total	**5.3%**	3.4%	1.8%							
Pharmaceuticals, Health, Cosmetics		*3*	*5*	*10*	*44*					
% of Total	**12.1%**	3.9%	5.9%	1.9%	0.4%					
Scientific research, Information and Communication technology		*9*	*38*	*42*	*45*					
% of Total	**9.7%**	4.1%	2.2%	3.3%	0.1%					
Textiles - Clothing and Accessories		*14*	*18*	*22*	*23*	*24*	*25*	*26*	*27*	*34*
% of Total	**17.6%**	1.7%	1.9%	1.4%	1.4%	1.9%	4.7%	1.4%	1.5%	1.6%
Transportation and Logistics		*7*	*12*	*39*						
% of Total	**6.6%**	2.3%	2.3%	2.0%						

Source of classification: Edital

Table A13: Trademark types		
	# Applications	*% Total*
Type		
Denominativas	524,907	67.5%
Figurativa	21,941	2.8%
Mixta	213,742	27.5%
Propaganda	16,983	2.2%
Sonora	16	0.0%
Origen	1	0.0%
Geografia	5	0.0%
Use		
Productos	453,687	58.3%
Servicios	247,316	31.8%
Productos/Servicios	47	0.0%
Frase Propaganda	16,983	2.2%
Establecimiento Comercial	40,636	5.2%
Establecimiento Industrial	17,007	2.2%
Productos/Establec.Industrial	1,901	0.2%
Producto./Servicio./Industrial	2	0.0%
Estab. Comercial/Estab. Indus.	3	0.0%
Producto/Comercial/Industrial	2	0.0%
Productos/Estab. Comercial	1	0.0%
Servicios/Estab. Comercial	1	0.0%
Servicio /Estab. Industrial	1	0.0%

Table A14: Trademark legal status

Legal status	*# Applications*	*% Total*
Abandoned	26,179	3.4%
“Desistida"	1,742	0.2%
Lapsed	3,038	0.4%
Rejected	147,422	18.9%
Expired	115,935	14.9%
Registered	71,627	9.2%
In process	413,396	53.0%

Table A15: IP types

Type	# Applications	% Total
Patent	42,455	85.8%
Utility model	1,052	2.1%
Industrial design	5,862	11.9%
“Precausional” patent	63	0.1%
Industrial drawing	34	0.1%

Table A16: Patent & utility model IPC -- technology mapping

Technology	% Total	Disaggregated technology	% Total
Electrical engineering	6.2%	Electrical machinery, energy	1.5%
Electrical engineering		Audio-visual technology	0.9%
Electrical engineering		Telecommunications	1.8%
Electrical engineering		Digital communication	0.8%
Electrical engineering		Basic communication processes	0.2%
Electrical engineering		Computer technology	1.0%
Electrical engineering		IT methods for management	0.1%
Electrical engineering		Semiconductors	0.1%
Instruments	6.4%	Optics	0.3%
Instruments		Measurement	1.3%
Instruments		Analysis of bio materials	0.6%
Instruments		Control apparatus	0.8%
Instruments		Medical technology	3.5%
Chemistry	66.0%	Organic fine chemistry	17.6%
Chemistry		Biotechnology	4.1%
Chemistry		Pharmaceuticals	21.3%
Chemistry		Macromolecular ch poly	1.7%
Chemistry		Food chemistry	3.8%
Chemistry		Basic materials chemistry	7.6%
Chemistry		Materials metallurgy	3.0%
Chemistry		Surface tech coating	1.9%
Chemistry		Micro-structure and nano-technology	0.2%
Chemistry		Chemical engineering	3.6%
Chemistry		Environmental technology	1.2%
Mechanical engineering	15.0%	Handling	4.2%
Mechanical engineering		Machine tools	1.3%
Mechanical engineering		Engines, pumps, turbines	0.8%
Mechanical engineering		Textile and paper	2.1%
Mechanical engineering		Other spec machines	3.5%
Mechanical engineering		Therm process and apparatus	0.9%
Mechanical engineering		Mechanical elements	1.2%
Mechanical engineering		Transport	0.9%
Other	6.4%	Furniture,games	1.4%
Other		Other cons goods	1.6%
Other		Civil engineering	2.6%
Other		Other	0.7%

Classification source: Schmoch (2008)

Table A17: Patents legal status

Legal status		In process	Abandoned	Lapsed	"Incorporada"	Rejected	Not presented	Granted	Total
Patent	*# Applications*	13230	12448	4750	80	2573	0	9374	42455
	% Total	31.2%	29.3%	11.2%	0.2%	6.1%	0.0%	22.1%	100.0%
Utility model	*# Applications*	237	500	43	2	45	0	225	1052
	% Total	22.5%	47.5%	4.1%	0.2%	4.3%	0.0%	21.4%	100.0%
Industrial design	*# Applications*	904	1000	172	6	95	1	3684	5862
	% Total	15.4%	17.1%	2.9%	0.1%	1.6%	0.0%	62.8%	100.0%
"Precausional" patent	*# Applications*	0	0	0	0	0	0	63	63
	% Total	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
Industrial drawing	*# Applications*	27	1	1	0	1	0	4	34
	% Total	79.4%	2.9%	2.9%	0.0%	2.9%	0.0%	11.8%	100.0%