Program innovation in higher education: an exploratory study of the creation of new degree programs in Chilean universities

Gonzalo Zapata
University at Albany, State University of New York, gonzalozapata@uc.cl

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PROGRAM INNOVATION IN HIGHER EDUCATION: AN EXPLORATORY STUDY OF THE CREATION OF NEW DEGREE PROGRAMS IN CHILEAN UNIVERSITIES.

By

Gonzalo Zapata

A Dissertation
Submitted to the University at Albany, State University of New York
in Partial Fulfillment of
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Doctor of Philosophy

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Department of Educational Administration and Policy Studies
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ABSTRACT

Many researchers have studied differentiation in higher education systems, considering the multiplicity of new programs as one of its relevant features. In Chile, as well as in Latin America, there is ample literature on emerging higher education institutions and their growing differentiation, but very little or almost none devoted to emerging programs and the program dimension of differentiation.

Using the concept of degree program innovation (DPI), as one particular type of innovation carried out by universities in its national context, this study describes and provides documentation about the new programs created by Chilean universities over a period of 28 years (1980-2008).

This dissertation builds on previous research and intends to assess the most relevant assumptions about the factors that seem to be promoting and/or limiting DPI. Therefore, together with describing DPI in Chilean universities, this research explores the main factors related to the emergence of new programs, thus contributing new evidence from Latin America to the international debate on program differentiation.

I report the magnitude of DPI in Chile, as well as its evolution over time. I also describe its distribution among different types of universities. I show how DPI occur in a higher rate in some universities compared to other, and discuss how a number of context and institutional factors figure simultaneously as considerations that need to taken into account for a better understanding. I suggest that changes in these factors are intertwined, vary in time, and relate to different universities in varied ways, promoting and/or limiting DPI differently across the whole period of study.
ACKNOWLEDGMENTS

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LIST OF ABBREVIATIONS

AFD  Aporte Fiscal Directo (Direct State Funding)
AFI  Aporte Fiscal Indirecto (Indirect State Funding)
CFT  Centros de Formación Técnica (Technical Training Centers)
CNA  Comisión Nacional de Acreditación (National Commission for Accreditation)
CONICYT Consejo Nacional de Investigación, Ciencia y Tecnología (National Council for Research, Science and Technology)
CRUCH Consejo de Rectores de las Universidades Chilenas (Chilean Universities Rector’s Council)
CSE  Consejo Superior de Educación (Higher Council of Education)
DEMRE Departamento de Evaluación, Medición y Registro Educacional, Universidad de Chile (Department of Evaluation, Measurement and Educational Registry)
DFL  Decreto con Fuerza de Ley (Law-ranking Decree)
DPI  Degree Program Innovation
FTE  Full Time Equivalent (Faculty)
INDICES Indicadores, Números y Datos sobre las Instituciones y Carreras de Educación Superior (CSE) (Indicators, Numbers and Data about Higher Education Institutions and Programs)
IP   Institutos Profesionales (Professional Institutes)
ISCED International Standard Classification of Education, UNESCO.
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<td>LGE</td>
<td>Ley General de Educación, 2009 (General Law of Education)</td>
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<td>LOCE</td>
<td>Ley Orgánica Constitucional de Enseñanza, 1990 (Constitutional Education Law)</td>
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<tr>
<td>MINEDUC</td>
<td>Ministerio de Educación, Gobierno de Chile (Secretary of Education)</td>
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<td>SIES</td>
<td>Sistema de Información de la Educación Superior (MINEDUC) (Higher Education Information System)</td>
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CHAPTER I: INTRODUCTION

Many researchers have studied differentiation in higher education systems, considering the multiplicity of new programs as one of its relevant features (Ben-David, 1972; Huisman, 1995; Dill and Teixeira, 2000; Neave, 2000, Clark, 2007; Meek, 2007). In Chile, much attention has been given to studying the emergence of new higher education institutions and non-university higher education programs (see Brunner and Briones, 1992; Cox, 1996; Courard, 1992, among many others). However, there are only few and very limited empirical studies regarding the emergence of new undergraduate degree programs in the university sector in the country. The same can be said about Latin America, where there is ample literature on emerging higher education institutions and their growing differentiation (see Bañ and García de Fanelli, 1993; Mollis, 2003; Rama, 2006; Lopez, 2010), but very little or almost none devoted to emerging programs and the program dimension of differentiation.

This research describes and explores the emergence of degree programs in Chilean Universities over a period of 28 years (1980-2008), with a case study to the debate on program innovation and differentiation in higher education.

Even though scholars suggest growing numbers of degree programs added by Latin American and Chilean universities over the last couple of decades (Fanelli and Trombetta, 1996; Brunner, 2006; Sebastian and Scharager, 2007), they have until now provided no data about its magnitude, characteristics and trends. Although studies show evidence about the growing number of programs overall, nothing has focused so far on
differentiation and emerging new programs. Therefore, my first objective was to describe
the emergence of new degree programs in Chilean universities and to provide insights.

My research proposes the concept of degree program innovation (DPI), as one
particular type of innovation carried out by universities in its national context. Previous
works on this matter in the US and in a number of European countries have studied the
issue from a variety of theoretical approaches and methodologies. Still, scholars would
argue that more research is needed even there because of the lack of clear empirical
evidence and some contradictory findings concerning the effects of different factors on
increasing or decreasing program innovations (Huisman and Morpew, 1998). This
dissertation builds on previous research and intends to assess, based on a longitudinal
national study, the most relevant assumptions about the factors that seem to be promoting
and/or limiting university DPI. Therefore, together with describing DPI in Chilean
universities, it also explores the main factors related to the emergence of new programs,
thus contributing new evidence from Latin America to the international debate.

I report the magnitude of DPI in Chile, which has increased over time, but at a
different rate than enrollment and the number of institutions in the overall system. In
other studied contexts, the growing number of DPI seems to be closely aligned with some
changes in institutional external factors, such as regulatory and higher education funding
frameworks; and changes in some internal institutional factors, such as organizational and
academic dynamics (Huisman, 1997; Van Vught, 2007; Meek, 2007). I suggest that
changes in these factors are intertwined, vary in time, and relate to different universities
in varied ways, promoting and/or limiting DPI differently across the whole period of
study.
1.1. Background

Until 1980, Chile’s higher education system was relatively small, homogeneous and almost fully funded by the government (Brunner and Briones, 1992). Access was restricted and the degree program supply and enrollment was controlled by the eight universities existing at the time (Campbell, 1995). A reform in 1981 stimulated higher education differentiation using several policies oriented to deregulation, privatization and the promotion of competition and market dynamics in higher education, pushing also to the massification of enrollment in the system overall (Balán and García de Fanelli, 1993; Brunner, 1997; Mollis, 2006; CAPES, 2008). Together with growing numbers of higher education institutions, universities’ growth took place by at least three parallel paths: greater numbers of students and increasing student’s openings in universities (vacancies), territorial expansion of many universities that created new branches, and diversification of the program supply of most universities (Brunner, 1986).

Many scholars have criticized patterns of growth following the reform in 1981 and until the mid 1990s, because of the lack of regulations and fast proliferation of institutions, branches and programs, affecting educational quality and pertinence (CAPES, 2008). Government funding cuts placed the traditional universities under strong pressures to raise income by increasing enrolment and tuition. Many new private universities focused on low cost degree programs with high student demand, without much concern about future employment opportunities of graduates (González, 2003). Some of the new private institutions created at the end of the 80s were considered mostly as market universities, a type of university that, in a strict sense, operates like an
intermediary, connecting teachers and students in labor oriented training activities, and losing the traditional idea of a place of higher knowledge, research and transmission (Bernasconi, 1996). Some scholars have even suggested a chaotic and indiscriminate proliferation of new institutions and university programs more often guided by lucre rather than academic standards (Samaniego, 2001: 42, 78, 97).

In the period from 1980 to 2008, the higher education system grew from eight Universities to 177 higher education institutions (60 universities, 44 professional institutes, and 73 technical centers). During the same period, enrollment increased more than 6 times, growing from 118,978 to 987,643 students. At the same time, the number of programs offered by the entire system increased from 652 to 9,040, meaning an increase of more than 14 times. According to the data collected for this dissertation, the total number of university programs grew from 488 to 5,046. For the same period of time, it is possible to identify 430 new degree programs in the university sector, meaning programs that were created by a university at a certain moment, offering a new degree or specialization, different from any previous program supplied by other universities in the country before (see: Table 2. Number of DPI 1981-2008).

Available literature in Chile largely claims that since 1981 higher education has gone through what has been called ‘institutional’ and ‘vertical’ differentiation (see: Clark,

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1 During the same period, many institutions were created and closed. Universities grew up to 70 in 1993-1996, and professional institutes and technical centers reached 81 and 161 respectively in 1990.

2 Besides undergraduate programs, universities also supply technical programs (2-3 years programs) and graduate programs (master, doctoral and health specializations).
1983; Huisman, 1996); this is, the emergence of new types of higher education institutions and new non-university level tertiary studies in Chile\(^3\). However, changes in university programs have been largely unstudied and available data are still limited. Even if some researchers claim that Chile underwent large university program increases and growing numbers of different professional and disciplinary degree programs (i.e. Pérsico, 1997, Campbell, 1995, Brunner, 1986, Vittini, 2005, Brunner, 2006), there are no empirical studies or evidence supporting this last matter. At the same time, there are no data systematizations or complete registries informing about the number of new different degree programs available in Chile. Gathering data about DPIs in Chilean universities and describing its evolution over time will enhance a debate that has largely been carried out without the benefit of adequate empirical evidence.

In the region, the available literature on DPI is almost inexistent. Most studies claim a widespread trend to higher education massification in all Latin American countries, together with various forms of institutional differentiation and diversification (Schwartzman, 1996; Mollis, 2003; Brunner, 2005; Rama, 2006; López, 2010). Chile, together with Mexico, were the first countries in the region introducing strong transformations promoting institutional differentiation (Mollis, 2006). However, the program dimension of higher education differentiation is still largely unexplored.

\(^3\) By non-university program studies, I mean tertiary short programs (2-4 years) mostly offered by technical centers and professional institutes in Chile (ISCED 5A programs), different from the university disciplinary and professional degree programs, typically 4-7 years (ISCED 5B programs).
The issue of program innovation has been studied internationally mostly in the developed world. One of the relevant perspectives adopted to approach the issue, is the study on higher education differentiation and diversity. The great transformations observed during the last decades have brought the attention of many researchers about how systems evolve in terms of their differences and to what extent differences and diversity may contribute, or not, to a higher performance of higher education in societies of growing complexity (Birbaum, 1983; Van Vught, 2007). Research about differentiation and diversity in higher education has permitted great advances in terms of conceptual definitions and some useful methodological approaches (see: Meek et al, 2007). However, in the case of program differentiation and diversity, most empirical research has been done in the US and Western Europe, and some of it has focused specifically on the creation of new study programs in higher education systems as a feature of program differentiation (Huisman and Morphew, 1998).

As I will discuss in the second chapter, I have chosen to use the concept of university DPI to refer to those new programs that emerge within the national university supply. These are programs never offered before by other universities, and that represent something new and different from before. Even if there are many sorts of program innovations, the one I am interested in here is when a new program is created, leading to a distinct new degree. This type of DPI is most of times carried out by a single university. It might become successful if acquires the number and type of expected students and if it is maintained over time and perhaps even replicated by other universities, or it might become a ‘flash in the pan’ when it does not meet expectations and it is soon aborted. The concept of DPI allows the identification of particular features of the differentiation
and diversification process, emphasizing also the economic and organizational perspectives in contexts of increasing competition in higher education (Dill and Texeira, 2000), particularly relevant matters for the highly market oriented Chilean higher education compared to elsewhere (Mollis, 2006; Brunner, 2007).

2.2. **Purpose of the study**

The purpose of this study is to examine DPIs in Chilean universities since the reform in 1981. This study describes and provides documentation about the new programs created over the last 28 years and their most significant characteristics and trends: number, evolution over time, distribution in terms of study fields and frequency among different universities and types of universities. No previous study has looked at these matters in Chile or Latin America before. In addition to building this new body of evidence for the Chilean case, this dissertation also carries out an exploratory analysis about the most significant factors related to DPIs in Chile, aiming to understand how DPI occurred in Chile in the way that it has.

The general assumption is that together with the expansion of higher education and the significant transformations since the reform in 1981, in Chile, universities have created new programs over time. However, there is no information about the size of DPI in relation to the growth of the university program supply, or estimation about the study fields in which DPI have occurred. At the same time, during the last three decades, in Chile, some of the factors that in the international literature have been identified as influencing DPI have changed. Thus, it is important to not only describe the magnitude
and characteristics of DPI during the whole period, but also learn about its evolution over time regarding how higher education has changed.

A particular matter of interest in this study is to find out which universities have innovated with new degree programs in the national context and explore why. Indeed, it seems reasonable that some universities might be more active innovating with new programs, while others remain largely reproducing and copying previously well-known degree programs. Some researchers claim several phenomena limiting program differentiation, such as program isomorphism (see DiMaggio and Powell, 1983) or copying strategies typically carried by demand absorbing institutions (see PROPHE, 2002, 2004). This study provides some evidence about the distribution of DPI among different universities, identifying which universities have contributed the most to DPI in Chile, if indeed such universities exist, and seeking to understand why.

Competing arguments have been raised in the literature regarding the extent to which various factors might be related to program innovation. In the next chapter, I discuss the most relevant factors presumably related to DPI, and how may promote and/or limit DPI in Chilean Universities. Previous research has explored and assessed several correlations between DPI and certain factors such as the regulations related to the university program supply or higher education funding structures, among other. However, most research has explored correlations in an aggregated manner, studying relationships between few factors and the number and evolution of DPI in countries over time.

One of my hypotheses it that DPIs are more likely to occur in some universities rather than others and that both context and institutional factors figure in simultaneously.
as considerations that need to be taken into account in these particular universities. Context factors such as the regulatory framework and funding structure seem to be relevant circumstances limiting and/or promoting program innovation. However, there is no consensus about the extent to which these factors are indeed related to all universities in the same way. As discussed in the second chapter, autonomous universities in Chile have no restriction on innovating and creating new programs, while non-autonomous universities need to fulfill certain requirements before offering new degree programs. For some researchers, the requirements imposed on non-autonomous universities have restricted and limited institutional innovations (Hernández, 2000); while for others, the legal restrictions have sheltered institutional and program differentiation, allowing non-autonomous universities to experiment DPI in a framework of legitimacy (González, 2003). Related to institutional characteristics, in Chile, some few authors have argued that private and highly entrepreneurial universities are more likely to innovate (Senhouse et al, 2007; CUP, 2009), while others have suggested that most private universities trend to reproduce the programs developed by the leading traditional universities (Bernasconi, 1996, Lolas, 2004, Samaniego, 2001).

Therefore, besides describing the evolution of DPI in Chilean universities, this study uncovers trends about DPI and pay special attention to its distribution among different types of universities\(^4\). For this purpose, I carried out an exploratory analysis\(^5\).

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\(^4\) This is the first research analyzing DPI in a disaggregated manner, confronting possible differences among universities in a country.

\(^5\) I used exploratory data analysis techniques (EDA). In Chapter 3, I provide justifications and a detailed description of the research methodology.
inquiring into the most significant factors that may be promoting and/or limiting the creation of new degree programs among Chilean universities. The analysis aims to uncover trends and examine several hypotheses and assumptions derived from previous research and report its results circumscribed in the Chilean context.

This is a central part of this research, contributing to a better understanding of DPIs in Chile, but also provides evidence and insights in relation to the scholarly debate about program innovation and differentiation in worldwide and regional higher education. My research explores trends and patterns, and searches for statistical associations between university DPIs and selected variables related to external and internal factors identified by previous research.

2.3. **Research questions**

The overall research question for this study is the following:

- How has DPI evolved in Chilean universities since the higher education reform in 1981?

At the same time, this research is organized following three specific questions:

- What are the magnitude and characteristics of trends in DPIs in Chilean universities over the last three decades?
- What are the most important factors associated with these features of DPIs in Chilean universities?
- Are there major differences in the magnitude, characteristics of trends and associated factors of DPIs among different universities?
To address these questions, I developed a longitudinal exploratory study based on data collection and analysis of Chilean universities DPIs and its evolution from 1980 to 2008. As discussed in the methodological section of this dissertation, the exploratory analysis begins with a statistical description of univariate patterns that addresses the first specific question, using descriptive statistics and graphical analyses to illustrate the magnitude and some characteristics of trends of DPI in Chilean universities. The second part of this study will address the second and third specific questions, looking at and bivariate and multivariate patterns of relationships between factors identified by previous research and DPIs in the Chilean context. This part of the study is also aimed to explore and confront several hypotheses and assumptions suggested about the factors that seem to be promoting and/or limiting university DPI, but paying special attention to the differences among universities or types of universities.

The factors that will be explored in terms of its relation with university DPI will be: the regulation applied to program approval (whether universities have full autonomy or not), state funding, research activity, faculty number and composition, institutional size, and the level of complexity of universities in terms of its fields of study. These factors are discussed and justified in terms of its relevance in the second and third chapter.
CHAPTER 2: LITERATURE REVIEW

2.1. Background and concepts

In the following section, I will introduce the concept of DPI in the realm of the scholarly debate about higher education differentiation and diversity. I will also discuss the various factors identified in previous research that may be related to program innovations, as well as analyze the most influential theoretical perspectives that have been present in the debate. I will finally assess those factors and their relationship to program innovation in the Chilean case, discussing what controversies are confronted and what kinds of new insights are advanced by this research.

2.1.1. Higher education differentiation and diversity

In the last couple of decades, the specialized literature in the field of higher education has contributed to a better understanding about differentiation and diversity. Burton Clark described higher education as a particular differentiating sector of the society par excellence (Clark, 1993). Institutions, disciplines and subject areas have become different in many ways (Kogan, 1972). Many researchers agree that with the expansion and worldwide massification of higher education observed in contemporary systems, differentiation and diversity have increased in most countries.

Some researchers have paid special attention to distinguishing between differentiation and diversity. While differentiation “will be defined as a process in which
new entities emerge in a system (...) of higher education” (Van Vught, 2007), diversity “is a term indicating the variety of entities within the system” (Ibid.). While differentiation has as a counterpart which is “dedifferentiation”, a process by which different entities return or converge to a general or primitive state, diversity has as a counterpart the concept of homogeneity, uniformed entities, lacking differences (Huisman, 2000). Differentiation is a process that implies a growing number of entities in a given system, one of its visible features. However, diversity is a condition of a system. It is not necessarily a matter of the number of units, but differences among themselves. Differentiation may be assessed by following the evolution of the entities in time, while diversity might be measured by focusing on the existing differences and distance among entities. Even though differentiation and diversity may be related concepts, it is highly debatable that one may lead to the other in simple terms (Huisman, 2000).

In higher education, differentiation and diversity are relative terms. Differentiation and diversity of what? In an early work, Burton Clark suggested that differentiation “may occur horizontally and vertically, within institutions and among them” (Clark, 1978). Differentiation allow all sorts of emerging new entities such as sections (i.e. colleges, programs or departments in institutions), tiers (different levels of tertiary education in a system), sectors (different types of universities, i.e. research or teaching, among others), and hierarchies (high and low placements based on certain tasks) (Ibid.). Franz Van Vught also paid attention to what research has said about differences within and between institutions (internal and external differentiation), indicating that there are different ways to approach to the matter (Van Vught, 2008). In the case of differentiation within institutions, the focus is in the differences that might be
identified in a certain institution. In the case of differentiation between institutions, differences can be observed in an aggregate number of institutions (i.e. in a country or region).

Maurice Kogan distinguished the several dimensions of differentiation, relating the term to certain phenomena and proposing differences in higher education levels (purposes, status, resources, etc.) as mostly related to stratification (Kogan, 1997). The growing differences in higher education disciplines and subject areas, and the segmentation in their epistemologies and organization is a typical feature of the differentiation process (Ibid).

In a very influential work, Robert Birnbaum (1983) identified seven categories in which differentiation and diversity occurred:

- **Systemic**: refers to differences in institutional type, size and control observed within a higher education system;
- **Structural**: alludes to differences in the type of higher education institutions and the internal division of power among institutions in a system, quite related to the historical roots and legal framework.
- **Program**: is related to the differences in degrees or certificates, levels, areas, and perhaps emphasis of the programs and services provided by institutions;
- **Procedural**: alludes to differences in the ways higher education institutions organize and provide teaching, research and/or other services;
- **Reputational**: points to the perceived status or prestige differences that may have institutions among them;
• Constituents: alludes to the plausible differences of the characteristics of students, faculty, staff or other constituents in the institutions;

• Values and climate: reveal possible differences related to social norms, environment and culture.

As seen, there are many ways to assess differentiation and diversity. Dill and Teixeira (2000) argue that most research refers to institutional and program diversity, the first considering differences in terms of institutional mission, size, type of control and location, among the most important; the second, on subjects or fields, academic degrees, orientation (theoretical/applied, research/vocational), quality, among others (Dill and Teixeira, 2000). This is also the case in the Chilean literature; however, most studies have focused on the growing differences among institutions and, almost none on the differences among educational programs.

2.1.2. **Focusing on degree programs**

Focusing on degree programs provides an opportunity for an in depth analysis of one of the features considered in the debate about higher education differentiation and diversity. The focus of the study is justified because of the lack of previous research and evidence in Chile and in the region, contributing with detailed description and analysis of one relevant phenomenon of program differentiation and diversity.

Researching about DPI has some conceptual complications that need to be taken into account. There are at least two relevant issues for this research purpose: i) what will
be considered a degree program? and ii) when will a degree program be considered an innovation? These issues were not so complicated for research in Europe because of the greater state control over new programs and standardized definitions.

In Latin America, programs in higher education may be defined in a number of ways. In Chile, almost all study programs lead to a specific degree or certificate from the very beginning, and students usually enroll from their first year in programs that clearly lead to an identifiable degree or few options of degrees (concentrations or specializations, i.e.). There may be a few exceptions; for example, general studies such as common study programs in some subject (engineering common study plan, i.e.) that may not lead to a certain degree, but lead to a particular set of specializations that students can pursue. Still, Chilean programs lack flexibility compared to counterparts in the developed world, and most programs are organized in very rigid curricula directly associated with certain degrees (OECD, 2009; Brunner, 2009, López, 2010).

In the university sector, many sorts of degree programs can be observed, from academic studies to vocational, from disciplinary based to professional oriented (see: Henkel and Kogan, 1999). In Chile, regardless of the nature of study programs, they are usually categorized in fields of study (using an adaptation of the UNESCO’s field of study framework⁶). University degree programs are usually 4 to 7 year, and graduates receive a licentiate and/or a professional certificate after completing their studies. From

⁶ The Higher Council of Education organizes the program supply in the following fields of study: administration and commerce, arts and architecture, sciences, social sciences, law, education, humanities, natural resources, health, and technology (INDICES, 2009).
the International Standard Classification of Education (ISCED, 1997), this type of programs are classified as 5A initial tertiary programs.

Therefore, for the purposes of this study, a degree program will be a study plan and set of teaching and learning activities, articulated in a curriculum and belonging to a certain field of study, and with a certain name that identifies the degree (licentiate and/or professional certificate) that is given to the student once studies are completed.

Nevertheless, when can a degree program be considered as an innovation? Using Burton Clark’s approach to differentiation (1978), there might be both internal or external approaches to program differentiation (internal when related to one single institution, and external when related to an aggregate number of institutions in a system or a sector), and vertical and horizontal differentiation (vertical when a previous program shifts into a higher or lower program/degree, and horizontal when a certain new program differentiates itself from previous known programs from the same level of training). For the purposes of this study, Clark’s approach to external and horizontal types of program differentiation is helpful. Indeed, we are searching for new programs at the aggregate national university sector level, and focusing on innovations taking place only at tertiary university types of programs (5A, ISCED).

Still, I have chosen the term of program innovation, instead of program differentiation. While program differentiation is conceived as a process, program innovation refers directly to the creation of a new degree program resulting from a process. Using the concept of program innovation has many advantages, because it allows me to identify not only new programs coming from previous programs or study fields—typically related to differentiation processes—but also the emergence of
completely new programs coming into existence, different from any other previous programs (Van Vught, 2007). Using the term of innovation instead of differentiation is quite relevant for the purposes of this research, because it goes beyond the classical linear evolutionary perspectives on differentiation, expanding the view to emerging new entities that may not be directly derived from previous entities. The use of the term ‘innovation’ allows overcoming the complex matter of the origins of new programs, whether new programs are clearly derived from other previous programs or perhaps have a very blurred genesis. Focusing in DPI allows concentrating on the creation of new programs and their characteristics, regardless their arguable disciplinary or professional roots.

2.1.3. Operationalizing DPIs

Even if there is a large literature dealing with the concept of innovation, there is not much about its application to higher education institutions and its programs. There is the general idea that even if higher education institutions may be considered a major force for innovation in our societies, they are at the same time resistant and sometimes even hostile to innovations attempted within themselves (Enarson, 1960).

The concept of innovation is clearly associated with ‘something new’, whether something completely new or at least partially new. Schumpeter (1912), one of the most prominent researchers studying innovations from the political economy tradition, classified innovations into four types: i) products, ii) processes of production, iii) factors of production, and iv) markets and/or commercial networks. In this study, I am mostly interested in the product innovation type of higher education programs; this is, the
introduction of a new degree program, one with which higher education and students are not yet familiar. From a university perspective, a new study program can be understood as a product innovation, organized with a new curriculum and resources, and designed to open a new area of knowledge for society and students with new academic or professional interests.\footnote{Understanding new study programs as product innovations does not imply necessarily that higher education is a commodity or an individual investment. Students might consume and/or invest in higher education from several opportunities supplied by higher education institutions, perhaps choosing or making educated guesses, but most of times unable to forecast their commodity benefits or future returns with any reasonable degree of precision (Marginson, 2004). Universities innovate to not only answer students’ demands, but also looking at long-term needs of society (Tilak, 2008). Even if there has been a shift in the perception of the nature of higher education from a public good to a private good, still universities serve the public interest (or at least intend to do so), and most government policies in Chile are inspired to enhance the social benefits of higher education.}

DPI can be understood in many ways. There are several dimensions in which innovations may take place: changes in objectives, study plan, subjects, resources involved, and delivery formats. However, I have chosen here a restrictive approach to DPI that allows a more precise identification. Gruba et al (2004) suggest five sorts of common innovative changes in university programs and curricula. These are: i) changes to or within elective subjects, ii) changes to or within core subjects, iii) introduction of new subjects, or deletion of an existing subject, iv) introduction of a new subject (course work) in a degree program, and v) the introduction of a whole new degree program or specialized stream. In this ladder of plausible curriculum and program changes, the most
radical innovation would be the introduction of a completely new degree program, implying most of times significant curricular and programmatic changes based on new knowledge and/or professional expertise. A fixed definition of program innovation, as a product innovation representing a completely new program and degree in the university sector, allows identifying with greater precision each of the relevant innovations for this study’s purposes.

However, innovations occur at a certain moment and it can be ‘perceived as new by an individual or other unit of adoption’ (Rogers, 1983). Indeed, innovations are always relative to certain point of reference. In this case, DPI in Chilean universities should be considered in reference to the existing national university program supply. Nevertheless, because the program’s supply evolves, adding new degree programs every year, innovations need to be carefully identified each time they emerge in comparison to the existing program supply.

Therefore, I propose an operational definition of DPI as follows: it is a new program identify by its new name or certificate name (including specialization/mention/concentration), different from previous programs and/or degrees offered by any other higher education institution in Chile. A university DPI will be considered as such, when

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8 It might be the case that some new programs names and degrees are the result of strategies to make it more marketable to students and the labor market, and perhaps represent little or no study plan and curriculum innovation. This is certainly a limitation of the study. However, my assumption is that these cases are infrequent and very difficult to identify from a methodological point of view. In any case, innovating in the names of programs requires taking on some risk and is an indicator of some innovation capability from universities.
fulfilling the following three conditions. i) it has a new name and leads to a new degree or certification, ii) considers a whole new study program publicly informed and supplied to new students, and iii) emerges in a certain moment and it is considered as new, in comparison to the existing national program supply in that moment.

2.2. **Factors related to program innovation**

Most previous studies (i.e. Huiman, 2000; Morphew, 2000) have advanced evidences about the extent to which different factors are related and influence program innovations in higher education systems. By influence, I understand that certain factors are closely related, showing a strong correlation promoting and/or limiting program innovations. However, the issue is still complicated and there seems to be no consensus about the variety of factors involved or about a methodological framework able to explore the different factors that seems to be related. Most research has approached the issue by exploring correlations between one or few factors (independent variables/predictors) and program innovation, and avoiding suggesting any causation relationships. Because of the lack of empirical data, most researchers have favored examining some particular factors over others and using descriptive methods and correlational analysis. In the methodology section of this dissertation, I will discuss this matter and propose a methodological procedure to explore the most important variables that seems to be related to program innovation and test potential relationships in the Chilean context.

As discussed before, research has approached program innovations in a general way, looking to the most relevant factors related to innovations in higher education
systems or in the university sector as an aggregate unit of analysis. Thus, factors such as the legal framework, funding system, and others, have been studied in their relationship with program innovation in higher education considered as a whole. Some variables have been assessed as both promoting and/or limiting the emergence of new programs in a country or a state, depending on how are conceived within a system or a sector, and interact across all universities, influencing program innovations positively or negatively. However, very few studies have focused on DPI differences among higher education institutions and how some factors might show different sorts of relationship on behalf of the different types of universities in a country. Indeed, approaching program innovation and assessing several factors that may be influencing innovations among universities in a certain country, requires not only a discussion of the extent to which factors might promote and/or limit innovations in a country, but also assess how those factors could be related to different universities in a variety of ways. In this section, I will analyze the most significant contributions provided by literature and research that have been taken into account for my own research.

2.2.1. Previous empirical studies

One of the first studies on the issue of program innovations compared the number of new academic programs developed by universities in the US and Germany between 1900 and 1930 (Ben-David, 1972). Findings showed that even if both countries started with a similar number of programs in 1900, the US had a greater number of new academic programs than Germany at the end of the period of study. Research suggested
that the strong differences in the structure and dynamics in higher education between the US and Germany explained such findings. Universities in the US are highly decentralized from government, and prompted to compete for faculty and new students; thus, universities seem to be quite responsive to external demands and to innovate in its program supply. Instead, German universities are unlikely to innovate in a highly state monopolized higher education system and lack of institutional competition. In Ben-David’s view, even if there are academic considerations influencing the emergence of program innovations, in his study, the external considerations, such as institutional competition and state regulations, are the most significant factors explaining the different magnitude over time in the number of innovations between the US and Germany.

Ben-David’s pioneering study of American higher education provided a first empirical investigation into the issue of program innovation, among other matters considered in his research, contributing largely to discussion about differentiation in higher education. The two most relevant considerations explaining why the US showed a greater number of program innovations in comparison to Germany are quite relevant for the Chilean case. This is the case even though Chilean higher education is one of the most decentralized and privatized systems compared with other countries in Latin America, with high levels of autonomy granted to its universities, and with widespread competition for funding and students⁹. We might expect that these external characteristics

⁹ Authors identify the reform of 1980 with a deregulation process of many commonly state regulated issues in other higher education systems (Funding, institutional/program approval, recognition of new providers, professional credentials and professional bodies, etc.). In addition, the deregulation process is associated with the growth paths of the system granted with a strong
should be encouraging innovations and fostering entrepreneurial behaviors in the university program supply.

Among contemporary researchers, Jeroen Huisman and Christopher Morphew stand out from others because of their several studies and publications related to the issue of program differentiation and diversity. Both researchers have contributed empirical research, paying special attention to new emerging program in national and cross-national case studies, and providing strong insights to the debate about higher education program differentiation and diversity.

In one of the first studies carried out by Huisman, he analyzed the number of new programs and program specializations introduced by twelve Dutch universities between 1974 and 1993, focusing in seven fields of study. In his research, he wanted to identify the most relevant factors to understand the emergence of new fields of research and teaching, arguing that both internal and external factors needed to be taken into account (Huisman, 1997). From a social exchange and resource dependency approach, he tested the following two hypotheses: i) larger levels of higher education dependency on governmental funding leads to higher numbers of new programs and specializations, and freedom to teach constitutional right and with little state control (Bernasconi and Gamboa, 2000; Marshall, 2010).

In an early work (Huisman, 1995), the author suggested that the degree of program differentiation, measured by the emergence of new study programs, was related to the degree of dependency of higher education institutions regarding social norms and values and funding. The relation to social norms and values is strong in the case of hard sciences and weak in less paradigmatic study fields (social exchange theory), and the relation to the government funding is mostly by enrolment (using a resource dependency theory).
ii) lesser levels of paradigmatic development (disciplinary norms and values) allow a
greater number of new programs and specializations.

Using correlation and regression techniques, Huisman observed the relationship
between new programs and a proxy of dependency on governmental funding (considering
enrollment patterns and funding) and a ranking of disciplines according to its
paradigmatic development. Findings showed that the growing number of new study
programs and degree specializations observed over time were influenced because of the
also growing pressures from government and its funding mechanisms intended to
courage program innovations among universities\textsuperscript{11}. Data showed also that the quantity
of program innovations and particularly specializations between higher and lesser
paradigmatic development disciplines over time was significantly different, suggesting
that there might be also internal disciplinary backgrounds intimately related to program
innovations (Huisman, 1997). Huisman’s research for the Dutch case supports the
assumption that not only external circumstances related to higher education (such as
funding) are relevant for program innovation, but also that innovations seems to occur in
a higher rate in some disciplinary fields compared to others. This kind of statement is also
suggested by Karseth (1995) from a different angle. Drawing from several interviews of
faculty at the University of Oslo, this author argued that several external factors seem to
influence the emergence of new academic programs, but also that the disciplinary
dynamics of academic departments (knowledge traditions, power and legitimacy, i.e.) are
critical in terms of the opportunity to bring up program innovations (Karseth, 1995).

\textsuperscript{11}Even if the number of new programs and specializations was not so high, the correlation
coefficient showed a strong relationship between the variables studied.
Morphew also contributed with a study about new programs and degrees in three states in the US, looking to its relation with faculty opinions and behavior (Morphew, 2000). In a qualitative study, he analyzed and discussed the opinions of new faculty in some universities. The study showed that faculty felt sometimes encouraged to design new study programs, in an effort to open new opportunities within their universities, fulfilling emerging interests from students and increasing institutional funding (Ibid.). In a similar study about faculty opinions, Huisman (2000) emphasized, in similar terms to Morphew, that the state regulations and incentives and the institutional policies pressuring for external funding, are the most relevant factors cited by faculty for the design of new programs in higher education (Ibid.). However, there is no reason to believe that faculty opinions might be identical in different types of universities, and that pressures for program innovation fall equally over all universities. Besides, universities have several pathways to increase the number of students and funding, depending on their own strategies and circumstances.

The regulatory framework for higher education seems to be a significant factor related to program innovation. Huisman et al (2003) reviewed the governmental regulations related to higher education program supply in five countries in Europe\(^\text{12}\), offering a classification of different levels of autonomy and government interference in the matter. Comparisons showed that while some countries maintain strong governmental regulations applied to higher education programs, others have very limited rules and policies providing great autonomy to universities. However, differences among countries

\(^{12}\) The review considered many types of governmental regulations, including legal requirements, approval processes, external review processes, funding, qualification frameworks, etc.
are not only a matter of the level of governmental interference, but also a matter of governmental rationale to regulate the program supply in higher education. Indeed, in some countries, regulations are meant to exercise a direct control from government in higher education supply (with a central planning perspective). In other countries, government assumes a far more indirect role controlling matters related to the program supply, and grants universities with enough autonomy to make incursions and innovate into new fields of study (Huisman et al, 2003). Therefore, assessing the regulatory framework for program innovations requires not only a review of the norms and rules taking place, but an analysis of the governmental rationale and regulatory dynamics promoting and/or limiting program innovations.

Huisman also undertook an international and comparative study in nine countries in Europe, looking to both institutional and program diversity (Huisman, 1997b). The level of institutional diversity was measured using Birnbaum’s (1983) and Simpson’s (1949) diversity indexes, and the level of program diversity looking to the number of different study programs (and locations) in different disciplines. The results of the study showed the difficulties of measuring diversity cross nationally. Despite the institutional diversity outcomes\textsuperscript{13}, program diversity across countries was higher, moderate, or lower, mostly because of national circumstances of the study and its classifications. Comparing countries was very difficult since definitions and the use of classifications were difficult to manage.

\textsuperscript{13}While the Simpson index showed very small country differences, the Birnbaum’s index showed more variety.
In any case, this study is interesting for the Chilean case, because it criticized the widespread assumption linking institutional to program diversity, at least in a simplistic manner. Therefore, I suggest that the Chilean growing university diversity usually affirmed in literature does not necessarily imply increasing program diversity over time. Another suggestive study for my research purposes was a longitudinal analysis comparing the US and the Netherlands in terms of public policies and program differentiation, and duplication or emulation of programs (Huisman and Morphew, 1998). The study analyzed program openings, both program innovations and program duplication of previous programs, in seven states of the US and the Netherlands, and in two periods of time (1971 and 1993). The study drew data from public registries and program classifications available in each country, analyzing the names of program openings and identifying whether they were innovations or duplications comparing it with the previous program supply. The study argued that mayor changes in public policies related to program review and governmental program approval, as well as some specific policies intended to encourage program innovations, helped to understand the differences in the number of program innovations and duplications between the US and Dutch in the two periods of time. Even if the authors suggested that program differentiation is still a very complex process, data gathered tended to reject two widespread assumptions in the literature: that market competition promotes diversity by its own and governmental policies usually block it (Ibid). Indeed, data suggested that both market competition and governmental dynamics might encourage or discourage program innovations, depending on how the market works and how policies are designed and implemented. This later study is relevant because it pays special attention to changes
over time, discussing how market competition (operationalized as decentralization and increased institutional autonomy) and governmental policies as external factors might be related to changes in the ration of program innovations and duplications. Whenever studying long-term program openings it is important to assess carefully the changes in the institutional environment over time.

None of the previous studies discussed above examined differences of program innovations among higher education institutions, one of the relevant objectives in my research. All assumptions about the factors that might be involved in program innovations were examined in these studies from an aggregate national point of view, limiting the possibility to examine differences across higher education institutions and understand that perhaps the relationship between factors and program innovation may vary from one type of university to other.

One of the few studies focusing on program innovation differences within a country is from Huisman and Beerkens (2000). This study inquired about the extent of program innovation success in Dutch universities from 1974 to 1993, analyzing the level of quality and enrolment in a sample of program innovations (in seven clusters of programs). The study discussed if early adopters of program innovations were likely to be more successful than the followers, but found no clear evidence (Ibid). While in some cases innovators were very successful compared to followers, in other cases, the innovators were barely successful, at least measured in terms of peer review processes and enrolment. However, the study did not consider the institutional characteristics of the

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To analyze the level of program 'quality', the study examined the conclusions of peer review reports of the programs.

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innovators while assessing program innovation success. Therefore, the question if innovators are successful or not because of the strong or weak institutional (internal) academic conditions where innovations took place remains unexplored.

Another study focusing on program innovations not only compares countries, but also explores differences within countries. In a large study, Jenniskens (2000) assessed state regulations related to program supply in the Netherlands, France, England, and the state of Pennsylvania (US). This research showed how different States approached to higher education program supply regulation differently, granting more or less autonomy to universities, and pressuring for program innovations in different terms. Using the concept of ‘governmental steering’, this research showed that different states assume very different policies when dealing with higher education institutions and their program supply; some promoting and some limiting program innovations. The study provided evidence about the relationship between governmental steering policies and the amount of program innovations in each of the states over time. It also suggested that some universities seem to be more responsive to certain policies (Jenniskens, 2000). Drawing from a sample of universities in each country and interviews of university staff members, this study suggested that young and small universities (established in 1960 or latter) are likely to be more active innovating than big traditional and mature universities (Ibid). However, the period and number of universities studied was limited (the study focused in innovations from 1978-81 and 1988-91, selecting four universities in each country/state). At the same time, the study selected cases only from comprehensive universities (those offering degree programs in a wide range of academic disciplines), limiting the variety of universities in each country. Even though, this study offers significant insights about
several external and internal factors involved in program innovation: new knowledge, shifting faculty interests, image and prestige of the academic departments, increased competition, changing students’ preferences and necessity to attract more students, among the most important (ibid).

All these empirical studies provide significant insights about many considerations related to program innovation. Evidence shows that both internal and external factors need to be taken into consideration assessing DPI, and that those different factors may well influence positively or negatively the emergence of new programs, depending on the country circumstances (context) and the way they are structured and related with each other. Even though, most empirical studies have highlighted some systemic features of higher education and/or regulations and policies that may contribute or limit program innovations. Matters such as the level of centralism of higher education systems, competition among institutions, funding mechanisms and incentives, regulations and governmental policies are placed among the most important country features related to program innovations.

At the same time, most studies have measured program innovations in an aggregate manner, comparing new programs between countries and/or between certain periods. Only few studies have disaggregated the analysis of program innovations in a country, investigating differences in which innovations may occur among universities. Studying how degree programs innovations occur among different universities is a major concern in this research, mostly because differences in DPIs may allow a better understanding about how different factors come into play in higher education systems of growing complexity.
Research in program innovation, and to a greater extent, program differentiation and diversity, is gaining interest in the field. Even if these phenomena are not something new (Neave, 2000) we seem to be witnessing an increase of differentiation dynamics with the expansion into mass higher education (Clark, 1978). Greater knowledge about how DPIs occur can partly illuminate the pathways of program differentiation and diversity.

2.2.2. General theoretical perspectives

Previous research offers a number of theoretical perspectives on the issue of the emergence of new programs in higher education. Even if most of the perspectives share a number of elements, in the literature it is possible to find some attempts to organize them and highlight the most significant contributions and emphases. In the following section, I will discuss how literature has organized the most relevant theoretical perspectives used by previous research, analyzing how approaches are useful for this study purposes. One of the comprehensive assessments of the perspectives applied to higher education differentiation and diversity was proposed by Huisman (1995). He identified at least three relevant sociological and organizational perspectives to understand the processes of program differentiation and diversity: i) differentiation as a form of division of academic and professional labor (Durkheim, 1964), ii) differentiation as a process of structural change in complex social systems (Parsons, 1966), and iii) differentiation from an ecological and organizational perspective, i.e. structural and institutional isomorphism (Hannan and Freeman, 1977; and DiMaggio and Powell, 1983). In Huisman’s view, even if all these broad theoretical approaches have contributed concepts for the study of
program differentiation and diversity, each framework in itself has been insufficient for operational purposes and, at the same time, its integration seems to be very problematic because of the variety of theoretical presuppositions (Huisman, 1995). Because of that, Huisman (1997) used an operational approach largely based on the social exchange theory (Emerson, 1962) and the resource dependency approach (Pfeffer and Salancik, 1978). As discussed earlier, Huisman suggests that the emergence of new programs is highly related with the degree of dependency of higher education institutions on the social norms and values, imposed by different actors, such as the government, academe, and others, and to resources needed for institutional survival, mostly funding and enrolment (Huisman, 1995).

In Huisman’s view, innovations likely occur when norms and values are weaker, and when there is less dependency to restrictions coming from government, the academic community or other actors involved in program regulation. At the same time, innovations are likely to occur when there is a greater degree of dependency of institutions to external funding that imposes the needs of greater funding and enrolment throughout new programs. Still, this approach rests largely in the external circumstances affecting higher education institutions, paying less attention to internal and organizational matters that may also explain the likelihood of program innovation across institutions.

Van Vught (2007) suggests a different way to organize the theoretical perspectives about program differentiation and diversity, distinguishing between the classical and contemporary perspectives. Among the classical approaches, he highlights some very influential researchers such as Darwin, Durkeim and Parsons, along with the most important, all providing strong insights about processes of differentiation in
complex social systems. With concepts from biology, sociology, and economics, the classical approaches understand differentiation as a basic process deeply involved in the nature of complex and dynamic systems, such as higher education. Differentiation is a natural process in the evolution and development of systems of growing complexity, continuously adapting to its environment. One of the critiques to the classical perspectives is that they mostly account for the effects of differentiation, rather than specify its causes (Rhoades, 1990). Indeed, program innovation and the continuous program differentiation would be a response to growing specialization and changing environments, but there is less of attention to the many factors driving program innovation.

Van Vught (2007) also recognizes some relevant contemporary contributions that tend to focus in higher education organizational behavior and its interaction with its higher education environment. In his own work (ibid.), he analyzes how some organizational theories can help developing a framework for better understanding differentiation in higher education. Three main theories provide insights in the debate about program innovation. i) the population ecology perspective (Hannan and Freeman, 1989), focusing in the sources of variability and homogeneity of organizations that compete in changing environments, ii) the resource dependence perspective (Pfeffer and Salancik, 1978), highlighting how the external resources and organizational environment affects the behavior of organizations, and iii) the institutional isomorphism perspective (DiMaggio and Powell, 1983), that calls on the adaptation processes that leads organizations to homogenization in uniform environmental conditions.
Describing DPIs and understanding how they have occurred in Chile over the last 28 years requires not only analyzing its features at an aggregate level, but also exploring different factors involved in the matter in a desegregate level. The contemporary perspectives suggest paying more attention to the organizational dimension of DPI mostly brought about by internal factors.

A different balance of contemporary theoretical perspectives drawn from previous research is provided by Meek et al (2007). He identifies three broad approaches to differentiation and diversity: i) Burton Clark’s internal perspective, based on disciplinary (and professional) differentiation (Clark, 1983), ii) Neave’s systemic perspective under the so-called state supervisory model (Neave and Van Vught, 1991), and iii) Van Vught’s environmental (social, political and economic) perspective (Van Vught, 2007).

Clark’s internal perspective, related to Durkheim’s division of professional and academic labor, offers a comprehensive approach to one significant higher education dynamic, which is the growing differentiation intimately related to academe. Having a variety of forms and pathways, the so-called ‘internal perspective’ highlights the academic work and the trend of disciplinary specialization, including organizational dynamics brewing from the institutional organization of universities (schools, departments, programs, i.e.). Particularly in contemporary higher education, the speed in knowledge development also accelerates professional and disciplinary segmentation in universities, promoting the emergence of new programs in higher education. Neave’s systemic perspective departs from a national (and supranational level, in the case of the European Union, i.e.), paying special attention to the country forces that work for and against differentiation and diversity. In Neave’s ‘new state supervisory model’ in higher
education, different from the old centralized and state planning model, higher education institutions have far more autonomy and freedom to innovate, but at the same are stressed by several external requirements including growing pressures for self regulation and enhanced accountability. From this perspective, the most important matter to analyze forces toward differentiation and/or homogenization, is how different countries are restructuring policy environments and the rules that govern universities, and if those forces are allowing enough space for innovation or rather limiting it. Van Vught’s environmental perspective draws from the open system’s theory, and higher education is considered as a system (with several subsystems – other sectors, authorities, etc.) operating within a social, political and economic environment. Higher education operates in changing environments, and its institutions are embedded in their own relevant environment, constantly competing for resources for survival; and survival occurs when there is a reasonable fit between the particular conditions of the environment and the specific characteristics of universities. From this perspective, innovation may occur when there are environmental conditions favoring it and organizations are able to. However, the environmental conditions may change from institution to institution, and competitors have different strategies to confront changing environments.

None of these latter approaches needs to be considered as mutually exclusive and, as a matter of facts; they actually share a number of characteristics. They all understand higher education differentiation as a complex and dynamic matter, having a variety of movements depending on a variety of factors and variables. Even if Clark's internal perspective contrasts from the other two because of its ever-increasing differentiation
approach in higher education, they all share that the degree of differentiation depend on several forces intimately involved with universities and the context in which they operate. All the contemporary perspectives identified by Van Vught (2007) and Meek (2007) recognize the emergence of new programs as a form of higher education differentiation that may affect diversity. They surpass the classic studies when identifying several forces driving to the proliferation of different programs, and at the same time outlining a complex matter with many peculiarities depending on country circumstances.

Nevertheless, it must be said that there is no consensus on a single theoretical framework able to capture, in a comprehensive manner, the variety of factors and forces that seems to be involved in program innovation (Meek, 2007). Empirical research and data are still very limited. Researchers have argued that there are many difficulties operationalizing various existing theoretical perspectives (Huisman, 1995).

Most researchers would agree that program innovation is a phenomenon that has become more pronounced with the growing complexity and massification of higher education and knowledge development, even if it has many historical roots and it cannot be considered as something new and exclusively contemporary. According to most researchers, program innovations occur because of a variety of internal and external factors that might be both promoting and/or limiting innovations, but the way in which these factors influence program innovations may vary from one country to other. For this research purpose, I suggest using the distinction of ‘internal’ and ‘external’ factors or variables to identify some considerations coming from higher education institutions and those related to its environment. On the one hand, I suggest understanding as the internal factors those mostly brought up by the organizational
perspectives, such as disciplinary and knowledge characteristics in higher education institutions. On the other hand, I suggest understanding as the external factors those usually related with higher education’s institutional environment, such as the regulatory framework (i.e. the level of autonomy) and the financial (funding) dynamics.

Both internal and external factors need to be taken into account to understand the Chilean case. Indeed, because I want to describe how program innovation occurred in Chile, I want to provide a description of data about the number of innovations, their evolution over time and some of their most important characteristics. However, I also want to examine their relationship with those internal and external factors identified by previous research, seeking to explore some hypotheses about why program innovations happened in the way they did in Chile.

A relevant difference with most previous research is that I assume that there is no reason to believe that the factors that seem to be influencing program innovations work in all universities in the same way. A discussion of the internal and external factors identified by literature for the Chilean case is needed, exploring its relationship with the differences of university DPI across different universities.

2.3. Chilean higher education

In the following section, I will introduce some of the most relevant features of Chilean higher education and some contrasts within the region (Latin America). My objective is to discuss how the most significant internal and external factors presumably related to program innovations can be understood and incorporated into my case study.
2.3.1. Background

Until 1980, Chilean higher education remained as a relatively small system, composed of a strikingly small number of universities compared to many countries in South America. There were only two State-owned universities and six private ones, all created by laws enforced by the National Congress. All universities were almost fully funded by the government (Brunner and Briones, 1992).

Higher education in Chile was understood as a public responsibility under the so-called ‘teaching state’ (Levy, 1986). Public and private universities were considered as contributors to the teaching mission of the State, and higher education was under an indirect control of the State and partly under the leadership of the oldest national university, the Universidad de Chile. The degree programs offered by universities, as well as the student openings, remained limited and controlled by the existing universities and the teaching State (Campbell, 1995). Because of the university reform in mid 1960\textsuperscript{15}, the professional orientation of higher education programs became stronger, and new

\textsuperscript{15} The university reform started in mid 1960 was inspired on the ‘Cordoba reform’ and it was developed in a context of mayor political and economic changes in society. It was a movement in Chilean universities pressuring for changes in the orientation of teaching, research and the contribution to society, as well as some changes in the government structure and administration of higher education institutions (For details on the case of Chile, see Garretón, 1985 or Huneeus, 1988).
levels of educational programs emerged: professional, semi professional and technical programs (Fanelli and Trombetta, 1996).

Most Chilean higher education programs were offered at an undergraduate level, and many researchers would argue that they were offered very limited program diversity (Bernasconi and Rojas, 2004). In 1980, of the 20-24 year-old population, only 10.8% of it, consisting of 118,978 students, had access to the university system. This was a selective higher education system, where access was restricted, according to the universities’ program supply and openings, and the student’s school performance and achievement on national standardized tests.

Particularly since 1950, universities were granted ‘privileged autonomy’ to operate (Brunner and Briones, 1992). However, with the military coup in 1973, all the existent universities were intervened; the military government took over university government, avoiding and also widely purging collegial and other individual internal authorities, and persecuting personnel and students that were opposed to the military regime (Levy, 1986b). Some schools were closed, most of which offered programs in the field of social sciences. Academic freedom, pluralism, and free speech were banned. Universities were put under permanent vigilance by the military government (Brunner, 1986).

From 1973 until 1980, and because of the political crisis, enrollment decreased as well as did public resources (Levy, 1986b; Brunner and Briones, 1992). A major transformation of Chilean higher education took place from 1980 on. Major changes were made at that time by central edict and bureaucratic rules (Cox, 1996; Schwartzman, 2002):
Dismemberment of the regional branches of the two main national Universities. The existing fourteen branches of the University of Chile and Catholic University were turned into new autonomous regional Universities. The 8 traditional Universities and the new 14 derived new universities became the members of the Rectors’ Council of Chilean Universities (CRUCH).

Establishment of a new system for the creation of private higher education institutions by a new State-sanctioned system based on minimum requirements, substituting the former stringent and protected legal procedures for the creation of Universities. These new system was highly favorable for the establishment of new private owned institutions.

Institutional diversification in a three-tiered higher education system. A vertical arrangement according to functional hierarchy was established, considering universities, professional institutes, and technical training centers. Public and Private universities were expected to focus on long cycle (4 to 7-year) undergraduate programs, as well as graduate programs leading to master and PhD degrees. The new professional institutes (IPs) were restricted to 4-year programs leading to professional qualifications, which did not require academic (bachelor or licentiate) degrees. Finally, the new technical training centers (CFTs) were restricted to short (2-year) cycle vocational programs leading to technical certificates. This structural diversification prompted the new professional and technical institutions to create a varied new offer of many new short programs.

Establishment of a new higher education finance system, restricting state sources and ending with the free-tuition student prerogative. The strong state funding
drove institutions to diversify their funding sources, start charging substantial tuition fees and increase funding by growing enrolment policies. The new system considered only two sources of state funding: i) a direct public grants, limited to those universities in existence before the reform in 1980 (the 8 traditional and 14 derived ones, members of the CRUCH), and ii) an indirect funding distributed to all higher education institutions (CRUCH and the new private universities) under a ‘best student formula’, this is, the number of students enrolled with the highest score in the national admission test.

The above reported structural changes were the basis for great transformations in higher education since 1981, allowing a major increase in the number of universities, the creation of a significant number of new non-university higher education institutions (IPs and CFTs), and the introduction of new dynamics of institutional competition for funding. These structural changes affected Chilean higher education since the early 80s, pressing for enrollment expansion and the increase in the number of programs offered by higher education institutions at all levels.

With the recovery of democracy in 1990, the traditional universities recovered its political autonomy and the internal authority was restored; however, the system itself had not changed structurally (Garretón, 2005). The new democratic government brought new measures and policies to higher education, adjusting but not changing many of the structural dynamics started in the reform in 1981.

In the period from 1980 to 2007, the higher education system grew from eight Universities to 196 higher education institutions. Enrolment increased from 118,978 to
752,182 students. The total number of programs offered by the entire system went from 652 to 6,679. Besides growing numbers, Chilean higher education evolved into a highly privatized system, with a high level of autonomy granted to higher education institutions. Brunner (2009) points out that the most remarkable characteristics of the Chilean higher education are its significant level of *privatism* and its extended market coordination dynamic compared with other countries in the region and worldwide. The country’s system has evolved not only a high number of private institutions, but also one of the highest percentages of enrolment in the private sector in the world. At the same time, families pay for almost 75% of the costs of higher education (Meller, 2010), while public funding remains as one of the lowest in the world. These particular characteristics, together significant autonomy of higher education institutions (political, financial, and academic), has allowed a vast competition among institutions and extensive market rule in Chilean higher education. Even if privatization can be found in most countries in the region, Chile started early transformations toward privatization and remains as one of the most privatized systems in Latin America together with Brazil and Colombia (Báñ and García de Fanelli, 1993; Schwartzman, 2002)\(^{16}\).

In the following section, I will provide an overview of the most relevant external and internal factors identified by previous research, and briefly describe how they are related to university DPI in Chile. It must be said that I will concentrate on those considerations related to the university sector, avoiding those that may be connected to non-university institutions (IPs and CFTs). As said before, it seems to be clear that the reform in 1981 brought program innovation and differentiation among technical and short

\(^{16}\) At least, in terms of the number of private institutions and enrolment.
professional study programs, mostly because those were new sectors created since the
reform (Courard, 1990; Pérsico and Pérsico, 1995a, 1995b; González, 1990; Velasco,
1998; Sepúlveda, 1999). However, there is little or no previous research regarding degree
programs innovations in the university sector, and certainty in disciplinary and
professional undergraduate level studies.

2.3.2. External factors related to DPI

From previous research, the most relevant external factors related to program
innovation are state or governmental regulations and funding. At the same time, I will
briefly comment on some social and labor dynamics also related to program innovation.

2.3.2.1. Regulations

Universities in Chile, once granted autonomy are allowed to define their program
supply and set the number of student openings, with no external authority interference at
all. Universities are granted substantial academic freedom and are able to award
academic degrees and professional certificates with full autonomy and national validity
(Brunner, 2009). Chile has no degree or certificate fixed framework, only a few basic
norms ruled by the national legislation as described below.

From a legal point of view, two main periods may be identified in terms of
regulatory circumstances related to the university’s program supply since the reform of
the 80th (Bernasconi and Gamboa, 2002). First, from 1980 and until 1990, the regulatory
framework was based on the Constitution of 1980, defining two basic constitutional principles: the right of education and the freedom of teaching, and some law-ranking decrees enacted by the military government in 1980 and 1981 (the DFL 1, 2, 3 and 4 of Education). Second, from 1990 until today, the regulatory framework was adjusted by a Constitutional Law (requiring a special quorum to be reformed) passed by the military regime, four days before the installation of the new democratic government (Ley Orgánica Constitucional de Enseñanza, 1990).

During the first period (1980-1990), all officially recognized universities under the new Constitution and law-ranking decrees, had full autonomy to determine their program supply. Universities were granted with institutional autonomy and full academic freedom. The DLF 1 of 1980 (MINEDUC, 1980), defined universities as degree granting institutions, able to offer licentiate, master and doctorate programs. At the same time, legislation allowed universities to supply other technical and professional certificates (coinciding with the attributions of the technical centers and professional institutes)\(^\text{17}\). Twelve professions required both the licentiate degree and the professional certification to be able to practice\(^\text{18}\), and because only universities could grant licentiate degrees, these

17 While universities are allowed to grant any sort of technical and professional certifications and undergraduate and graduate degrees, the professional institutes can only grant technical and professional certificates and the technical centers just technical level certifications.

18 Lawyer, architect, biochemical, dentist, agronomy engineer, civil engineer, commercial engineer, forestry engineer, medical surgeon, veterinary, psychologist and chemical pharmacologist (Art. 12, DFL 1, MINEDUC, 1980).
twelve professional programs were kept reserved only to be supplied by universities\textsuperscript{19}. No academic requirements (i.e. number of courses, length of the study plan, credits, resources or faculty requirements) were established. However, the law declared the principle that universities needed to fulfill their own missions, maintaining ‘excellence’ in teaching activities.

A clear distinction was drawn between the existing universities (the eight traditional and the new seventeen derived universities grouped in the CRUCH), and the new private universities created from 1981 forward. On the one hand, the existing public and private universities with full autonomy came under no external authority or external limitations to define their program supply, and decisions about the programmatic supply were determined by their own governing bodies. Nevertheless, it must be noted that the rectors appointed by the military government played a role of political vigilance. Perhaps this type of political intervention did not influence the universities’ program supply overall, but there is evidence that indicates ideological interventions over certain fields in Chile and in other Latin American countries under military rule (Levy, 1986; Figueiredo, 2002). On the other hand, the new officially recognized private universities started to function under a provisional licensing system called ‘examination’, until full autonomy could be granted. The new private universities were allowed to supply programs, but needed to be under an examination mechanism assigned to the CRUCH universities (public and private traditional and derived universities), meaning that the private

\textsuperscript{19} Because of this reason, professional institutes are allowed to grant professional certificates (usually 4-year programs) identical to those supplied by universities, but with no licentiate degree.
university programs needed to be approved by the examining universities and the students needed to take their final exams with faculty appointed by the examining universities\textsuperscript{20}.

As some researchers point out, the examination system to supervise the program supply and quality of teaching in private universities was tough and rigorous in the beginning, but it rapidly started to be exceeded by the growing number and size of private universities, and began to show laxity and lack of academic credibility in many cases (Bernasconi and Rojas, 2005). This legal requirement over private universities could certainly play a relevant role limiting the program supply in new private universities, and it seems to be the case that, even if there are no data available until now, most examined universities presumably emulated the study programs and courses from their examiners rather than innovated with new programs. Some researchers also suggested that many of the new private universities created since the reform, concentrated their programmatic offer in the so-called chalk and blackboard (tiza y pizarrón) programs, this is, traditional professional programs with low investment requirements (Fanelli and Trombetta, 1996; Vial, 1999; Arnold, 2000, Lolas, 2004).

The second period started in 1990, with the new regulations passed in the last day of the military government and inherited to the democratic government. The LOCE emphasized the principles of academic freedom and institutional autonomy, ruling also

\textsuperscript{20} Internationally, putting new private universities under supervision is not uncommon; what was somehow unique in Chile was that the government granted the state authority over all the public and private traditional and derived universities (CRUCH) to supervise all the new higher education institutions (Courard, 1993).
about university political and ideological activities vetoes. The law created the Higher Council for Education (CSE), a public organism in charge of a new licensing system for the recently created new private universities, replacing the previous examining mechanism that had been extensively criticized. The new licensing process (called ‘accreditation’), required new private universities to present their educational projects and be supervised for a period from six to eleven years, until full autonomy could be granted to institutions (or closed) depending on their level of accomplishment according to certain academic criteria. Particularly, the law established that all new programs created by universities under supervision needed to be first evaluated and approved by the CSE.

Most new universities created before 1990, applied to the new licensing process. Few remained under the old examination system. All the new private universities created after the LOCE was passed, needed to go through the new legal procedure. The new regulations involved academic standards for the creation of new programs, so private universities needed to present projects about their new programs, as well as a record that justified academic and professional soundness and viability. This requirement clearly represented a hurdle that only private universities under supervision needed to pass for the creation of new degree programs. Even if there was no rule in terms of possibilities to innovate with new degree programs, it is possible to argue that because of the peer review process carried up by the CSE and its likely conservative approach, the possibility to innovate with success was difficult (Hernández, 2000).

In any case, there are no previous studies about the number of innovative degree programs approved by the CSE. The last annual report of the CSE indicates that from a
total of 519 degree program projects presented from 1990 to 2006, almost 60% were approved (CSE, 2007), rejecting the common idea that the state supervision was most of times biased to approve new programs from private universities, especially when driven by peer reviewers selected from the CRUCH competitors.

The LOCE was reformed a few times, including new professions to the list of professional certifications that required a licentiate degree (passing from 12 to 18 \(^21\)), and increasing the number of professional degree programs that could only be offered by universities. Even though in 2008 the LOCE was changed into a new law (Ley General de Educación, LGE), no significant changes were introduced in terms of the legal framework related to higher education (the new law included many changes in the primary and secondary education system).

In the meantime, the university members of the CRUCH had no legal limitation to open new programs. However, because of the growing concern about the maintenance of quality standards in the program supply, in 1995 the CRUCH created an internal procedure for the approval of new programs among its universities. This procedure was a mutual agreement across CRUCH universities, and it was assigned to a group of experts grouped in the commission for self-agreed regulation\(^{22}\) (Letelier et al, 2003). This technical commission started operations settled within the CRUCH secretariat, and played a significant role evaluating and making recommendations about proposals of new

\(^{21}\) In 1990, the Law included three teacher specializations that needed a previous Licentiate degree (preschool education, primary education, and secondary education teachers). In 2005, the law included Journalism and Social Work professions as university level programs.

\(^{22}\) Comisión de Autorregulación Concordada.
degree programs opened by the universities members of the CRUCH. Scholarships funded by the Ministry of Education recognized the authority of this technical commission, requiring the approval of the new programs to be eligible for student aid. However, the commission fell into disuse by the year 2002, mostly because of the advances in a quality assurance system developed from 1997 and forward in Chile (Lemaitre and Zapata, 2004).

Indeed, a comprehensive higher education quality assurance mechanism started in Chile in 1997, mostly involving voluntary program and institutional accreditation for autonomous higher education institutions. Accreditation was put forward by government and other higher education actors, arguing the lack of credibility and effectiveness of regulations in higher education, and the need to enhance quality among institutions (presidential message, higher education quality assurance bill –Ley 20.129–). However, the quality assurance mechanism considers no standards related to DPIs. Program accreditation is mostly for undergoing study programs, and not for new degree programs. Institutional accreditation standards require institutions to have a clear procedure to establish their program supply, and are required to apply internal quality assurance mechanisms to observe and maintain institutional standards when a new program is defined and supplied to the public. The first institutional accreditation processes started in 2001 (with 14 higher education institutions), and today all existing universities have gone through the process.

Programs are required to report graduation rates in their applications for program accreditation; therefore, no new programs can ask for accreditation. Only medicine and education programs need to be accredited for their first year of activities due to state funding requirements.
While in many countries in the region, accreditation is intended to regulate higher education programs, there is no clear evidence about impacts so far (Zapata and Tejeda, 2009). The relationship between accreditation and the emerging new programs is very uncertain.

Regulations in Latin America may play a relevant role in what can be identified as coercive isomorphism (Levy, 2004), particularly encouraging the new private institutions to avoid innovation and follow the patterns of their public counterparts. Even if there are several examples of regulations limiting the scope of action of the private universities in Latin America, the issue remains unclear and unexplored in the area of program supply (including differences between universities on such supply).

2.3.2.2. Funding

As some researchers suggest (Huisman, 1997, 2000; Morphew, 2000), the funding structure of higher education may play a relevant role in terms of program innovation. In previous research, two main concerns have been tested in its relationship with new programs: the pressures for expansion and tuition income growth, and the state funding and incentives for innovation. Even if there are significant differences between Europe and Latin America, in the Chilean case, the issue of funding could be understood as following,

First, because of the large private funding Chilean universities are compelled to compete for students and increase funding from many sources, but mostly from tuition. Chilean higher education maintains very high rates of tuition and fees compared to other
countries, and the self-funding of institutions reaches 74% of the total funding of higher education (OECD, 2009)\textsuperscript{24}. Therefore, a significant proportion of funding is directly associated with the capacity of the universities to enroll students and collect tuition and fees. The universities’ program supply and student enrollment is certainly the most relevant source of income and viability (Ibid).

Program innovation in highly competitive and privatized contexts remains a complex matter. On the one hand, universities may well be influenced to supply programs that are in high demand and thus secure enrolment, and perhaps even consider less costly programs with a reasonable demand that allow viability\textsuperscript{25}. On the other hand, some universities may also be motivated to explore new niches, innovating with new degree programs and that may or may not succeed. This latter possibility was studied by economists such as Joseph Schumpeter (1912). The argument is that entrepreneurial and innovation practices may take place under certain circumstances, i.e. when organizations are able to handle risk, are qualified to use the available resources in a proper manner, and have enough ability to capture (or monopolize for a certain period of time) the profit of innovations\textsuperscript{26}.

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\textsuperscript{24} The private funding of Chilean higher education is the highest in Latin America and second in the world.

\textsuperscript{25} Data available in Chile suggest large concentrations of the enrollment in a very limited number of programs, most in very traditional professional programs. Meller et al (2010) raise the fact that 28 programs concentrate 72% of the total enrolment in Chilean universities. From those programs, 17 have increased enrolment in more than a 70% in the last 10 years (Ibid).

\textsuperscript{26} For a discussion about the Schumpeterian hypothesis in higher education academic innovations, see Dill and Teixeira (2000).
Second, even if there is large private funding in Chilean higher education, the public funding mechanisms should be also considered. In Chile, there are no public funding incentives or program steering mechanisms such as the ones studied by Huisman in Europe (1997, 2000). However, Chilean higher education has some funding incentives to enroll students with high test scores (i.e. AFI and AFD), and a variety of student grants and student aid subsidies that finance studies in higher education programs, including new innovative programs that universities may design. Funding the demand with little or no program steering may be probably considered as a factor promoting growing program supply in those study fields with larger students demand, and only eventually the emergence of new programs.

Therefore, funding is perhaps a consideration that may be relevant to DPI depending on a complex circumstance defined by various issues such as the ratio between public/private funding, state policies toward emerging programs, market dynamics and student demand.

2.3.2.3. Other external factors

There is a vast literature discussing the relationship between higher education and other external factors, particularly the social and labor demands in society. Ulrich Teichler, one of the contemporary and most influential researchers in the field, would

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27 Some student grants and aid funds are directly associated to certain programs, such as technical programs and teacher education programs; but by in large, there is no programmatic restriction on the distribution of state subsidies to students.
argue that the relationship between higher education and social and labor demands is highly complex and with growing levels of ambivalence and confusion (Teichler, 1998).

In Chile, some researchers have argued that the social and labor demands are relevant sources of external pressure to higher education institutions (Brunner, 2002; Brunner and Meller, 2004; Brunner and Elacqua, 2003; Brunner et al, 2005). There are few empirical studies about the relationship between higher education, economics and employment particularly in technical education (i.e. Vergara and Rodríguez, 1986; Pérsico and Pérsico, 1995; Sepúlveda, 1999) and in advanced human capital training (i.e. Brunner and Elacqua, 2003). However, these studies say little about these external pressures over the university sector.

Examining broad trends, the OECD suggests that the evolution of programs does not necessarily vary in accordance to the labor market evolution or the economic growth requirements in the country (OECD, 2009). This suggestion coincides with the claims about the lack of adjustment between higher education and economic, and the need of a better match to contribute to development purposes (Teicher, 2000; Gómez y Celiz, 2004; Rama, 2006, Gallart, 1994)28.

Most researchers would agree that the rapid growth in the Chilean economy during the last 28 years is due to the structural reforms in the 70th and 80th, the economic policies followed during the whole period, and the favorable international context (Álvarez and Fuentes, 2004). After the economic crisis in 1982 and until now, the

28 Some scholars have also suggested the difficulty to match higher education and economics, mostly because higher education institutions and students cannot anticipate and act in terms of future labor demands and economic activity requirements.
Chilean economy has shown significant technological development in many sectors, and it is one of the leaders in technological development and competitiveness in Latin America (World Economic Forum). The Chilean labor market has shown also a distinctive large percentage of professionals (with higher education) in high level positions compared with other countries in the region (Schwartzman, 2002). At the same time, some economic sectors seem to show more dynamism during the last 28 years. The most important one in the case of Chile are the mining industry, finance and business, transportation and communications, construction and fishing (Álvarez and Fuentes, 2004). However, the classifications of the economic sectors are too broad and follow a different rationale than the study fields classifications usually considered in higher education. Thus, linkages are highly problematic and it is very difficult to assess any clear relationship.

Most international research in program innovation and differentiation has avoided considering these sorts of external factors, mostly because of methodological limitations but also because it is still a highly debatable issue. On the one hand, the demands from society and labor markets cannot be ignored; on the other hand, it is very complicated to assess the relationship with university program innovations. There are no data available to explore this relationship beyond a general description of trends.

2.3.3. Internal factors related to DPI

Previous research has pointed to some internal factors that may both promote and/or limit program innovation and differentiation. Even if these internal factors have
external expressions beyond universities, they are mostly related to issues within universities. Two main internal considerations stand out in previous research: the disciplinary and knowledge dimension and some organizational characteristics within universities.

2.3.3.1. Disciplinary and knowledge development dynamics in universities

Burton Clark, in *The Higher Education System* (1983) and other later writings (1993a, 1993b, 2007), makes a remarkable description of the patterns of higher education institutions in the American society, identifying the academic dynamics or disciplinary knowledge as engines driving increasing division of labor and differentiation. Clark’s perspective follows a tradition of the sociology of academics and professions (i.e. Polanyi, 1967; Campbell, 1969; Becher, 1987), discussing many classical studies about knowledge development, academic culture and identity and the evolution of disciplines and professions, among the most important.

Higher education is understood as a differentiated sector of society par excellence (Clark, 1983). The growing differentiation of the professional knowledge and academic expertise is related to at least four processes of program fragmentation. These are: i) subject partition (new fields of knowledge emerging from the division of old-traditional fields), ii) program affiliation (new professional fields admitted as legitimate subjects), iii) subject dignification\(^{29}\) (the recognition of a new subject into academics, previously...

\(^{29}\) The concept of subject ‘dignification’ can also be understood as subject recognition or legitimization within the academic community.
left out because of its low prestige), and iv) subject dispersion (Subjects going beyond its
traditional limits, spreading knowledge into new areas and fields) (Clark, 2009, citing
Metzger, 1987). Each of these movements may well promote not only organizational and
departmental fragmentation, but also the emergence of new study programs and/or
specializations. Clark argues that evidence and research done in countries such as the US,
Germany, UK, Japan and France, reveals that program fragmentation is something old in
higher education systems, but speeding out since the 80s (Clark, 2007).

Clark’s academic internal perspective is relevant to understand the Chilean case. However, it may well be argued that the Chilean academic culture –as well as that in
most countries in Latin America- differs largely from highly developed countries.
Brunner recognizes that the disciplinary component of academics in Chile is unequal and
limited compared to ‘central countries’ and that the military government eroded deeply
and in a lasting way the communitarian basis of academic organizations (Brunner, 1982).
Perhaps the professional component related to academics after the university reform in
the mid 60s allowed stronger professional cultures, with wider and more influential
associations, but by and large with a typical culture of status and group identity, i.e. in
areas such as medicine and engineering (Brunner, 1982). Therefore, it may be
questionable that the Chilean academic dynamics in different fields may have such strong
dynamism as seen in the most developed countries with large provision of resources for
higher education, scientific research and knowledge development.

On the other hand, Clark’s academic internal perspective may well be displayed
in Chile in a slightly different manner, considering the academic local dynamics
reinforced by the large international cooperation strategies and particularly the influence
of globalization in academics. Indeed, Chile has experienced for many decades strong international cooperation and brain circulation with developed countries. The local faculty has been largely influenced by research in other countries, particularly in those where they received graduate education. Compared to Brazil, Mexico or Argentina, Chilean graduate education started late (Schwartzman, 2002), at the end of the 80th and mostly during the 90th, and the small community of faculty with higher academic degrees was traditionally trained in North America and Europe. Globalization is also a phenomenon with vast implications in higher education, and it may well be playing a relevant role in the diffusion of academic differentiation dynamics.

Therefore, even if academics in Chile may differ from other countries in certain matters, it is commonsense that some of the differentiation tendencies observed in the developed world could be influencing the local academic community as well. This is reasonable i.e. in those fields with faculty trained overseas, and with high levels of international exchange and fluid participation in the global and international academic community. Program innovation in Chile seems to be closely related to the internal academic dynamics within universities and within disciplinary and professional communities. Even if perhaps some of the influences related to the emergence of new programs may be from overseas, they are always reinterpreted within the local context and still can be considered as innovations within the local context.

Even if it is complex to judge the disciplinary and knowledge level of universities, it is reasonable to argue that at least those show a higher number and more advanced faculty (with higher training), and a strong research activity and production. Studies in Chile show that there are strong differences between CRUCH and private universities in
terms of the proportion of faculty (particularly full time) and their academic credentials. CRUCH universities concentrate more than double the full time faculty compared with the new private universities, even if private universities today exceed the enrolment of CRUCH universities (SIES, 2008; Zapata, Rojas and Tejeda, 2011). At the same time, the research activity seems to be highly concentrated in some universities, mostly the leading traditional universities of the CRUCH. Even though examining the number of projects and publications is needed to observe changes happening over time.

2.3.3.2. Organizational dynamics in universities

There is extensive evidence of institutional diversity of Chilean universities. Brunner suggests several institutional differences regarding property/control, government, history, mission and goals, management structure, size, location, academic structure, program supply, student profile, and prestige, among the most important institutional characteristics (Brunner, 2006). It seems reasonable to argue that some differences among universities will be also expressed in different organizational practices.

Regarding DPI, the question is whether some universities are more active innovating than others are, and why. However, it is very difficult to separate between what could be ascribable to the external/environmental factors and what to the internal/organizational considerations.

30 The universities of the CRUCH have four times more PhD faculty than the new private universities (Ibid)
The organizational practices described by the new institutionalism would consider this sort of consideration as non-coercive isomorphism, there being several pressures for imitation searching for social legitimacy and common goals (Levy, 2004). How these pressures affect different types of universities needs to be studied.

Some studies have suggested that innovation seems to be related to some organizational characteristics, such as flexibility and rapid adaptability to changes. But assessing organizational characteristics is still highly complicated. The small available evidence from case studies suggest that young and small universities are sometimes more active innovating than big traditional and mature universities (Jenniskens, 2000).

From this research point of view it is important to test the most relevant available hypothesis in the Chilean context, analyzing if there is any relationship between the history (or age) and size of universities and the likelihood of DPI. As discussed before, in Chile we may find at least two competing arguments on this matter: for some researchers, the old and traditional universities maintain strong leadership in the system, providing many guidelines for the rest of the universities, and for others, the new private universities enjoy great flexibility and have proven innovation and entrepreneurial capacities. Traditional and new private universities differ largely in terms of history, management and academic dynamics. While traditional universities have longer history and prestige, they also seem to maintain structures of management with usually wide space for faculty participation, contrasting with the typically vertical, flexible and less

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31 I also suggest considering the scope of universities, whether they supply a wide number of programs in several fields of study or are limited to certain fields. Unlike Jenniskens’s (2000) study, in this research I will cover all sorts of universities, not only 'complex' universities.
participative management of the new private universities (Levy, 1986). It must be said that among the traditional and new private universities there is also ample variability.

One of the current typologies to assess university differences is from Brunner (2005). He distinguishes the following types of universities: i) traditional universities with academic international leadership, ii) public universities with national scope, iii) selective private universities, iv) specialized metropolitan state universities, v) regional less selective universities, vi) mid selective private universities, vii) low selective public and private universities, and viii) non selective private universities. These types of universities differ in several ways, including size, mission, goals, complexity (fields of knowledge), productivity and selectiveness. This classification allows a reasonable approach to some of the most relevant organizational differences among universities in Chile, and permits us to explore some DPI differences.

2.4. Synthesis, relationships and hypotheses

Several factors may be considered describing DPI and exploring potential features and relationships. In this chapter, I have discussed the most important factors identified by previous research, trying to circumscribe them in the local context. To confront my research questions, I will now summarize the most relevant considerations for describing DPI in Chile and identify the most significant internal and external factors (or variables) that emerge from the literature. Considering the following variables is needed to explore DPI potential features and relationships in the Chilean context.
Table 1: Factors for exploratory univariate and multivariate analyses

<table>
<thead>
<tr>
<th>University DPI</th>
<th>Univariate analyses Variables/factors</th>
<th>Multivariate analyses Variables/factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of DPI</td>
<td>Legal status</td>
<td>Autonomus / Supervised</td>
</tr>
<tr>
<td>Total number</td>
<td>Funding</td>
<td>Total state funding</td>
</tr>
<tr>
<td>DPI Distribution</td>
<td>Per university</td>
<td>Indirect State funding</td>
</tr>
<tr>
<td>Per type of university</td>
<td>Indirect State funding</td>
<td>Direct State funding</td>
</tr>
<tr>
<td>Per field of study</td>
<td>Direct State funding</td>
<td></td>
</tr>
<tr>
<td>Evolution of DPI 1980-2008</td>
<td>Faculty</td>
<td>Faculty</td>
</tr>
<tr>
<td>Per year</td>
<td>Per type of university</td>
<td>Ratio of faculty holding graduate degrees (Master and PhD) over total faculty</td>
</tr>
<tr>
<td>Per field of study</td>
<td>Per field of study</td>
<td>Per field of study</td>
</tr>
<tr>
<td>Research</td>
<td>Number of Projects</td>
<td>Research funding</td>
</tr>
<tr>
<td>Number of Projects</td>
<td>Enrolment</td>
<td>Research funding</td>
</tr>
<tr>
<td>Research funding</td>
<td>Branches</td>
<td>Research funding</td>
</tr>
<tr>
<td>Institutional size</td>
<td>Branches</td>
<td>Number of years of existence</td>
</tr>
<tr>
<td>Enrolment</td>
<td>Branches</td>
<td>Number of years of existence</td>
</tr>
<tr>
<td>Branches</td>
<td>Number of years of existence</td>
<td>Number of study field supplied</td>
</tr>
</tbody>
</table>

Note.- The table lists the variables/factors considered in the study. For the multivariate analysis, the dependent variable is the number of university ‘degree program innovation’ (DPI).
From the selection of descriptors and variables, several hypotheses and assumptions\textsuperscript{32} have been advanced by the literature and it is relevant to test and discuss them in the Chilean context. While some hypotheses have strong grounding in previous research, others are quite weak. At the same time, there are some hypotheses that have even encountered contradictory evidences in previous research, as discussed before.

I propose the following sets of hypotheses taken from previous research and my own discussion.

In terms of the univariate analysis, I will inquire into the structure and features of DPI, searching for which if any of my following hypotheses finds strong support:

1. Massification and competition are related to the number of DPIs during the whole period of study (1980-2010).
2. DPIs are unevenly distributed among universities during the whole period of study.
3. The number of DPI is greater in some types of universities compared to others. The CRUCH universities have a greater rate of DPI compared to private universities during the whole period of study.

\textsuperscript{32} Previous research has suggested and tested various hypotheses about program innovation (see the literature review). However, it is also possible to identify several suggestions or reasonable conjectures based on the literature, but not formally put forward as hypotheses. For this reason, I propose to consider several hypotheses and what I call here ‘assumptions’, to formulate my own hypotheses.
4. Even if at a lower rate, private university DPI is concentrated in the last period, mostly when acceding to full autonomy.

5. DPIs are found in both paradigmatic and non-paradigmatic fields of study, and its distribution is different across different types of universities. Some universities have a higher rate of innovations in paradigmatic fields and other in non-paradigmatic fields.

Regarding the multivariate analysis, I propose the following hypotheses to be explored and tested in the Chilean context of university program innovations.

6. The number of DPI is positively related (correlated) with the regulatory status of universities. Universities with full autonomy may have a higher number of DPI compared to universities under supervision.

7. The number of DPI is correlated with the level of state funding (AFD and AFI). Universities with higher state funding may present a higher number of DPI.

8. The number of DPI is correlated with the research level of universities (research projects). Universities with a greater research activity may exhibit a higher number of DPI, particularly in paradigmatic fields of study.

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33 At the same time, the private universities may have a lower rate of DPI while being under supervision, and perhaps they might increase the number of innovation after acceding to full autonomy.
9. The number of DPI is correlated with the following faculty characteristics: universities with larger faculty and with higher degree training (Master and PhD) may have a greater number of DPI.

10. The number of DPI is correlated with institutional size and/or trajectory (number of years). Bigger and older universities may have a greater number of DPI compared to smaller and younger universities.

11. The number of DPI is correlated with the scope of universities. Universities with several programs in most study fields may present a higher rate of DPI than specialized universities (even when controlled for size and number of programs).

12. A number of unanticipated factors will come to the fore as correlated with DPI.

The multivariate analysis is aimed to uncover possible structures and relationships between DPI and the several factors considered in my research. The analysis is built on previous research, recognizing that some of the hypothesis and assumptions provided above are not strong enough in terms of the current empirical research. Exploratory data analysis (EDA) is a methodological approach that offers an extensive repertoire of techniques for the detailed study of a set of data, providing enough flexibility to adjust to a broad range of situations (Hoaglin, Mosteller and Tukey, 1983).

Exploratory analysis will contribute to identify structures, trends and patterns, explore important outliers, identify intriguing anomalies, but also inquire about a number of hypotheses and assumptions common in literature (Ibid). This research will help to clear some assumptions and develop stronger hypotheses for further research.
Exploratory analysis will include inquiring about the nature of relationships between factors and testing the strength of bivariate and multivariate correlations, though without assuming causality. Exploring variable dependencies and analyzing correlation coefficients is not a sufficient condition to support causality, since third-variable and directionality problems are present. Nonetheless, the strength of this research is subjecting a number of prevailing implicit and explicit hypotheses to empirical tests.
CHAPTER 3: METHODOLOGY

3.1. Introduction

My research is a longitudinal study of Chilean university DPIs, from 1980 to 2008. The methodological approach employs exploratory techniques based on a new national data set that I have put together.

I have chosen exploratory data analysis for many reasons. First, because it allows an in-depth investigation about a matter where the body of literature is still limited and there are not enough explicit and operationalizable hypotheses (Schutt, 2004). At the same time, there is considerable disagreement on the theoretical and empirical approaches to address the subject (Huisman and Morphew, 1998). Second, the boundaries between DPI and the context where it occurs are not evident; in other words, the phenomenon that I am describing and exploring concerning its underlying trends seems highly related to its contextual circumstances. Third, a study circumscribed in a country setting allows relying on multiple sources of evidence and benefits from the prior development of theoretical propositions, leading to both exploring and developing hypotheses (Flyvbjerg, 2006).

This longitudinal study on Chilean university DPI covers a reasonable long period, from the reform of 1981 and its consequences in Chilean higher education for almost three decades\textsuperscript{34}. This feature of my method permits describing and exploring DPI

\textsuperscript{34} Most previous studies have considered shorts periods of study or two sets of periods. My study offers the longest period investigating DPI compared to any previous research.
data and trends during a period of time over which certain contextual circumstances have changed, allowing the possibility of a better understanding of the historical patterns of DPI and the context where it occurs.

In this research, I provide systematic evidence on the Chilean case, describing DPIs' most significant characteristics and tendencies. My research aims to gain a sharpened description of how DPI occurred in Chile, providing documentation that has not previously existed. I also explore the relationships between DPI and several factors or variables identified by previous research, seeking to enhance the scholarly debate about program innovation and differentiation, seeking to discover whether there is empirical substantiation – albeit for the Chilean case only – for some important claims in the existing literature. However, this study cannot address what explains or causes program innovation in Chilean universities; it only explores the most significant variables that theory has identified about the issue, contributing with data to illuminate the many assumptions suggested by literature and by some current controversies in the local and international scholarly debate. In addition, this study lays empirical groundwork for the generation of stronger testable hypotheses that may serve as the foundation of future work.

To answer the research questions, I developed a methodological design consisting of three steps. Step 1: the application of a data gathering procedure, intended to generate information about DPI in the last 28 years in Chilean universities. Step 2: a univariate analysis of the gathered data, to characterize DPI magnitude, evolution and patterns over time, and a portrayal of some of its most relevant characteristics (fields of study, distribution over types of universities, etc.). And Step 3: a multivariate analysis of the
new data gathered exploring the variety of factors identified by previous research, aimed at testing several hypotheses derived from previous research and report its results in the Chilean context.

The first and second steps of this study generate and provide original data. My research offers new data about DPI and its features, such as its scope, evolution over time (year to year information), growth patterns, distribution in terms of fields of study, and identification of the universities that have carried them out (grouped and ungrouped: DPI per university and type of university). I carry out a statistical description using an array of indices, graphical and cross-tabular analyses. I also evaluate the association between the number of DPI and different periods of time, fields of study and types of universities, providing illustrations and describing the existence, strength, direction and patterns of the associations, if any. The third of this research assesses the relationship between DPI and the internal and external factors anticipated by the literature review and analysis. For this purpose, I analyze the data gathered in this research and explore possible relationships existing between DPI and the several factors discussed in the literature review. The exploratory analysis confronts evidence from each of the factors presumably related to DPI (or variable predictors) and explores plausible correlations and dependencies. As described below, findings are illustrated in scatter plots (to learn about the shape of relationships) and analyzed using correlation techniques (exploring correlation coefficients between independent and dependent variables in terms of the hypotheses).

My intention was to follow a rigorous exploratory approach flowing from the preliminary

\[35\] To describe the evolution and possible shifts in time, as well as to explore possible changes regarding certain regulations and policy initiatives developed during the study period.
descriptive work: maximizing statistical insights into the new data set created in my research, uncovering evidence about possible underlying structure, identification of potentially important variables, identifying outliers and anomalies and testing some relationships posited in the international literature.

To provide the most complete picture of university DPI in Chile, I took into account all degree undergraduate program innovations by all universities. However, there was no existing registry of new programs in the country, until now. Instead, several data sources informed about program opportunities and vacancies on a yearly basis. Thus, I collected information from yearbooks, serial publications, catalogues and databases, all from the Ministry of Education, the Rector’s Council and the Higher Council of Education. These sources provide data about student program opportunities and the programs supplied by universities in Chile. Drawing from all sources it was possible to identify new degree programs supplied by universities on a yearly basis, comparing data from one year to the other, and identifying when a new degree program emerges. No data source taken independently covers the entire period of study and all the programs and types of universities. However, data sources taken simultaneously permitted a fuller picture of DPI as well as detecting many of the errors that each data source had. At the same time, to avoid potential contradictions between different data sources and detect data errors, I designed a specific data gathering protocol.

Data gathering covered the whole universe of university level –disciplinary and professional- degree programs supplied in Chile36. Because the study period covers 28

36 Technical programs and non-university degree programs were not considered, because such higher education levels have received previous attention from researchers, and the study intends
years, most DPI corresponds to Chilean universities existing now, but a few correspond to universities that have disappeared over time (see: APPENDIX 3: Private universities (closed until 2008)). The study considers data from the 59 existing universities in 2008 (some have changed their names, but maintain their official recognition status), but also 16 other universities that operated during the period of study but no longer exist (see: APPENDIX 1: Universities members of the Rector’s Council – CRUCH and APPENDIX 2: New private universities).

3.2. Data sources

Identifying DPIs in Chilean universities involves certain challenges. As affirmed before, there is no unique available registry in the country covering the whole period of study. Instead, a number sources and available databases offer data for partial periods. Most higher education public information in Chile has been collected by some public organizations such as the Rectors’ Council (CRUCH), the Ministry of Education (MINEDUC) and the Higher Council of Education (CSE). Even if there are a few other sources and databases developed by private organizations, most of them collect information from public sources (Zapata and Fleet, 2012). For this reason, I gathered data from those most important public databases developed by the CRUCH, MINEDUC and CSE. All these organizations collect data directly from institutions in a regular basis.
However, each of the available sources and databases has certain limitations. The oldest sources from the CRUCH, with data from mid 60s until today, collect data only from CRUCH universities. Perhaps the most accurate available database in Chile is from the CSE; however, the registries start from 1995 (Zapata and Fleet, 2012). For this research, I used the following databases and sources of information:

- The yearly statistical series from the CRUCH (AE-CRUCH: *Anuario Estadístico del Consejo de Rectores*). These documents contain a list of all the universities of the CRUCH (25 universities), most significant institutional statistics, and program data (name of the programs, degree/certificate, number of semesters, vacancies, enrolment, graduates, etc.). Each yearbook registers the information for the previous year, information that it is sent by universities to the secretary of the CRUCH. There is no verification of the information sent by universities; however, some year-to-year consistency checking is done by the secretary. These series are available for only certain years before 1981. However, the information is complete from 1982 to the present. These yearbooks are published in hardcopy and in electronic form, from 2002 on.

- The national yearly application guidelines for the universities of the CRUCH (GA-CRUCH: *Guía de Admisión del Consejo de Rectores*). It is a document published by a technical office from the Universidad de Chile, responsible for the design and implementation of the national higher education admission test. Each year, this office publishes its guidelines about the national test, as well as a document for student applications to the universities that are part of the CRUCH,
their programs, degree/certificates, and admission requirements. Even if it seems that guidelines have been published annually since the mid 1960s, it was not possible to find the publications for the whole period. National libraries hold yearbooks only for some years (1980-1986 in print documents; 2001-2009 in electronic databases), and the DEMRE-Universidad de Chile did not answer to our several requests for the yearbooks from 1987 to 2000.

- The directory of higher education, from the Ministry of Education (DES-MINEDUC: Directorio de Educación Superior del Ministerio de Educación) is a publication with information about all higher education institutions and their programs, covering data from 1990 until present. It is probably one of the most complete sources of information, holding data from all universities (CRUCH and the new private universities), and it is available for most years (hardcopy from 1990-2000, and in electronic databases from 2000 until now). The Directory records information from all higher education institutions, but lacks validation except some internal crosschecking done by the Ministry.

- The statistical electronic yearbook of the Ministry of Education (AE-MINEDUC: Anuario Estadístico del Ministerio de Educación). Considers information for all education in Chile and it is the basis for most national and international official statistical information. It contains information for selected years from 1986 until now (there are some gaps in the information in the period 1986-1990). This database includes information provided by different institutions to the Ministry of Education.
• The registry of the Ministry of Education (REG-MINEDUC: Registro del Ministerio de Educación). Supposedly contains the official information about higher education institutions and its programs, covering the period from 1981 to present. Although, higher education institutions are strongly compelled to report any changes about their program supply and new programs (by a Ministry edict), because there is no explicit sanction, many universities do not necessarily report information on a regular basis. The official Ministry registry is intended to cover data about all new programs offered by higher education institutions and the year in which they started. Even if it is not necessarily up-to-date, the registry is under permanent review, revising information from previous years.

• The Higher Education Information System (SIES-MINEDUC: Sistema de Información de la Educación Superior, del Ministerio de Educación) Created in 2007 by Law (20.129, National System for Quality Assurance in Higher Education), integrates many of the previous efforts of the Ministry in terms of information, organizing statistics and generating new data and reports. The system works with several historical databases, most from 1983 and on. These databases have been reorganized and subject to some data cleaning processes, helpful for this research purposes. SIES introduced new technical definitions and gathering protocols from 2008 and on. Because of these changes in 2008, there are several disruptions in the historical series between year 2008 and year 2009. This is one of the reasons to maintain this research period of study only up until 2008, but using SIES historical databases.
• INDICES from the Higher Council of Education (INDICES-CSE: Indicadores, Números y Datos sobre las Instituciones y Carreras de Educación Superior, INDICES), available since 1995 until today. Collect data and statistics from higher education institutions and its programs. This database contains the annual data and statistics from higher education institutions, and its program, including the data in which presumably each program was opened for the first time. Even though universities voluntarily send information to the CSE, this source is well known to be one of the most complete and accurate sources, commonly used for orientation, ranking and benchmark purposes. It has no external validation; however, the CSE applies many internal consistency tests and a wide publicity of the information.

I collected information about DPIs in Chile reviewing all the public and most complete available sources of information in the country listed above. It was indispensable to collect information from several sources of information at the same time, to cover the whole period under study (1980-2008) and to face any possible validity problems coming from each of the sources of information taken individually. Indeed, the available information in Chile listed above has been sometimes criticized because of validity problems, mostly related to its definitions, data omissions or transcription errors (Zapata, 2006 and 2011). Also, because most information is provided on a voluntarily basis, with almost no external validation procedures, there is a chance for misunderstandings, inaccuracies and missing data. Some of the criticism points to the
issue that institutions do not necessarily report all the requested data and some information may be inaccurate—transcript errors or problems in numbers (numbers of students, graduates, etc.).

Even if it is more complicated, reviewing all of the public sources of information allows detecting possible missing data and other errors. Thus, some of the omissions that one source of information might have can be possibly filled reviewing other available sources. The same holds for possible transcription errors.

Drawing on well-known public available sources also promotes a high level of reliability in this study, particularly inter-rater reliability. The other possibility was to collect data directly from universities, but that alternative, even if feasible, carries a number of other problems that need to be avoided. Indeed, the information that today universities could provide about DPIs in the past may be inaccurate. The experience of INDICES-CSE, is a good example about the misleading information that universities provide when informing about historical events. Indeed, INDICES-CSE asks universities every year to inform about the year in which current programs were opened, and data is not always consistent from year to year. A plausible explanation is that universities change the opening date of their programs, confusing dates (with the creation of the department serving the program, or the date of the original program that latter changed name, or other reasons) and/or data is misleading because of the many changes in the authorities responsible for providing the data. For this reason, relying on historical public sources was the best alternative, seeking for accuracy and tracking DPIs on the exact date in which they emerge.
Therefore, for validity and reliability purposes, the solution in this study was to draw information from varied public sources at the same time, examining published data year to year, and reviewing missing data and possible errors in the information sources. To ensure that contradictions between sources could be identified, a specific data collection protocol was defined.

This protocol tackles one additional problem, besides those discussed in the previous paragraphs. Because in Chile professional institutes (IP) may supply all kinds of professional degree programs, but not those specifically detailed in the LOCE (that need a licentiate degree by Law), it is the case that some of the DPIs (four years professional degrees, with no licentiate degree) could emerge from professional institutes first, and then be replicated in some university. Because this study is focused on university DPI, and not on innovations occurring in other higher education sectors, it is relevant to avoid counting as university DPIs any emerging program first supplied by professional institutes. Because some of the sources of information used in this study provide data about the professional institutes program supply, it was necessary to identify and filter those DPIs emerging from universities, separating them from those first originating in professional institutes.

3.3. Data gathering protocol

First, it was necessary to identify the complete degree program supply (four and more year’s 5A-ISCED professional and disciplinary programs) existing in 1980 in Chile. This was defined as the base of existing degree programs in 1980 (BDP1980), against
which information about degree program supply starting in 1981 was compared. Any new degree program (a new program name and degree) was identified as a DPI in 1981 (DPI1981), registering the complete identification of the emerging program (name and degree) and the university that is supplying it.\footnote{When two or more universities are supplying the new emerging degree program in the same year, then, the innovation will be attributed simultaneously to all the universities supplying it, registering the eventuality of the case. This situation happened few time.}

Second, for further years’ data gathering, the basis of existing degree programs (BDP) was modified, incorporating the new DPI from the previous years. Therefore, for a certain year, the basis of existing degree programs is $BDP_n = BDP_{n-2} + PDIn_{-1}$. The procedure reviewed new emerging programs focused on the supply of universities, but it also reviewed the program provision from professional institutes on a yearly basis. If a new degree program emerges from a professional institute (compared with $BDP_{n-1}$), and no university is also supplying it in the same year, it will be registered in the BDP of the year (BDPn), without being counted as a DPI.

For the period from 1980 to 1988, data gathering was relatively simple. Most DPI came from the existing CRUCH universities. Indeed, the majority of private universities (and professional institutes) were created from 1988 on. At the same time, private universities were not supposed to innovate under the licensing procedures applied until 1990. Therefore, to cover the first period of study, it was necessary to draw on few
sources of information, mostly those from the Rector’s Council and the DEMRE\textsuperscript{38} (AE-CRUCH; GA-CRUCH).

However, from 1990 on data gathering was a little bit more complicated, because of the greater number of universities (and professional institutes) and the need to draw from more sources of information detailing degree program information about different types of higher education institutions. From 1990 forward, data was gathered from all the listed sources of information.

For consistency purposes, and to confront potential data contradictions among different sources of information, I developed the following procedure. First, DPI were identified from year to year publications of the primary sources of information (CRUCH, MINEDUC, CSE), and if the comparison between BPS with two or more sources inform about an emerging program, then the DPI will be counted as one. However, if contradictions are found\textsuperscript{39} or the year in which a new degree program was created, or

\textsuperscript{38} Few exceptions of private universities created before 1988 are the Universidad Central, Universidad Gabriela Mistral and Universidad Diego Portales. The most important professional institutes created before 1988 are INACAP and DUOC. The information about program supply from these institutions during the decade of 1980 is registered in AE-MINEDUC and REG-MINEDUC.

\textsuperscript{39} By degree program ‘name’ contradictions, I am referring to significant differences in the nomenclature of the degree programs, this is, when the name of a program is different from anything before and points to a new knowledge, professional field, or specializations and/or mentions of the program. However, it was also possible to find many possible contradictions related to transcript errors or ways to name a same degree program. Many transcript errors were found ("INGNERO COMERSIAL" (sic), psicología or sicología, i.e.) and also some programs that are
perhaps one source informs about a new program and the program is missing in other sources of information in the same year and forward, then crosschecking is needed. To clarify contradictions, I compared the specific names and years of the emerging programs identified by one of the primary sources of information with one specific section of INDICES-CSE, REG-MINEDUC and SIES-MINEDUC (that I used as secondary sources).

These databases consider information about the year in which universities opened their programs for the first time. If at least one of this secondary data sources confirms the information provided by one of the primary sources, then the DPI (the specific name and year) was counted and registered as one. However, when contradictions persisted, the name and year of the DPI were discarded. The crosschecking procedure allows us to confirm a DPI previously discarded with a certain name and for a specific year, with a new name and new year when the requirements are met (this is, when two or more of the primary sources of information coincide or a secondary source confirms data in one primary source).

called indistinctly by the field of study (ingeniería industrial, pedagogía básica, pedagogía en educación básica, pedagogía en ciencias de la educación básica, i.e.) or the degree (ingeniero industrial, pedagogo(a) básico, profesor(a) básico, profesor(a) en educación básica, profesor(a) en ciencias de la educación básica, i.e.). None of these transcript errors or slight differences in naming was considered as DPIs. All minor differences and errors were amended and normalized during the data gathering process.
With this procedure, I identified each of the program innovations, and built my database detailing DPIs per year, with the complete name of the program and the university that first supplied it.

To allow rich description, the new database needed to report additional information: the fields of study of the new programs and a classification of types of universities. As mentioned before, to identify the fields of knowledge, I used the classification and criteria provided by the Higher Council of Education, CSE (similar than the UNESCO fields of study framework).

At the same time, I used one of the most popular and current university classifications, offered by Brunner (2009b), distinguishing among: i) research universities, ii) regional state universities, iii) regional catholic universities, iv) specialized universities (focused in certain fields of study), v) selective private universities, vi) large non selective private universities, and vii) small non selective private universities. These seven types of universities differ in size, mission and goals, complexity, productivity, faculty and selectiveness.

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40 Amended and normalized, when necessary.

41 An early typology suggested by Brunner (2005) considered: i) universities with academic international leadership, ii) public universities with national projection, iii) selective private universities, iv) specialized metropolitan state universities, v) regional less selective universities, vi) mid selective private universities, vii) low selective public and private universities, and viii) non selective private universities.
The snapshot of the format of this study DPI database is the following:

Figure 1: Database format for the exploratory univariate analysis.

<table>
<thead>
<tr>
<th>Degree Program Innovation</th>
<th>Year</th>
<th>University</th>
<th>Field of Study</th>
<th>Type</th>
<th>Brunner Typology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actor cómico</td>
<td>2005</td>
<td>Universidad Bolivariana</td>
<td>Arts &amp; Architecture</td>
<td>New Private U.</td>
<td>1</td>
</tr>
<tr>
<td>Administración de empresas / Mención recursos humanos</td>
<td>1993</td>
<td>Universidad de Antofagasta</td>
<td>Administration &amp; Commerce</td>
<td>CRUCH / Public</td>
<td>2</td>
</tr>
<tr>
<td>Administración de empresas de servicio</td>
<td>1993</td>
<td>Universidad de Los Andes</td>
<td>Administration &amp; Commerce</td>
<td>New Private U.</td>
<td>5</td>
</tr>
<tr>
<td>Administración de empresas de turismo</td>
<td>1990</td>
<td>Universidad Austral de Chile</td>
<td>Administration &amp; Commerce</td>
<td>CRUCH / Public</td>
<td>1</td>
</tr>
<tr>
<td>Administración de industrias</td>
<td>1982</td>
<td>Universidad de Santiago de Chile</td>
<td>Administration &amp; Commerce</td>
<td>CRUCH / Public</td>
<td>1</td>
</tr>
<tr>
<td>Administración de negocios internacionales</td>
<td>2001</td>
<td>Universidad de Valparaíso</td>
<td>Administration &amp; Commerce</td>
<td>CRUCH / Public</td>
<td>2</td>
</tr>
<tr>
<td>Administración en ecoturismo</td>
<td>2001</td>
<td>Universidad Andrés Bello</td>
<td>Administration &amp; Commerce</td>
<td>New Private U.</td>
<td>5</td>
</tr>
<tr>
<td>Administración hotelera y gastronómica / Mención chef manager</td>
<td>2006</td>
<td>Universidad de Valparaíso</td>
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Source: Own data organized in Excel-Microsoft.

3.4. Univariate analysis

Having gathered data about DPIs in Chile, I conducted data exploratory procedures intended to illuminate the research questions and examine my hypotheses (see: 2.4 Synthesis, relationships and hypotheses).

First, it was necessary to describe the number and evolution of DPIs during the period of study. For this purpose, I inform about the total number of degree programs available in 1980 and the number of different degree programs supplied by universities in Chile in the same year. Then I detail the number of DPIs for each year, starting in 1981 and until 2008. I also provide illustrations to inform about the evolution of DPI during the whole period, offering a picture of the periods during the last 28 years when innovations
have occurred. Finally, I specified the number and evolution of DPI comparing to the total growth of programs in the country, allowing appreciation of the relative size of innovations within the university sector.

Second, I specified DPI per field of study, describing its distribution and evolution over time. I used INDICESCSE study fields classification (based in the UNESCO classification), to learn if innovations are equally distributed in all areas, or not, and if there are any variations during the whole period of study in Chile.

Third, I reported DPI per university, illustrating how concentrated or equally distributed are innovations among different universities. For this purpose, I reported the basic central tendency statistics from my sample of universities, and assessed some clusters identifying universities with similar numbers of innovations. For data clustering, I used central tendency statistics.

Fourth, I reported DPI differences in terms of Brunner’s typology (2009b), informing about the number of PDI’s per type of university and comparing some basic descriptive statistics between types of universities (arithmetic mean and standard deviation) \(^{42}\).

\(^{42}\) I also exercised this same procedure, looking to differences in terms of the most common legal distinction available in the country: public state universities (CRUCH-Public), private universities with direct public funding (CRUCH-Private), and the new private universities. It is important to examine differences using this distinction, because most of the higher education differentiation literature in Chile has looked at it. However, even if I anticipated some relevant differences between these types of universities, I also anticipated great internal variance.
All these data description procedures allowed us to discover much about how innovations occurred in Chile during the last 28 years: their magnitude, evolution over time, and distribution among universities and fields of study. Data allowed examining many of the assumptions in the local literature and my hypotheses about it.

3.5. **Bivariate and multivariate analysis**

I finally used multivariate exploratory data analysis (EDA), having the following goals related to this research:

- Description of structures in the data set, especially as found through statistical analysis.
- Graphical exploration of both discrete univariate variable structures (including measures of central tendency, range and variation) and bivariate relationships.
- Identification and description of outliers and anomalies.
- Preliminary testing of hypotheses derived from the international literature and my own assessment.

Seeking to explore the relationship between DPI and several factors remains complicated. Previous research has advanced some significant approaches and insights about this matter. Still, the theoretical state of the art is not strong enough to provide a unique and compelling framework with clear measures and relationships. In my literature review, I have identified the most relevant hypotheses and assumptions, some of them
based on previous empirical research in other countries, but not all. This part of the study is highly relevant because it explores and tests multiple variables and their relationships with DPI in the Chilean context. The approach of considering both internal and external factors is an original methodological option for this specific case of DPI research that I have based on the assumption that both are relevant and may inform differences in the strength of the relationship among universities. The use of EDA is used precisely because it is the most appropriate method for cases in which strong statistical hypotheses have not been advanced (Hoaglin, Mosteller and Tukey, 1983).

One of the most significant contributions in this part of the study was exploring several hypotheses on the Chilean national context.

But this research also offers a methodological contribution, disaggregating DPI national data according to different universities (and types of universities), fields of study, periods of time, etc. No previous study on any country has provided such disaggregated DPI data, nor have data of this type been the subject of in-depth, rigorous statistical exploration of this kind.

A range of univariate, bivariate and multivariate statistical explorations was conducted, and some of the correlational work was developed.

To advance insights about plausible correlations between DPI and several external and internal factors presumably related to DPI, I considered the following analytical procedure:

The study database was reorganized, identifying the number of DPI per university during the whole period. At the same time, database registered information about the following factors: scope of universities (number of study fields), age of universities
(number of years), institutional size (number of students- enrolment), faculty (ratio full time faculty and faculty with graduate studies), research (number of projects, research funding, and publications), and state funding (AFD and AFI), among the most important.

Because it is was likely that all the predictor variables presented some changes over time, it was necessary to define certain values for each variable and university to proceed. For this purpose, I considered fixed values using the last year of available information for most variables. In some few cases, I also considered the mean value from the last 10 years. This was the solution for the lack of valid information for previous years in many of the factors considered in this study. This is one of the limitations of the study. Nevertheless, considering fixed values provides one reasonable picture of the factors of each university for the Chilean case.

Factors were defined in the following way:

- scope of universities (number of study fields in 2008),
- age of universities (number of years until 2008),
- institutional size (number of students in 2008),
- faculty (mean of ratios full time faculty/students and % of faculty with Master and Doctorate degree / total faculty in 2008),
- research (aggregate data for the last 10 years: total number of projects and funding provided by national research agencies),
- State funding (aggregate data for the last 10 years, AFI+ADF).
To explore relationships and search for correlations it was important to define both predictor variables (independent variables) and the dependent variable. Therefore, each university has its own number of DPI and several fixed values related to the internal and external factors that will be explored. The new database had the following format:

> Figure 2: Database format for the correlational analysis

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Source: Own data organized in Excel Microsoft.

Using the data disaggregated by universities (and types of universities), I first conducted some basic correlational procedures, plotting DPI, and each of the predictor variables in simple scatterplots. The purpose of this procedure was to look at the general trend of data, searching for relationships between the variables, assessing the direction of relationships (positive, negative, i.e.) and whether any cases are markedly different from the others (outliers, that may severely bias the correlation coefficients). In this case, I
plotted each of the predictor variables with university DPI. At the same time, this procedure provided useful information about the strength of each independent variable considered independently. Some variables showed little or no relationship at all, circumstances that are of course duly reported.

The next procedure was analyzing the multiple correlations between DPI and all the selected variables. Statistics are discussed and conclusions careful assessed. Exploring correlations in this research is relevant to test the strength of the relationships between DPI and the several factors that will be assessed. In Chapter 2 (see: Synthesis, relationships and hypotheses), I anticipated some of the expected relationships that needed to be observed and confronted with data. My research provides correlation coefficients, aiming to confirm, or not, those assumptions. I particularly assessed collinearity carefully, since it was likely that factors would be highly correlated among them.

As discussed before, there is no reason to believe that DPI in Chile occurred because of one or just a few factors. Indeed, it is reasonable that the various factors may be related differentially among different types of universities, promoting and/or limiting DPI. What the exploratory analyses provided was a preliminary picture about my research questions. By this means, it was possible to test the several assumptions and advance new hypotheses in regards to the factors that come together in relation to DPI in universities or across them.

For this reason, an additional procedure was particularly relevant for this research purposes. Because I wanted to find out if some universities were more likely to innovate than others were, I focused on those universities that had a higher number of DPI and
searched for strong relationships with the factors. I anticipated that the public and private universities from the CRUCH may have a higher number of DPI, and particularly the research universities from the CRUCH may present the highest number of DPI. The question here was if the values of the factors considered in the model were also higher than in the rest of universities.

Finally, the issue of autonomy was assessed independently from other factors. For the sample of new private universities, it was important to assess if there were any observable relationship between the number of DPI of private universities while under supervision or operating with full autonomy. To assess this matter, the database needed to be reorganized, identifying each of the private university’s DPI, the year when emerged and the status of autonomy or supervision of the university in the specific point of time. In this procedure, I reported the evolution and trends in the number of DPI and the status (autonomy or supervision) of the private universities that had innovated in Chile.

3.6. Limitations

This research has limitations that need to be recognized and taken into account to understand the scope and reach of the study. Limitations emerge from the concepts and from the chosen research design and its methodology.

The first limitation is that DPIs are operationalized only as those emerging new degree programs. This option clearly leaves outside a variety of other possible types of innovations in study programs, such as changes in the educational profile, objectives, curriculum and study plan, teaching methods, involved resources (i.e. IT), and many
other. It seems to be the case that many universities in Chile are introducing a variety of innovations in their degree program supply that fall outside my research indicator.

However, this study does not intend to cover all plausible innovations, but only one of its most important. Understanding DPI as the introduction of new degree programs rests on the supposition that a new program involves a significant innovation carried up by a university, providing something different from the competitors previously known study programs, shaping new disciplinary and/or professional contends, and probably new labor perspectives for its graduates.

A second limitation is directly related to the research design. DPI is operationalized in terms of the introduction of a new name of the degree program. Even if the data gathering protocol anticipates sorting out innovations carefully, still the research methodology rests on formal definitions and the names of the degree programs. Even if the research design distinguishes between new degree programs and specializations, there will be little or no information about the real depth of the program content innovation. It is possible that a new degree program name could represent a different acknowledge of certain program or perhaps only just a strategy to make a degree program more marketable. At the same time, all DPI will be counted as it they were identical, but it is reasonable to believe that they may be very different in terms of the content program innovation. In any case, the advantage to identify new degree program by its names, allows greater validity and also covering a fairly long period where information is very limited. At the same time, even if in some cases the depth of an innovation in the program itself might be very limited, a new program name maintains its innovation
character from the students’ point of view, requiring same innovation compatibilities from the universities that decide to supply it.

It is also a limitation of the study the discrete number of DPI in Chile, compared to the whole program provision of program proliferation in higher education during the study period. At the same time, the number of universities, and particularly the exploratory assessment of factors and considerations related to DPI, obliges us to proceed carefully and draw conclusions accordingly. Indeed, caution was also needed because of the small number of cases under analysis.

Notwithstanding all this, this research advances a significant portrait of DPI and its most relevant characteristics and trends. Previous research has encountered serious problems to frame causal relations and that is also the case of this study. This research remains as a descriptive and exploratory analytical empirical study about how DPIs have occurred in Chile. The methodology avoids undue claims of causal relationships, but instead offers an analytical and exploratory study of plausible and mixed relationships, trying to advance some arguments based on abundant new evidence drawn from the case of Chile. Further research could confront some of the limitations listed above. Yet, once described and analyzed in Chile, the world of research possibilities regarding DPIs opens up significantly.

3.7. **Field work**

One of the challenges of this research was to provide a methodological design able to deal with the various validity and reliability problems related to program
innovation in higher education. The adopted concept of DPI, the selection of the data sources and the data gathering protocol, among other methodological options, respected the need to overcome some common problems and limitations in previous research, but at the same time brought some new dilemmas and restrictions related to the conceptual and methodological options.

The plausibility of the methodological approach described in this chapter was tested from August to December 2009, reviewing all available public sources of information, and experimenting with various procedures until defining the data collection protocol and the data sources finally used in this research.

Together with elaborating the study project, part of the fieldwork was advanced, to anticipate several difficulties working with the various sources of information, and to check the applicability of the data gathering protocol. At the same time, the preliminary figures were needed to determine if DPI numbers in Chile were sufficiently relevant to warrant proceeding with the study.

The data gathering protocol worked fine, allowing building the database for this study with the DPI information from universities. For reliability purposes, the protocol was carried out twice (once by me and once by a colleague\textsuperscript{43}), arriving at very similar numbers. Once DPI were identified and registered for the entire period of study, a number of corrections were needed, to amend transcription errors and normalize

\textsuperscript{43} Thanks to my colleague and good friend Ivo Tejeda. With a unique talent and generosity, Ivo helped me building the database and testing the data gathering protocol. All errors, of course, remain mine.
differences in degree program names across databases and across the different years that the information was reviewed.

As said before, most corrections were because of spelling and common errors in transcription, but some were necessary to normalize minor differences in degree program names. In these last cases, decisions were taken consulting specialists in the fields of study.

Defining DPI by its nominal designation was beneficial from various perspectives. It allowed reviewing data during many years, with scarce and fragmented historical registries, while still preserving strong reliability. On the other hand, this option brought new dilemmas and limitations, such as the limited concept of program innovation studied and the difficulty to appreciate different levels of innovations hidden under a new name. Indeed, while some DPI may be the result of a significant innovation (nominal and substantively), other may be just marginal innovations of the program name with little or doubtful changes in the program content itself. This study cannot distinguish whether such things are taking place.

The results provide a portrait of DPI in Chilean universities since the reform of 1980, something that was missing until now, and advances analyzing and exploring several variable associations, with greater detail than previous research, but at the same time it opens new research questions that will need to be pursued in the future.
CHAPTER 4: RESULTS - EXPLORATORY UNIVARIATE ANALYSIS

In the following pages, I will summarize the study’s results, according to the data description and analysis procedures explained in Chapter 3. I will provide a picture about how DPI evolved in Chilean universities since 1981. I will describe and analyze the magnitude and characteristics of trends in university DPI during the period. This chapter is dedicated to inform about the structure and features of DPI, providing evidences to respond to the univariate hypotheses suggested before. The results of the bivariate and multivariate analyses, this is the relationship between DPI and several factors identified by literature, are presented in the Chapter 5. The conclusions, interpretation of data and final remarks will be presented in Chapter 6.

4.1. Number of DPI

A total of 430 universities’ DPI could be identified from 1981 to 2008. During the same period, the total number of university programs grew from 488 to 3,728.

This means that the number of university programs grew during the period at a rate of 120 programs per year, and that each year an average of 15 “new” professional degrees as well. The 216 Professional Institute DPIs are not considered in this study.

44 Besides the 430 Chilean university DPI, there are also 216 professional institute DPI (5-A professional degrees as well). The 216 Professional Institute DPIs are not considered in this study.

45 Data from CRUCH and MINEDUC (SIES). This number includes only professional degree programs supplied by universities in Chile.
degree programs were supplied by universities in the country. This figure represents about 13% of program innovations contrasted to program proliferation per year during the period of study\textsuperscript{47}. It is important to note that the number of DPI and the increase in the total number of programs is uneven in a number of ways (i.e. its evolution year-to-year, knowledge fields, enrolment, and the universities that supplied it).

4.2. Evolution of DPI

The evolution in the number of DPI during the period of study is presented in the next table (Table 2. Number of DPI 1981-2008).

The total number of DPI identified from 1981 to 2008 was 430. During the 80th and 90th, yearly DPI fluctuated between 10 and 20, with few exceptions. In 1981 and 1987, no DPI could be identified, and in 1999, only five could be counted. However, since 2000, the number of DPI per year rose over the level of the previous decades, with the exception of the two last years of the period of study (2007-2008), were DPI diminished to 9 and 4 respectively. These shifts are illustrated in figure 3 (Figure 3: Evolution in the number of DPI, 1981-2008), showing a line trend with several

\textsuperscript{46} This average number is based on the net growth of programs supplied by universities during the period (deducting the closed programs during the period of study).

\textsuperscript{47} This comparison is just a rough approximation. While the average of 95 additional programs is calculated over the net growth in each year (deducting closed programs), the average of 15 new programs per year is calculated considering the gross total amount –cumulative- of new programs during the whole period (including closed programs).
fluctuations, but with different value limits between the period 1981-2000 and 2001-2008.

Table 2. Number of DPI 1981-2008

<table>
<thead>
<tr>
<th>Year</th>
<th>Number DPI</th>
</tr>
</thead>
<tbody>
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<td></td>
</tr>
<tr>
<td>1981 *</td>
<td>0 †</td>
</tr>
<tr>
<td>1982</td>
<td>20</td>
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<tr>
<td>1983</td>
<td>22</td>
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<td>1985</td>
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<td>1986</td>
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<td>0</td>
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<td>1988</td>
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<td>1989</td>
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<td>1994</td>
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<td>1995</td>
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<td>1996</td>
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<td>1997</td>
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<tr>
<td>1998</td>
<td>13</td>
</tr>
<tr>
<td>1999</td>
<td>6</td>
</tr>
<tr>
<td>2000-2008</td>
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</tr>
<tr>
<td>2000</td>
<td>11</td>
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<tr>
<td>2001</td>
<td>28</td>
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<td>2002</td>
<td>22</td>
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<td>2003</td>
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<td>2004</td>
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<td>2006</td>
<td>30</td>
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<tr>
<td>2007</td>
<td>9</td>
</tr>
<tr>
<td>2008</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>430</td>
</tr>
</tbody>
</table>

Source: Author’s compilation, based on the data collection protocol described in the methodology chapter.

Note. – DPI= Degree Program Innovation.
* The time sequence starts in 1981, considering 1980 as the benchmark year.
† In 1981, there was no DPI (as well as in 1987).
What are the magnitude and characteristics of trends in DPI in Chilean universities? First, DPI is a small (≈ 1/8) but relatively regular part of program proliferation. DPI could be identified in most years (all except 1981 and 1987), and in numbers that fluctuate in bands from 10 to 20, during 1981-2001, and from 20 to 35, from 2001-2006. No growth patterns can be seen during the first two decades, and the mean value of DPI per year was 13.2. From 2001-2006, the average of DPI doubled the mean value from the previous period, reaching an average of 27.8 DPI per year. It is important to consider the standard deviation of the number of DPI per year during the whole period (SD= 8.8). Even if DPIs are consistently identified during the entire period, there are relevant fluctuations in its number per year.

Source: Author’s compilation, based on the data collection protocol described in the methodology chapter.

Note. – DPI= Degree Program Innovation.
There is no clear relationship between the evolution of DPI and program proliferation and university student’s enrolment. From 1981 on, program proliferation and enrolment show solid growing patterns as seen in Figure 4: Evolution in the number of programs (5A) 1983-2008 and Figure 5: University enrolment 1983-2008. In both cases, the growing pattern shows a relatively straight line formed by numbers increasing in steady rates. An exception might be drop in more than one thousand programs between 2001 and 2003 showed in Figure 4: Evolution in the number of programs (5A) 1983-2008. However, this may obey presumably to the change in the methodology of the Ministry of Education (MINEDUC, SIES) to collect data and by the closure of a number of university branches offering very small and low quality programs during that period. This suggested explanation is consistent with the student enrolment trend showed in Figure 5, which no relevant fluctuation during 2001-2003.

Figure 4: Evolution in the number of programs (5A) 1983-2008

Source: SIES – Ministerio de Educación.

Note. – 5A: University level degree programs, 4 to 7 years degree programs (International Standard Classification of Education, ISCED, 1997).
Figure 5: University enrolment 1983-2008

Source: SIES – Ministerio de Educación.
Note. – Enrolment: Total number of student in the university sector (enrolled in all program).

4.3. DPI per universities

To explore if some universities are more likely to create new study programs than others are, it is important to disaggregate data and examine the number of DPI per universities and types of universities.

In the following table, there is the list of all Universities with the number of DPI identified during the period. It is important to notice that the list includes all universities...
existing during the period of time (1981-2008). While most universities continue existing, 15 private universities were shut down before 2008\(^{48}\).

<table>
<thead>
<tr>
<th>Universities</th>
<th>Number of DPI</th>
<th>Percentage</th>
<th>Cumulative Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universidad de Chile</td>
<td>48</td>
<td>11.16</td>
<td>11.16</td>
</tr>
<tr>
<td>P. Universidad Católica de Chile</td>
<td>36</td>
<td>8.37</td>
<td>19.53</td>
</tr>
<tr>
<td>Universidad de Concepción</td>
<td>29</td>
<td>6.74</td>
<td>26.28</td>
</tr>
<tr>
<td>Universidad Metropolitana de Ciencias de la Educación</td>
<td>28</td>
<td>6.51</td>
<td>32.79</td>
</tr>
<tr>
<td>Universidad de Santiago de Chile</td>
<td>25</td>
<td>5.81</td>
<td>38.60</td>
</tr>
<tr>
<td>Universidad de Playa Ancha de Ciencias de la Educación</td>
<td>19</td>
<td>4.42</td>
<td>43.02</td>
</tr>
<tr>
<td>Universidad de Valparaíno</td>
<td>19</td>
<td>4.42</td>
<td>47.44</td>
</tr>
<tr>
<td>Universidad de Antofagasta</td>
<td>15</td>
<td>3.49</td>
<td>50.93</td>
</tr>
<tr>
<td>Universidad de Las Américas</td>
<td>14</td>
<td>3.26</td>
<td>54.19</td>
</tr>
<tr>
<td>Universidad Tecnológica de Chile†</td>
<td>14</td>
<td>3.26</td>
<td>57.44</td>
</tr>
<tr>
<td>Universidad Tecnológica Metropolitana</td>
<td>13</td>
<td>3.02</td>
<td>60.47</td>
</tr>
<tr>
<td>Universidad Austral de Chile</td>
<td>12</td>
<td>2.79</td>
<td>63.26</td>
</tr>
<tr>
<td>Universidad de Magallanes</td>
<td>10</td>
<td>2.33</td>
<td>65.58</td>
</tr>
<tr>
<td>Universidad Iberoamericana de Ciencias y Tecnología</td>
<td>9</td>
<td>2.09</td>
<td>67.67</td>
</tr>
<tr>
<td>Universidad Técnica Federico Santa María</td>
<td>9</td>
<td>2.09</td>
<td>69.77</td>
</tr>
<tr>
<td>Universidad Mayor</td>
<td>8</td>
<td>1.86</td>
<td>71.63</td>
</tr>
<tr>
<td>P. Universidad Católica de Valparaíso</td>
<td>7</td>
<td>1.63</td>
<td>73.26</td>
</tr>
<tr>
<td>Universidad de la Frontera</td>
<td>6</td>
<td>1.40</td>
<td>74.65</td>
</tr>
<tr>
<td>Universidad de Talca</td>
<td>6</td>
<td>1.40</td>
<td>76.05</td>
</tr>
<tr>
<td>Universidad del Mar</td>
<td>6</td>
<td>1.40</td>
<td>77.44</td>
</tr>
</tbody>
</table>

Source: Author’s compilation.
Notes – Universities sorted by the number of DPI 1981-2008.
– DPI= Degree Program Innovation.
† ex Universidad Vicente Pérez Rosales.

\(^{48}\) Since 2008 to date, an additional private university from the list was closed (Universidad Regional San Marcos).
Table 4. Frequency and Percentage of Degree Program Innovations per Universities (1980-2008) (Continuation I)

<table>
<thead>
<tr>
<th>Universities</th>
<th>Number of DPI</th>
<th>Percentage</th>
<th>Cumulative Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universidad Católica de Temuco</td>
<td>5</td>
<td>1.16</td>
<td>78.60</td>
</tr>
<tr>
<td>Universidad Central de Chile</td>
<td>5</td>
<td>1.16</td>
<td>79.77</td>
</tr>
<tr>
<td>Universidad de Artes, Ciencias y Comunicación</td>
<td>5</td>
<td>1.16</td>
<td>80.93</td>
</tr>
<tr>
<td>Universidad Diego Portales</td>
<td>5</td>
<td>1.16</td>
<td>82.09</td>
</tr>
<tr>
<td>Universidad Nacional Andrés Bello</td>
<td>5</td>
<td>1.16</td>
<td>83.26</td>
</tr>
<tr>
<td>Universidad Adventista</td>
<td>4</td>
<td>0.93</td>
<td>84.19</td>
</tr>
<tr>
<td>Universidad de Ciencias de la Informática</td>
<td>4</td>
<td>0.93</td>
<td>85.12</td>
</tr>
<tr>
<td>Universidad de La Serena</td>
<td>4</td>
<td>0.93</td>
<td>86.05</td>
</tr>
<tr>
<td>Universidad de Viña del Mar</td>
<td>4</td>
<td>0.93</td>
<td>86.98</td>
</tr>
<tr>
<td>Universidad del Bío Bío</td>
<td>4</td>
<td>0.93</td>
<td>87.91</td>
</tr>
<tr>
<td>Universidad Internacional Sek</td>
<td>4</td>
<td>0.93</td>
<td>88.84</td>
</tr>
<tr>
<td>Universidad Academia de Humanismo Cristiano</td>
<td>3</td>
<td>0.70</td>
<td>89.53</td>
</tr>
<tr>
<td>Universidad Boliviana</td>
<td>3</td>
<td>0.70</td>
<td>90.23</td>
</tr>
<tr>
<td>Universidad Católica de la Santísima Concepción</td>
<td>3</td>
<td>0.70</td>
<td>90.93</td>
</tr>
<tr>
<td>Universidad Católica del Norte ‡</td>
<td>3</td>
<td>0.70</td>
<td>91.63</td>
</tr>
<tr>
<td>Universidad de Arte y Ciencias Sociales</td>
<td>3</td>
<td>0.70</td>
<td>92.33</td>
</tr>
<tr>
<td>Universidad de Atacama</td>
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<td>0.70</td>
<td>93.02</td>
</tr>
<tr>
<td>Universidad de Los Lagos</td>
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<td>0.70</td>
<td>93.72</td>
</tr>
<tr>
<td>Universidad de Tarapacá</td>
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<td>94.42</td>
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<tr>
<td>Universidad Educares (*)</td>
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</tr>
<tr>
<td>Universidad Marítima de Chile</td>
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<td>0.70</td>
<td>95.81</td>
</tr>
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<td>Universidad Pedro de Valdivia §</td>
<td>3</td>
<td>0.70</td>
<td>96.51</td>
</tr>
<tr>
<td>Universidad Adolfo Ibáñez</td>
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<td>96.98</td>
</tr>
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<td>Universidad Arturo Prat</td>
<td>2</td>
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<td>97.44</td>
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<tr>
<td>Universidad La República</td>
<td>2</td>
<td>0.47</td>
<td>97.91</td>
</tr>
</tbody>
</table>

Source: Author’s compilation.

Notes – Universities sorted by the number of DPI 1981-2008.
– DPI= Degree Program Innovation.
* Universities closed up until the year 2008.
‡ ex Universidad del Norte
§ ex Universidad Mariano Egaña
Tabla 5. Frequency and Percentage of Degree Program Innovations per Universities (1980-2008) (Continuation II)

<table>
<thead>
<tr>
<th>Universities</th>
<th>Number of DPI</th>
<th>Percentage</th>
<th>Cumulative Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universidad Alberto Hurtado</td>
<td>1</td>
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<td>98.14</td>
</tr>
<tr>
<td>Universidad Bernardo O'Higgins</td>
<td>1</td>
<td>0.23</td>
<td>98.37</td>
</tr>
<tr>
<td>Universidad Contemporánea (*)</td>
<td>1</td>
<td>0.23</td>
<td>98.60</td>
</tr>
<tr>
<td>Universidad de Los Andes</td>
<td>1</td>
<td>0.23</td>
<td>98.84</td>
</tr>
<tr>
<td>Universidad del Pacífico</td>
<td>1</td>
<td>0.23</td>
<td>99.07</td>
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<tr>
<td>Universidad Finis Terrae</td>
<td>1</td>
<td>0.23</td>
<td>99.30</td>
</tr>
<tr>
<td>Universidad Gabriela Mistral</td>
<td>1</td>
<td>0.23</td>
<td>99.53</td>
</tr>
<tr>
<td>Universidad Regional El Libertador (*)</td>
<td>1</td>
<td>0.23</td>
<td>99.77</td>
</tr>
<tr>
<td>Universidad San Sebastián</td>
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<td>0.23</td>
<td>100.00</td>
</tr>
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<td>Universidad Autónoma de Chile</td>
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</tr>
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</tr>
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<td>Universidad de Rancagua (*)</td>
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</tr>
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<td>Universidad de Temuco (*)</td>
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</tr>
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<td>Universidad Francisco de Aguirre (*)</td>
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<td>Universidad José Santos Ossa (*)</td>
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<td>Universidad Las Condes (*)</td>
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<td>Universidad Mariscal Sucre (*)</td>
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<td>Universidad Miguel de Cervantes</td>
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<td>Universidad Real (*)</td>
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<td>Universidad Regional San Marcos</td>
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<td>Universidad San Andrés (*)</td>
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</tr>
<tr>
<td>Universidad Santa Cruz de Triana</td>
<td></td>
<td>(*)</td>
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</tr>
<tr>
<td>Universidad Santo Tomás</td>
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<td>0.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Source: Author’s compilation.

Notes – Universities sorted by the number of DPI 1981-2008.
– DPI= Degree Program Innovation.
* Universities closed up until the year 2008.
|| ex Universidad Leonardo da Vinci.
DPIs are unevenly distributed among universities. While a handful of universities concentrate most DPI, the largest part of Chilean universities presents few or no DPI during the period of study. Sorted by the number of DPIs, universities form an curved line with very few universities reaching the highest numbers of DPI, and the rest drop down in a continuous ladder with a greater frequency of universities with less and less DPI.

Figure 6: Number of DPI per universities (1981-2008)

Source: Author’s compilation.

Note: Universities (N=75) lined up by the number of DPI (1981-2008) and grouped by its contribution to the total number of DPI (0-10%, 10-15%, 15-20%, 20-50%, and 50-100%).
By the number of DPI, it is possible to cluster universities in a variety of ways. Here we use five groups, considering the percentage of the contribution to the total amount of DPI during the whole period of study. Groups are: i) universities with no DPI (zero contribution), ii) universities with a very small number of DPI (1-3), iii) universities with a modest number of DPI (4-6), iv) universities with a mid number of DPI (7-15), and v) universities with a high number of DPI (more than 15). The following figure shows the distribution of DPI per university (and the suggested grouping of universities, sorted by the percentage of DPI).

Compared with the rest, the largest fraction of universities (21 universities, 26%) shows no DPI at all (the modal number is zero DPI). In this group of universities, we can find almost all the universities that were closed during the period (12 from 15). All these universities are private and created after the reform of 1981, and only one is a member of the Rector Council (a regional Catholic university).

The largest proportion of universities presents a very small number of DPI. Nine universities (11.7%) show just one (1) innovation, three (3.9%) show two (2) innovations, and eleven (14.3%) show three (3) innovations. These universities combined reach 23 universities in total (29.9% of all universities counted during the period of study), and contribute with 11.2% of all DPI. This group of universities is a little more diverse than the ones that show no DPI. In this group, we may find 17 private and six regional CRUCH universities (4 State and 2 Catholics). Universities with no DPI and with a very small number of DPI represent the majority of all universities during this research period of study. The median value of all the cases is three DPI.
The following group of universities shows a modest number of DPI. Six universities (7.8%) show four (4) innovations, five (6.5%) five (5) innovations, and three (3.9%) six (6) innovations. In this group we may find the average number of DPI per universities (=5.7). All together (19%), this group of universities adds up to 67 DPI (15.6%). These universities include nine private and five regional CRUCH universities (Four State owned and one Catholic).

The next group that can be identified is the one made up of universities with more than the average number of DPI per university. This group is formed by nine universities (12%) showing each one from seven to 14 DPI. This group contributes with 96 DPI in total, representing a 22.3% of all DPI. Is formed by five CRUCH universities (two State and three privates, some regional and some metropolitan), and four private universities.

The smallest group (eight universities, representing 11% of all universities), contributes with more than the half of all DPI (50.9%). In this group, it is possible to find universities with 15 and up to 48 DPI. All universities in this group are members of the CRUCH (6 State and 2 Private, including the biggest traditional metropolitan universities of the country).

Just three universities from this group add more than ¼ of all DPI (26.3%). These three universities correspond to the three most prestigious, largest, traditional, and research universities in the country. The following three universities with highest DPIs, are characterized as large, public and relatively specialized universities.
4.4. DPI per types of universities

As illustrated before, DPIs are unevenly distributed among different universities. The exercise of grouping universities by number of DPI allowed exploring the different makeup in terms of the most common legal distinction of Chilean universities (CRUCH/public/private).

The following two figures report the distribution of DPI for the whole period of study sorted by its legal nature (CRUCH/public/private).

Figure 7: Total number of DPI per type (legal) of university

Source: Author’s compilation.
Note: Legal types of universities: i) CRUCH public universities, ii) CRUCH private universities, and iii) New private universities.
As illustrated in the graphs, almost \( \frac{3}{4} \) of all DPI occurred in CRUCH universities. The DPI annual mean value for CRUCH and private universities is 12.00 and 4.54, respectively. These values differ by more than one standard deviation (SD CRUCH sample= 6.83; SD Private Universities sample= 6.03). The evolution of CRUCH universities DPI shows highs and lows during the whole period, contrasting with the private universities DPI, mostly concentrated from 2002-2005.

A different array of universities is the one suggested by Brunner (2009) and discussed in the literature review. Brunner suggests seven sorts of universities regarding several variables. The distribution of DPI sorted by this typology is the following.
The highest number of DPI can be found, first, among the research (seven oldest research and graduate intensive universities) and state regional universities (eleven state universities derived from the regional branches of the Universidad de Chile and Técnica del Estado). Far below, it is possible to find the specialized universities, a group of seven universities, which concentrate a moderate number of DPI. Some private non selective universities (most, small size) show a little but important amount of DPI, but they are few cases that stand out from the large group of nonselective private universities where they belong, and that in most cases innovate little or not at all. No relevant number of DPI can be found among the Catholic regional universities and most private selective and no selective universities.
However, some changes can be identified when analyzing the distribution of DPI breaking up the period of the study. The following figure shows the number of DPI (sorted by Brunner’ types of universities) in four equal-term spans of the period of study.

Figure 10: Evolution of the DPI distribution sorted by Brunner’ university typology (1981-2008)

Source: Author’s compilation.

From the figure, it is possible to observe some changes over time in the amount of DPI activity in different types of universities. Even if most DPI are concentrated in research and state regional universities (particularly during the three first quarters of the study period), during the last quarter of the study period, specialized and private universities show a notable relative increase in the number of DPI as compared to other types of institutions.
4.5. DPI per fields of study

The distribution of DPI per field of study is reported in the following table:

Table 6. Count of Degree Program Innovations by field of study

<table>
<thead>
<tr>
<th>Field of Study</th>
<th>New Degree Program</th>
<th>New Degree Specialization</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration and Commerce</td>
<td>28</td>
<td>14</td>
<td>42</td>
</tr>
<tr>
<td>Arts and Architecture</td>
<td>18</td>
<td>19</td>
<td>37</td>
</tr>
<tr>
<td>Education</td>
<td>18</td>
<td>56</td>
<td>74</td>
</tr>
<tr>
<td>Health</td>
<td>7</td>
<td>12</td>
<td>19</td>
</tr>
<tr>
<td>Humanities</td>
<td>11</td>
<td>10</td>
<td>21</td>
</tr>
<tr>
<td>Law</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Natural Resources</td>
<td>33</td>
<td>26</td>
<td>59</td>
</tr>
<tr>
<td>Sciences</td>
<td>9</td>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>10</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>Technology</td>
<td>79</td>
<td>60</td>
<td>139</td>
</tr>
<tr>
<td>Grand Total</td>
<td>216</td>
<td>214</td>
<td>430</td>
</tr>
</tbody>
</table>

Source: Author’s compilation.

Notes – Degree Program Innovation includes New Degree Programs (whole new program) and New Degree Specialization (a new diploma specialization or mention)
Its distribution over time (four period spans) is illustrated in the following figure.

Figure 11: Evolution of the DPI distribution sorted by field of study (1981-2008)

The distribution of the gross number DPI by field of study is irregular. The largest amount of DPI is in the field of technology. A relevant proportion of DPI is shown in the fields of education, natural sciences, administration and commerce, and arts and architecture. A comparative lower proportion of DPI is shown in the fields of humanities, health, science, social sciences, and law.
The evolution of the number of DPI per field is also irregular. On the one hand, in those fields of study with a low amount of DPI (humanities, health science, social sciences, and law); there are minimal changes in its evolution over time. It is possible to argue that during the last period (2002-2008) all these fields of study present a slight increase in the number of DPI, with the exception of humanities, that presented a higher number of DPI during the previous periods of time. On the other hand, in those fields of study with a higher proportion of DPI, there are variations among time, mainly during the last quarter of years, when most fields of study show growing numbers of DPI.

The fields of study differ among themselves in many ways. Some include many more programs than others do (in 2008, i.e., Education included a total of 654 programs, and Humanities 75) having a bigger size in terms of the amount of programs they cover. For a better understanding of the relative magnitude of DPI in terms of the size of the fields of study, it is important to compare the distribution of DPI and the distribution of the total number of programs per field of study. The next figure (Figure 12: Distribution of DPI per field of study compared with the distribution of the total number of programs in 2008 per field of study) illustrates the percentage of DPI per field of study, and the proportion of all programs in each field. I used the information from the last year with available information to provide a picture of the relative size and distribution of all programs according to the fields of study.
Figure 12: Distribution of DPI per field of study compared with the distribution of the total number of programs in 2008 per field of study

From this figure, it is possible to argue the relatively larger amount of DPI in the fields of technology and natural resources, when comparing with the distribution of the total number of programs in a certain year (2008). The relatively amount of DPI in the fields of arts and architecture, humanities and sciences are relevant in terms of the total number of programs in those fields. The number of DPI in the fields of education, health, law, and social sciences are comparatively smaller than the rest of the fields of study.
4.6. DPI per fields of study and types of university

Even if for the whole period of study, there is a greater frequency of DPI among the CRUCH universities compared with new private universities, when sorting by fields of study, it is possible to suggest that in some areas differences are larger than in other.

Table 7. Degree Program Innovations (1980-2008) sorted by field of study and type of university

<table>
<thead>
<tr>
<th></th>
<th>Administration and Commerce</th>
<th>Arts and Architecture</th>
<th>Education</th>
<th>Health</th>
<th>Humanities</th>
<th>Law</th>
<th>Natural Resources</th>
<th>Sciences</th>
<th>Social Sciences</th>
<th>Sciences</th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRUCH /Public-Private</td>
<td>21</td>
<td>20</td>
<td>66</td>
<td>15</td>
<td>19</td>
<td>1</td>
<td>45</td>
<td>19</td>
<td>9</td>
<td>97</td>
<td></td>
</tr>
<tr>
<td>New Private Universities</td>
<td>21</td>
<td>17</td>
<td>8</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>14</td>
<td>8</td>
<td>42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grand Total</td>
<td>42</td>
<td>37</td>
<td>74</td>
<td>19</td>
<td>21</td>
<td>3</td>
<td>59</td>
<td>19</td>
<td>17</td>
<td>139</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author’s compilation.

Notes – CRUCH /Public-Private= Universities members of the Rector´s Council.

There are large differences in the number of DPI between CRUCH and new private universities in most fields of study: Education, Health, Humanities, Natural Sciences, Science and Technology. In those fields of study with the higher number of DPI (Technology, Education and Natural Resources), differences between CRUCH and new private universities are important. However, differences narrow in the fields of Arts and Architecture and Social Sciences, disappear in Administration and Commerce, and
even reverse in the case of Law. While Law is the field with the smallest number of DPI overall, Administration and Commerce is among the four biggest fields of study in terms of the number of DPI. All these later fields of study group several disciplines and professional areas commonly considered as low paradigmatic (soft and/or applied disciplines in Biglan’s typology).
CHAPTER 5: RESULTS - EXPLORATORY MULTIVARIATE ANALYSIS

As described in the previous Chapter, most DPIs are strongly concentrated on a limited number of universities in the country. Almost half of the universities in Chile have little or no DPI during the period of study. Some universities show a modest number of DPI, but few universities contrast with the rest because of its comparatively elevated number of DPI.

Even if I anticipated an uneven distribution of DPI per universities (see: 2.4. Synthesis, relationships and hypotheses), the irregular distribution of DPI seems more striking than expected. The evidences for the Chilean case are relevant to examine many of the hypotheses advanced by previous research, but considering for the first time disaggregated data and the irregular distribution of DPI.

The next three tables report selected descriptive statistics values for those variables that will be discussed in this section of the document. Table 8 inform about mean values and standard deviation of each of the variables analyzed in the study, and table 9 about the median, range and minimum and maximum values. Finally, Table 10 show Pearson’s R Coefficient and the number of cases between DPI and each of the variables considered in this study.
Table 8. Descriptive statistics for selected variables I

<table>
<thead>
<tr>
<th></th>
<th>Mean Value</th>
<th>Standard Deviation</th>
<th>Number of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Annual DPI (1980-2008)</strong></td>
<td>5.73</td>
<td>8.90</td>
<td>75</td>
</tr>
<tr>
<td><strong>University Characteristics (2008)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (up to 2008)</td>
<td>24.8</td>
<td>25.8</td>
<td>75</td>
</tr>
<tr>
<td>Enrolment (2008)</td>
<td>9,258</td>
<td>7,531.</td>
<td>59</td>
</tr>
<tr>
<td>Number of study fields (2008)</td>
<td>7.8</td>
<td>2.1</td>
<td>59</td>
</tr>
<tr>
<td>Number of branches (2008)</td>
<td>3.5</td>
<td>4.3</td>
<td>59</td>
</tr>
<tr>
<td><strong>Faculty (2008)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full Time Faculty (Number)</td>
<td>367.30</td>
<td>388.66</td>
<td>58</td>
</tr>
<tr>
<td>Full Time / Total Faculty (Ratio)</td>
<td>46.81 %</td>
<td>31.77 %</td>
<td>58</td>
</tr>
<tr>
<td>Faculty with graduate studies / Total Faculty (Ratio)</td>
<td>49.09 %</td>
<td>19.58 %</td>
<td>58</td>
</tr>
<tr>
<td>Student / Faculty ratio (FTE)</td>
<td>30.56 %</td>
<td>12.78 %</td>
<td>57</td>
</tr>
<tr>
<td><strong>Research / publications (2004-8)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Projects</td>
<td>64.10</td>
<td>138.26</td>
<td>42</td>
</tr>
<tr>
<td>Research Funding (Thousand Ch$)</td>
<td>$ 1,466,267</td>
<td>$ 3,766,165.</td>
<td>43</td>
</tr>
<tr>
<td>Publications (ISI + SciELO)</td>
<td>500.74</td>
<td>1402.57</td>
<td>58</td>
</tr>
<tr>
<td><strong>Funding (1990-2008)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State funding AFD + AFI (Annual Average Thousand Ch$)</td>
<td>$ 2,051,433</td>
<td>$ 4,959,461</td>
<td>72</td>
</tr>
</tbody>
</table>

Source: Author’s compilation.
Table 9. Descriptive statistics for selected variables II (continuation)

<table>
<thead>
<tr>
<th></th>
<th>Median</th>
<th>Min</th>
<th>Max</th>
<th>Range</th>
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</thead>
<tbody>
<tr>
<td>Annual DPI (1980-2008)</td>
<td>3</td>
<td>0</td>
<td>48</td>
<td>48</td>
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<tr>
<td>General Characteristics (2008)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (up to 2008)</td>
<td>18</td>
<td>2</td>
<td>166</td>
<td>164</td>
</tr>
<tr>
<td>Enrolment</td>
<td>7,108</td>
<td>54</td>
<td>30,321</td>
<td>30,267</td>
</tr>
<tr>
<td>Number of study fields</td>
<td>8</td>
<td>1</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Number of branches</td>
<td>2</td>
<td>1</td>
<td>20</td>
<td>19</td>
</tr>
<tr>
<td>Faculty (2008)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full Time Faculty (Number)</td>
<td>294.15</td>
<td>0</td>
<td>1,836.89</td>
<td>1,836.89</td>
</tr>
<tr>
<td>Full Time / Total Faculty (Ratio)</td>
<td>57%</td>
<td>0%</td>
<td>92%</td>
<td>92</td>
</tr>
<tr>
<td>Faculty with graduate studies / Total Faculty (Ratio)</td>
<td>52%</td>
<td>0%</td>
<td>88%</td>
<td>88</td>
</tr>
<tr>
<td>Student /Faculty ratio (FTE)</td>
<td>26.32</td>
<td>13.38</td>
<td>79.2</td>
<td>65.82</td>
</tr>
<tr>
<td>Research / publications (2004-8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Research Projects</td>
<td>18</td>
<td>1</td>
<td>687</td>
<td>686</td>
</tr>
<tr>
<td>Research Funding (Thousand Ch$)</td>
<td>$235,255</td>
<td>0</td>
<td>$20,843,873</td>
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</tr>
<tr>
<td>Publications (ISI + SciELO)</td>
<td>52</td>
<td>0</td>
<td>8,438</td>
<td>8,438</td>
</tr>
<tr>
<td>Funding (1990-2008)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State funding AFD + AFI (Annual)</td>
<td>$636,834</td>
<td>0</td>
<td>$586,217,488</td>
<td>586,217,488</td>
</tr>
<tr>
<td>Average Thousand Ch$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>

Source: Author’s compilation.
Table 10. Correlations with DPI for selected variables

<table>
<thead>
<tr>
<th></th>
<th>r</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Characteristics (2008)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (up to 2008)</td>
<td>.790(**)</td>
<td>75</td>
</tr>
<tr>
<td>Enrolment</td>
<td>.584(**)</td>
<td>59</td>
</tr>
<tr>
<td>Number of study fields</td>
<td>.319(*)</td>
<td>59</td>
</tr>
<tr>
<td>Number of branches</td>
<td>-.059</td>
<td>59</td>
</tr>
<tr>
<td><strong>Faculty (2008)</strong></td>
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<td></td>
</tr>
<tr>
<td>Full Time Faculty (Number)</td>
<td>.766(**)</td>
<td>58</td>
</tr>
<tr>
<td>Full Time / Total Faculty (Ratio)</td>
<td>.418(**)</td>
<td>58</td>
</tr>
<tr>
<td>Faculty with graduate studies / Total Faculty (Ratio)</td>
<td>.224</td>
<td>58</td>
</tr>
<tr>
<td>Student / Faculty ratio (FTE)</td>
<td>-.400(**)</td>
<td>57</td>
</tr>
<tr>
<td><strong>Research / publications (2004-8)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Projects</td>
<td>.814(**)</td>
<td>42</td>
</tr>
<tr>
<td>Research Funding (Thousand Ch$)</td>
<td>.809(**)</td>
<td>43</td>
</tr>
<tr>
<td>Publications (ISI + SciELO)</td>
<td>.807(**)</td>
<td>58</td>
</tr>
<tr>
<td><strong>Funding (1990-2008)</strong></td>
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<td></td>
</tr>
<tr>
<td>State funding AFD + AFI (Annual Average Thousand Ch$)</td>
<td>.839(**)</td>
<td>72</td>
</tr>
</tbody>
</table>

Source: Author’s compilation.

Notes: * p < 0.05. ** p < 0.01.
5.1. Regulation (supervision/autonomy)

One of the common assumptions discussed in the specialized program higher education literature is that regulations may inhibit DPI. Even if it is possible to analyze the number of DPI of the subset of universities that has been under supervision and later obtained full autonomy during the period of study, evidence need to be carefully examined. First, the number of DPI from these universities (all new private universities) is smaller than from the public and traditional private and derived universities (see: Figure 7: Total number of DPI per type (legal) of university Second, not only is the number small, its distribution is also uneven (see: Figure 13: DPI evolution from new private universities under supervision or autonom). Therefore, the number of universities with relevant DPI and valid cases to be examined is very limited. From the 54 new private universities existing during the study period, 32 show one or more DPI. From the 32 universities, just seven hold more than 50% of all new private universities’ DPI.

Figure 13: DPI evolution from new private universities under supervision or autonom show the number and evolution of DPI from new private universities, sorting those created from universities under supervision and those created under full autonomy conditions. From the 118 DPI, 41 programs (35%) were created by universities under supervision, and 77 (65%) created once full autonomy was granted.

While most of these innovations belong to universities under their licensing process carried up by the Higher Council for Education, there are few exceptions of DPI from universities under examination. This finding is unanticipated, because universities under examination were not supposed to innovate; universities were supposed to replicate the programs from their examining
As expected, DPI under autonomy starts from 2000 and on, when most universities obtained their full autonomy. There is an increase in the number of DPI from 2000-2008, compared with the previous period.

Figure 13: DPI evolution from new private universities under supervision or autonomy

Source: Author’s compilation.

However, it is possible to identify some universities with a comparatively higher number of innovations from 2000 and on. It is the case of five new private universities, all creating new programs just after obtaining their autonomy, and having no innovations before. These universities have 14, 9, 8, and 5 DPI respectively. When drawing out these cases, the view of the evolution of DPI under supervision and full autonomy changes universities. These few exceptions might be errors from the databases or perhaps examples of the laxity of the examination mechanism applied in Chile during the 80th.
considerably. The following figure (Figure 14: DPI evolution from new private universities under supervision or autonomy (corrected)) shows the evolution in the number of DPI from new private universities, excluding the five universities with the highest number of DPI, all created in the subsequent years of obtaining their autonomy.

Figure 14: DPI evolution from new private universities under supervision or autonomy (corrected)

Source: Author’s compilation.

Note: This graph represents the evolution of DPI from all new private universities, with the exception of the universities: Andrés Bello, Las Américas, Mayor, Iberoamericana de Ciencias y Tecnología (UNICYT) and de Artes, Ciencias y Comunicación (UNIACC).
On the one side, this evidence seems to support the argument that there are private universities that tend to innovate only when enjoying full autonomy. Few large private universities started to innovate only after obtaining their autonomy in the 2000th. These universities are large selective or non-selective private universities (Brunner’ university types 5 and 6). On the other side, there is evidence showing that most private universities that show a moderate number of innovations during the whole period of study, showed a similar rate of innovations with or without autonomy. In all these latter cases, the number of DPI is small or modest, and the types of universities that carried innovations belong to the whole variety of new private universities (Brunner’ university types 4, 5, 6 and 7).

5.2. State funding

State funding is one of the factors to be explored in its relationship to DPI. As discussed before, the Chilean funding system has a number of mechanisms. The two most important funding contributions from the State, beside the several student aid funding programs, are the AFD (Direct State Funding) and the AFI (Indirect State Funding). While AFD is allocated only among CRUCH universities on behalf of historical criteria and some performance indicators, AFI is distributed along all universities according to the number of high scoring students (on the national admission test) enrolled each year. The resources from the AFD and AFI are highly concentrated in few universities, as shown in the next figure (Figure 15: Funding (AFD + AFI) by university (annual average 1990-2008). Ordered by the annual average of funding received by government (1990-2008), the figure shows a highly positive skewed tendency. Differences among
universities are coincident with the also relevant differences in terms of the age (number of years of existence), performance in selected indicators (such as research and productivity), and the capacity to enroll the students with the highest scores in the national admission test.

Figure 15: Funding (AFD + AFI) by university (annual average 1990-2008)

Source: Data from SIES.
Approximately 50% of the State funding (AFD and AFI, during 1990-2008) was allocated to just four universities (Universidad de Chile, Católica de Chile, de Concepción, and de Santiago). A 75% was allocated in ten universities (the first four, plus the Pontificia Universidad Católica de Valparaíso, Austral de Chile, Técnica Federico Santamaría, Católica del Norte, de Talca and Metropolitana de Ciencias de la Educación) and a 90% in sixteen universities (plus U. de Tarapacá, U. de Valparaíso, U. de la Frontera, U. del Bío Bío, and U. de la Serena). Thirty-one universities, most private and few CRUCH regional universities, received a comparatively tiny fraction from funding (less than 1% of all the state funding). Finally, eighteen universities (all new private), received no state funding at all.

Figure 16: Funding (AFD + AFI) by university (annual average 1990-2008) and DPI plots the distribution of state funding and the number of DPI during the period of study.

Universities with little or no state funding show a modest number of DPI or no DPI at all. Universities with a comparatively higher state funding show a higher rate of DPI. The subset of universities with the greatest funding is, at the same time, the one with the greater amount of DPI.

The strength of the relationship between state funding and DPI is positive and significant (Pearson’s R Coefficient= 0.839, p<0.01, see: Table 10. Correlations with DPI for selected variables)
Figure 16: Funding (AFD + AFI) by university (annual average 1990-2008) and DPI

Source: Data from SIES and author's compilation.

The relationship is particularly relevant among the traditional elite universities, which concentrate large amounts of state funding and show the highest rate of innovations. The relationship is blurred among the subset of universities with a modest amount of DPI, were it is possible to find universities with a relatively middle level of funding, but also universities with no funding at all.
5.3. Research

Research activity in Chilean higher education is highly concentrated in a small number of universities, the same that receive the greatest amount of state funding. Two very common indicators of the research activity in universities in Chile are: i) the amount of research projects granted to universities, and ii) the amount of research funding. For this research, I systematized the information provided from the most relevant research funds\textsuperscript{50} during the last four years of my study period (2004-2008). An additional statistic commonly used to assess research production is the number of indexed publications attributable to researchers based at the various universities.

Even if these statistics do not cover all the study period, they provide a broad indication of the level of research activity and its distribution among Chilean universities. These statistics are the ones currently available and belong to public sources of information\textsuperscript{51}. The picture of research funding and its relation with the number of DPI is illustrated in the following two figures.

\textsuperscript{50} FONDECYT (regular, cooperación internacional, and posdoctorado), FONDEF, and FONIS. These three funds cover different fields and research initiatives, representing nearly all research funding in the country.

\textsuperscript{51} The available information considers all indexed publications from 2002 to 2008, including all ISI publications, plus SciELO (not ISI) publications. The source for ISI was Web of Science Thomson Reuters, and for SciELO, the SciELO Chile Database (reviewed in September 2011).
Figure 17: Research (Number of projects) by university (total 2004-2008) and DPI

Source: Data from SIES-CONICYT and author's compilation.
These two figures show the differentiated array of research activity among universities in the country, and its relationship with the number of DPI. The relationships with DPI in both cases (number of projects and research funding) are positive and strong, above all in those cases with the highest research statistics that show also a very high
number of DPI (cases located in the mid and upper right part of the graphs). The relationships are less evident in the lower left of the graphs, showing a greater concentration of cases when values get closer to zero.

The variability of the number of research projects among universities is moderately higher than the variability of research funding (see Table 8), and the relationship with DPI is closer in those cases with a higher and moderate number of projects and DPI.

The descriptive statistic analyses report important standard deviation of the values of research variables. In the sample, the research funding variable standard deviation is higher than the research projects variable standard deviation. The correlation statistics report a strong and positive relationship in both number of projects and research funding variables with the number of DPI. The strength of the relationship is 0.814 and 0.809 respectively (Pearson’s R Coefficient, p<0.01, see: Table 10. Correlations with DPI for selected variables).

A different way look at the relationship between research and DPI is examining research productivity by the amount of indexed publications. The following two graphs illustrate the distribution of publications among Chilean universities during 2002-2008, and its relationship with the amount of DPI.
In Chile, not surprisingly, there are very few universities with a recognized position in research production (indexed publications). It must be said that the concentration of publications is more radical than the distributions observed about the
two previous statistics of research activity (numbers of projects and research funding). The oldest two universities concentrate almost half of all indexed publications during 2002-2008 in Chile: the Universidad de Chile reaches a 29% and the P. Universidad Católica a 20%. The next university is Concepción, with a 12%. The universities of Santiago, Austral and Santa María have a comparatively modest 3%, and the universities of Talca and Valparaíso a 2%. There are 13 universities with about a 1% of all publications. All these universities, having at least some recognizable percentage of publications during the period, are 21 in total, representing less than a 30% of the universities in Chile.

Figure 20: Research production (ISI and SciELO publications) by university (total 2004-2008) and DPI, synthesizes the analyses between research production (number of publications) and DPI.

Again, the few universities that stand out because of their number of publications are the leading universities in terms of the number of DPI during the period of study. Because of the asymmetric distribution of both publications and number of DPI, there is a high concentration of cases in the lower left quadrant. There are some interesting cases of universities with no publications at all and with a moderate and even high number of DPI, as well as one case of a university with a moderate number of publications and a comparatively less number of DPI.
Despite the fact that the number of valid cases is smaller than when analyzing the first two research statistics (projects and funding), the standard deviation in this sample of cases is almost three times the mean value. This means that when analyzing the academic production measured by publications, the differences among universities are relevant and
higher compared with other statistics. At the same time, the strength of the relationship is strong and positive (Pearson’s R Coefficient= 0.807, p<0.01, see Table 10. Correlations with DPI for selected variables), but slightly less than the relationships with the number of projects and research funding.

5.4. Faculty

The following three graphs illustrate the statistics chosen to explore university faculty and its relationship with university DPI. The graphs order Chilean universities in terms of three faculty statistics: i) proportion of full time faculty over all faculty, ii) proportion of faculty holding graduate degrees (Doctoral, master and health specializations) over all faculty, and iii) number of students over faculty FTE (Full Time Equivalent). These data are from the year 2008, allowing an approach to university faculty statistics and its relationship to DPI.
Figure 21: Ratio of Full Time Faculty over all Faculty (SIES, 2008)

Source: Data from SIES.
Figure 22: Ratio of Faculty holding graduate degree (Doctoral, master and health specializations) over all Faculty (SIES, 2008)

Source: Data from SIES.
The three last figures show how selected faculty statistics from Chilean universities can be ordered and plotted in relatively continuum series of values, going from very high ratios (between 80 and 100%) to very low ratios (0 to 20%). As discussed before, Chilean universities present significant differences in many regards, faculty characteristics being one of these. The university distribution according to some faculty...
statistics confirms most literature about the relevant differences among Chilean universities. Few traditional elite universities tend to rank on the higher positions, while most new private non-prestigious universities rank always on the lowest positions. The exception on the previous figures are some regional nontraditional CRUCH universities high ranked in terms of the number of full time faculty, a reasonable condition for those universities located somewhat far from metropolitan zones.

The relation between faculty statistics and DPI is explored here.

Figure 24: Ratio Full Time Faculty (2008) and DPI

Source: Data from SIES and author’s compilation.
Figure 25: Proportion of faculty holding graduate studies (2008) and DPI

Source: Data from SIES and author’s compilation.
Figure 26: Ratio Students/Full Time Equivalent Faculty (2008) and DPI

Source: Data from SIES and author’s compilation.

Unlike other factors explored, the selected faculty statistics have a comparatively blurred relationship with DPI in Chile, even if in most cases it was possible to find significant correlations.
In figure 24 (Figure 24: Ratio Full Time Faculty (2008) and DPI) it is possible to observe the few universities with the highest amount of DPI, reaching also high full time faculty ratio (close to an 80%), but sharing that position also with a number of regional universities with a low amount of DPI. There are no cases of universities with a high number of DPI and low rate of full time faculty, but several cases of a moderate and low number of DPI, indistinctly of the proportion of full time faculty. The correlation analysis reported a significant but moderate weak relationship between full time faculty ratio and DPI (Pearson’s R Coefficient= 0.418. p<0.01. see: Table 10. Correlations with DPI for selected variables).

A similar situation can be observed when analyzing DPI with the proportion of student over faculty (see: Figure 26: Ratio Students/Full Time Equivalent Faculty (2008) and DPI). The universities with the highest number of DPI are those with a relatively low number of students per faculty (or a high number of faculty per students), but at the same time there are a number of other universities sharing an identical student/faculty ratio but presenting low and very low DPI. Again, there are no cases of universities with a high numbers of students per faculty and high number of DPI. There are, however, several cases of various student/faculty ratios, presenting similar levels of DPI. The correlation analysis in this case reported a significant but moderate weak relationship (Pearson’s R Coefficient= 0.400. p<0.01, see: Table 10. Correlations with DPI for selected variables).

52 An exceptional case is a new private university with almost zero full time faculty, but showing a relatively leading position in terms of the number of DPI.
Finally, no significant relationship was found between DPI and the proportion of faculty holding graduate degrees. While differences among universities in terms of the proportion of faculty holding graduate degrees is as ample as in the other faculty statistics reported before (see tables 8 and 9), in this particular case differences are not correlated with DPI. Figure 25 (Figure 25: Proportion of faculty holding graduate studies (2008) and DPI) show the random distribution of cases when considering DPI and the proportion of faculty holding graduate degrees. Universities with the highest number of DPI present a reasonably high rate of faculty holding graduate degrees, although there are also universities even with a higher rate of faculty holding degrees but with a dramatically lower number of DPI. The Pearson’s R Coefficient reports a 0.224, no significance. (see: Table 10. Correlations with DPI for selected variables)

### 5.5. Institutional size (number of students, branches)

The size of the universities is measured by two indicators: student enrollment and the number of university branches. The next figure shows data from 2008, and illustrates university differences in terms of enrollment and the number of branches. University enrolment and university number of branches are significant but weakly correlated \(^{53}\). It is possible to find large universities in terms of enrolment, but with few branches, and large universities in terms of it number of branches, but with a moderate number of students. The mean values for student population is 9,258 and for the number of branches is 3.5 (see variable statistics in tables 8 and 9). While most universities have between 1 and 5

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\(^{53}\) The Pearson’s R Coefficient reports a 0.317 (p<0.05).
branches, those with more than 5 branches belong to either large, mid size or small student population types of universities.

Figure 27: University Size (enrolment and branches, 2008)

Source: Data from SIES and author’s compilation.

The relationship between DPI and institutional size, considering both enrolment and the number of branches and DPI, is explored in figure 28 and 29.
Figure 28: University Size (Enrolment, 2008) and DPI

Source: Data from SIES and author’s compilation.
Enrolment shows a stronger relationship with DPI than the number of branches.

From figure 28 (Figure 28: University Size (Enrolment, 2008) and DPI), it is possible to identify the universities with a large enrolment and high number of DPI in the upper right. At the same time, there is a concentration of cases in the lower left section of the
figure. Three universities are relatively distant from the rest: two new private large universities but with a moderate and low number of DPI (Universidad de las Américas and Universidad Nacional Andres Bello), and one public midsize university and with a comparatively large number of DPI (Universidad Metropolitana de Ciencias de la Educación).

Figure 29 (Figure 29: University Size (Number of Branches, 2008) and DPI) illustrates the relationship between DPI and University size measured by the number of branches. The majority of the universities has less than five branches in 2008, and shows a random distribution in terms of its number of DPI. However, the few universities with more than five branches (nearly all new private), tend to present a moderate and low number of DPI.

While the relationship between enrolment and DPI is significant and shows a positive but moderate strength (Pearson’s R Coefficient is 0.584, significant at p<0.01), the relationship between the number of branches and DPI is not significant (the Pearson’s R Coefficient is -0.059 no significant) (see: Table 10. Correlations with DPI for selected variables)

5.6 Age (number of years)

The measure of the institutional age for this study is the number of years counted from its creation and up until year 2008 (or up until the year it was closed, when universities no longer exist). Figures 30 and 31 graph the distribution of university age and its relationship with DPI.
Figure 30: University Age / Years (up until 2008)

Source: Data from SIES and author’s compilation.
In respect to age, in 2008, there are just two traditional centenarian universities (more than 100 years old) and six traditional universities that are 50 to 100 years old. These universities constitute the so-called traditional universities existing up until 1980 in Chile. By 2008, the rest of the universities in the country had 27 years of existence or less. This younger group of universities is made up of 67 institutions (few no longer
exist). The mean value for the age of universities is 24.83 years old, with a standard deviation of 25.81.

Figure 31 (**Figure 31: University Age / Years (up until 2008) and DPI**) show the distribution of cases plotting age and DPI. While the two centenary universities lead in the number of DPI, the rest of the traditional universities aged from 50 to 100 show very dissimilar numbers of DPI, but always at least some DPI (there is no case of a zero DPI). The majority of universities aged 27 or less present also a wide range of DPI, but mostly in moderate or small numbers. Finally, the younger universities, with 13 years or less, present minimal DPI when any (one has 3 DPI, and three has 1 DPI).

The relationship in the case of age and DPI is positive and strong. The correlational analysis reported a Pearson’s R Coefficient of 0.790, significant at p<0.01, (see: Table 10. Correlations with DPI for selected variables), been one of the strongest relationships found from the set of variables explored in this study.

5.7. **Scope (fields of study)**

The last factor examined in this study is the institutional scope, measured by the number of study fields cover by the degree programs supplied by universities. The institutional scope is usually related to the mission and measured by the variety of programs covering the UNESCO fields of study. The next figure show all universities according to its number of study fields supplied up until 2008.
The mean value of study fields for the sample of universities in Chile is 7.76. The minimum is one and the maximum is 10 (SD=2.08), covering the whole range of fields of study. Most universities supply programs in several fields of study rather than few. In 2008, only three universities were limited to one, two or three fields of study (universidades Marítima de Chile, Chileno Británica de Cultura and Regional San
Marcos, respectively). These three universities are all new private and very small institutions. Eight universities were concentrated in four to six fields of study, all small new private universities or mid size CRUCH universities. Most universities supply programs in seven or more fields of study. The relationship with the number of fields of study and DPI is illustrated in the following figure.

Figure 33: University Study fields (2008) and DPI

Source: Data from SIES and author’s compilation.
The majority of the universities had in 2008 a wide scope in their educational program supply (seven or more fields of study). The relationship with the number of DPI is unclear in this group, some show a prominent number of DPI, some a moderate and some a very low amount of DPI. The universities with a limited and moderate scope show in most cases very few DPI and even zero DPI. An exception is the Universidad Metropolitana de Ciencias de la Educación, a public CRUCH university focused in 5 fields of study (all serving teacher training programs) and among the top 5 universities according to the number of DPI.

The correlation analysis reported a significant but moderate relationship between DPI and university scope (Pearson’s R Coefficient R=0.319, significant at p<0.01, see: Table 10. Correlations with DPI for selected variables).

5.7. Multiple relationships and correlations

Tables 8 to 10 synthesized the selected descriptive statistics and the multiple correlation analyses reported for all the variables considered in this study. The descriptive analysis from the variables was reported before. However, some additional comments about relationships and correlations among these variables are necessary.

First, even if the uneven distribution of DPI was anticipated, it turned out to be more striking than expected. Most variables analyzed in this study show irregular distributions, representing differences among universities. However, the number of DPI is among the most irregular distributions of all variables considered in this study.
Together with research indicators, DPI numbers are concentrated in a number of universities in Chile, while most universities report little or no DPI.

Second, values in most of the variables analyzed show high dispersion. DPI showed a mean value of 7.73, with a standard deviation of 8.90. The relative standard deviation (RSD) or coefficient of variation (σ/x) is 1.55, meaning a relatively wide range of values among the sample of universities. This is also the case for many of the variables studied. The variables with the highest RSD are: research (indexed publications, 2002-2008) with a 2.80, research funding (annual average) with a 2.42, research projects (2004-2008) with 2.16, and total state funding (1990-2008) with a 2.42. A moderate coefficient of variation is present in variables such as: age (1.04), enrolment (0.81), and full time faculty ratio (0.69). The variables with the narrowest range of values and dispersion in the sample of university cases are: scope (number of study fields) (0.27), student/faculty ratio (0.42) and the proportion of faculty holding graduate degrees (0.40)\textsuperscript{54}.

The multiple correlation analysis was reported in Table 10. Correlations with DPI for selected variables From data, several of the selected variables in this study are statistically correlated with DPI, showing significant and moderate to strong relationships. The variables showing the strongest correlation with DPI are state funding (AFD and AFI) and research activity (research number of projects, research funding, and publications). A very strong and positive relationship with DPI is also found with

\textsuperscript{54} It is important to consider the fixed and discrete character of these variables. The number of study fields has a minimum of one and a maximum of ten, and the faculty rates are expressed in percentage values.
institutional age (number of years), and the number of faculty (full time). A moderate relation was found between DPI and student’s enrolment. Even if significant, a moderate weak relationship was established between DPI and the proportion of full time faculty over all faculty, the ratio of students per faculty (FTE) and the university scope (measured by the number of fields of study). Finally, no statistical relationship could be proven between DPI and the number of university branches and faculty holding graduate degrees.

Data provides a picture about how these variables are distributed and are related among them. The analysis was designed for exploratory purposes and to test, for the Chilean case, a set of hypotheses. Even if anticipated in some ways, relationships turned to be stronger than expected. Differences among universities are very impressive. Like DPI, data about the factors examined in this research inform about a very differentiated and stratified university system.

In the following final chapter, I will summarize the interpretation of data; review each of the suggested hypotheses and most relevant conclusions of this study.
CHAPTER 6: CONCLUSIONS

In chapter four, I provided documentation about the new programs created over the last 28 years in Chile, and reported their most significant characteristics and trends: number, evolution over time, distribution in terms of study fields and frequency among different universities and types of universities, addressing in this way my research questions. At the same time, in chapter five, I reported the relationship between DPI and several factors, aiming to explore and understand how DPI occurred in Chile in the way that it has. This new body of knowledge contrasts the most relevant competing arguments and hypotheses raised in literature regarding the extent to which various factors might be related to program innovation against pertinent evidence. In this final chapter, I will summarize the main conclusions, suggesting interpretations of data concerning the study purposes, research questions and hypotheses.

6.1. Interpretation of data – purposes, research questions and hypotheses

6.1.1. Descriptive purposes, questions and hypotheses.

The first purpose of this research was to examine DPIs in Chilean universities since the reform in 1981, and to describe and provide documentation about its number, evolution over time, distribution in terms of study fields and frequency among different types of universities. The main research question for the descriptive part of this study was about the magnitude and characteristics of trends in DPI in Chilean universities over almost three decades.
Four hundred and thirty (430) DPI could be identified from 1981 to 2008. These innovations, far from being an incidental figure, are quite relevant. The magnitude of DPI in Chilean universities is equivalent to 13% of university program proliferation for the same period. There is little available information to make international comparisons on this regard. It may be seen as a large number of innovations in many senses (i.e. compared to all other empirical studies carried up internationally\textsuperscript{55}), but it is also important to consider that is the number of program innovations identified within a relatively long period of time, characterized by significant higher education growth and differentiation.

Some characteristics of trends in DPI in Chilean universities can be drawn from data. There are DPIs for almost all years (except in 1981 and 1987), so it is possible to argue that DPIs are ‘events’ that show up frequently. Even if the amount of DPI varies from one year to the other, data show a fluctuation of values within certain bands, relatively steady across the periods of the study. During the first twenty years (1981-2000), DPI fluctuated between 10 and 20 DPI per year, and during 2001-2006 this value almost doubled, reaching between 20 and 35 DPI per year. DPI shows ups and downs during the period of study, but within certain margins, and with an increase in its frequency during the last five years of the time series.

Contrasting with our hypothesis, the evolution of DPI revealed little parallel with enrolment or program proliferation (Hypothesis 1, see: 2.4 Synthesis, relationships and hypotheses). While enrolment and program proliferation in Chile show similar patterns of growth over the entire period under study, the evolution of DPI differ from the two previous ones. Therefore, the hypothesis that massification and competition propels the

\textsuperscript{55} This is the largest study in terms of the amount of program innovations investigated up until now.
number of DPI is dismissed for the Chilean case, at least during the higher education developmental stages covered during the period of study. The systematically increasing rates observed in enrolment and program proliferation in Chilean universities in 1980-2008, differ largely with the patterns shown by DPI. In other words, the number of DPI may contribute to the number of programs overall, but the patterns of expansion in the Chilean university sector are expressed much better by institutional and program proliferation, rather than by the rhythm of program innovations. The argument that massification takes place by increasing supply from old and new providers offering mostly well known and very traditional degree programs, those highly demanded by students, fits much more with the data shown by my research.

A key finding in this research is the uneven distribution of DPI among universities during the whole period of study. There is strong evidence about the asymmetrical distribution and high concentration of DPI in a number of universities. This is consistent with my hypothesis that DPIs would be unevenly distributed among universities during the whole period of study (Hypothesis 2, see: 2.4 Synthesis, relationships and hypotheses).

Unlike previous studies, my research show differences in the distribution of DPI across universities and high concentration of DPI in some universities compared to other. Differences can be described in a number of ways, but the distribution of DPI show: i) a majority of universities with a very small number or zero DPI (56% of all universities), ii) a smaller group with a modest number of DPI (19% of all Universities), iii) an even smaller group with a mid number of DPI (12% of universities), and iv) the smallest group of universities showing the highest number of DPI (11% of universities).

56 This might not be necessarily the case for non-university higher education sectors.
This research showed an unequal distribution of DPI among Chilean universities more striking than expected. It was suggested in the literature review that the universities from the rector’s council may present a greater rate of DPI compared to private universities during the whole period of study, which proves accurate according to the data (Hypothesis 3, see: 2.4 Synthesis, relationships and hypotheses). However, there is also an uneven distribution of DPI within both the CRUCH and the new private universities. Among CRUCH universities, DPIs are highly concentrated in the few research universities and in some of the state and regional universities. Among the private universities, DPIs are also concentrated in a few large and small non-selective universities.

Evidence implies that even if CRUCH universities display far more DPI than new private universities, there are relevant differences within CRUCH universities in this matter. While some CRUCH universities do not differ much from most of the new private ones, innovations come by in large from two types of university. i) the research elite universities, suggesting that program innovations are probably one among the many strengths of the Chilean top leading universities, and ii) the state and regional universities, suggesting perhaps connections between the educational supply and the public and local new professional needs.

At the same time, just few new private universities have a recognizable activity in terms of program innovations, been exceptions in the private sector. DPI among new private universities are present over all the period of their existence, even if it is possible so observe an increase in its frequency during the last period of study 200-2008 (Hypothesis 4, see: 2.4 Synthesis, relationships and hypotheses).
The three most prominent universities showing the highest DPI in the private sector are: i) a large non-selective market oriented university (actually, the biggest new private university in the country) and ii) two small, non-selective and focused niche oriented universities. The main lesson is that some market-oriented universities include innovation strategies together with program proliferation, but it is not the rule for most Chilean private universities during the period of study.

As understood in this research, DPI is a specific form of differentiation within a certain context, expanding the boundaries of the program supply in higher education. Few universities supply the significant contributions to this sort of differentiation. While many institutions contribute with massification and program proliferation, few explore and undertake innovations. This argument is consistent with the classical statement of higher education as a traditional field, making limited space for innovation (Enarson, 1960). However, how to explain the great dynamism shown by few universities compared to the rest?

The CRUCH and non-CRUCH university distinction is too broad to identify innovators. We could argue that CRUCH universities have a higher dynamism than privates do in this matter. However, we learn from data that the most significant contributions to program innovations are circumscribed to few universities.

57 One is the Universidad Tecnológica de Chile, former Universidad Vicente Pérez Rosales. This university had a relevant program innovation activity for many years, when used to be a small and focused university. When transformed into the Universidad Tecnológica de Chile, maintained its program innovation rate, but in a context of a large non-selective new project of university.
The evidence for the Chilean case, suggests rejecting the assumption that young and small universities are sometimes more active innovating than big traditional and mature universities (Jenniskens, 2000). Instead, the implications of the Chilean case offer a mixed picture, where the few most relevant innovators happen to be the traditional elite universities, followed by a number of different types of universities.

Is it the ‘traditional’ component of the CRUCH elite universities that propels innovation? Probably not. These universities are on the top, leading a very stratified higher education system in many ways. Their contribution to DPI is significant. Even if criticized because of their lack of flexibility, they enjoy great legitimacy and have the necessary resources to promote innovation in the system. Their institutional prestige provides trust against the uncertainty of the new projects undertaken. Their competitive position is privileged for innovation compared to other universities.

However, even if innovations are mostly concentrated on few leading universities, the few non-elite public and private universities that also contribute in great numbers to innovation are fine examples of diversity on this matter. Innovation is not only plausible coming from top universities, but from other universities that respond with particular strategies from their own circumstances. The reasons that influence their innovation behavior are probably different in each case, as suggested before (i.e. regional pressures, public policies, and cluster development).

I also reviewed if DPIs could be found in both paradigmatic and non-paradigmatic fields of study (Biglan’s typology). The evidence for the Chilean case shows that DPI tends to occur in fields of study that meet at least one of the following two conditions. First, most of the study fields with the highest DPI are those with a considerable
enrolment in the system\textsuperscript{58}. Second, it is the case of study fields with an enormous relevance for the Chilean economy and its foremost economic activities\textsuperscript{59}, showing several transformations and vivid dynamism during recent decades (Álvarez and Fuentes, 2004). The field of technology includes most of the professional engineering programs, including those with the highest employment rates and best salaries in the country.

Administration and services is the biggest economic sector in the country in terms of the proportion of the labor force it represents. The field of natural resources is also a strategically critical area for the economy in many regions of the country, which income depends largely from forestry, agriculture, animal husbandry and fishing, among the most important. Therefore, it is relevant to consider the dynamism of the fields of study, their relevance and external demands. The relationship between higher education and socioeconomic and labor dynamic is indeed a complex issue (Teichler, 1998). The rate of innovations is higher in those fields of study that have both the largest amount of students and great economic dynamism.

The field of education is relatively different from the previous ones. It is the largest in terms of enrolment and with an enormous program proliferation during the last 20 years (Zapata et al, 2011), and it is a sector challenged by several reforms implemented by government since the recovery of democracy in 1990 (Bernasconi and Rojas, 2004). The high rate of DPI in the field of education is mostly from 1990 onward and mostly carried

\textsuperscript{58} Enrolment in the fields of technology and education are the highest in the system, with also the highest increases during the period of study.

\textsuperscript{59} The fields of study of Technology, Administration and Commerce and Natural Sciences are directly associated to the most important economic activities in the country.
out by state universities specialized in the field of education (particularly the UMCE, the biggest pedagogical state university). This is probably the case of a relevant state policy reform affecting the behavior of universities.

As anticipated in this study, there are differences in the distribution of DPI across fields of study and types of universities (Hypothesis 5, see 2.4 Synthesis, relationships and hypotheses). There is a higher rate of DPI from CRUCH universities in almost all fields, consistently with the higher concentration of DPI in CRUCH universities overall. However, the margins narrow and tend to disappear in the fields of arts and architecture, social sciences, administration and commerce, and law. All these last fields of study can be categorized as non-paradigmatic fields of study and usually considered as low investment or chalk and blackboard (tiza y pizarrón) programs (Fanelli and Trombetta, 1996). This finding suggests that new private universities, when innovating, mostly do so in non-paradigmatic fields of study, comparatively less expensive and managing lower risks if innovation fails.

Besides the DPI increase pattern observed in the last period of time (2002-2008), in almost all fields of study (except in humanities) there are no clear changes in the evolution of DPI and its distribution of fields of study and types of universities overall. This unanticipated persistence of the frequency of DPI per field of study and types of universities suggest that there might be relevant dynamics related to the fields of study institutional factors that need to be taken into account in future research.
6.1.2. Multivariate purposes, questions and hypotheses

This research purposed to find out which universities have innovated with new degree programs in the national context and explore why. The exploratory analysis was designed to inquire into the most significant factors that may be promoting and/or limiting DPI, uncovering trends and examining several hypothesis and assumptions suggested in the literature review. Two specific questions were put forward in this regard: i) what are the most important factors associated with DPI in Chilean universities, and, ii) are there any differences in the relationship between these factors and different universities? This research explored several internal and external factors presumably related to DPI and reported in the previous chapter.

One of the relevant factors considered in this research is the regulatory framework and institutional autonomy. A hypothesis was advanced: the number of DPI was associated with the regulatory status of universities (Hypothesis 6, see: 2.4 Synthesis, relationships and hypotheses). In other words, Chilean private universities with full autonomy may present a higher number of DPI compared to universities under supervision. However, the evidence about this matter is unclear, partly because of the limited number of DPI carried out by private universities.

On the one hand, there is an increase in DPIs in private universities since 2002 (see: Figure 10: Evolution of the DPI distribution sorted by Brunner’ university typology (1981-2008)), in line with the number of private universities passing from supervision to full autonomy. On the other hand, most of the private universities’ DPI marginal growth observed from 2002-8 is accounted for few very active universities creating new
programs just after obtaining their full autonomy. The rest of the universities (the great majority) remained reasonably stable during the entire period of study (see: Figure 14: DPI evolution from new private universities under supervision or autonomy (corrected)), not innovating at all and some innovating in a very moderate rate.

This evidence suggests that for a small group of private universities (mostly large and non-selective) autonomy might have propelled innovation. Indeed, a group of five universities, which never innovated under supervision, started to innovate just after they received autonomy. However, data also suggests that for most of the private universities that showed a moderate frequency of innovations during the entire study period (a group of 25 private universities); supervision did not represent a real barrier for DPI, and autonomy cannot be considered a strong factor propelling innovations after obtaining it. Indeed, this last group of universities shows a similar number of innovations under supervision and with full autonomy, even if it is a group showing a low-to-moderate rate of DPI during the period of study.

The evidence about this matter is only partial, but defies the common assumption that state supervision was most of the times biased against approving innovative programs from private universities. Indeed, there are universities that innovate on a regular basis despite regulations. The evidence from the Chilean case in this particular matter suggests that coercive isomorphism (Levy, 2004) may be working on the beliefs and the reluctance of some universities to undergo procedures perceived as too heavy or biased. At the same time, the few universities that innovated just after obtaining their full autonomy are examples of institutional behavior not anticipated by policy (Levy, 2006).
Findings in this research allow confirming several of the study’s hypotheses regarding the relationship between DPI and selected factors (2.4 Synthesis, relationships and hypotheses). The number of DPI is associated with state funding, showing that universities with higher state funding present a higher number of DPI (Hypothesis 7). The number of DPI is strongly associated with research, and universities with a greater research activity exhibit a higher frequency of DPI (Hypothesis 8). The number of DPI is moderate related with some faculty characteristics, were universities with a larger faculty and with a higher rate holding degrees trend to present a greater number of DPI (Hypothesis 9). The number of DPI is also related with institutional size and age, and bigger and older universities have a greater number of DPI compared to smaller and younger universities (Hypothesis 10). The number of DPI is associated with the scope of universities, where universities with several programs in most study fields may present a higher rate of DPI than specialized universities (Hypothesis 11).

As reported in the previous chapter, the evidence for the Chilean case show significant association statistics (with p values <0.05 and <0.01) for most of the factors examined in its relationship with DPI. However, the strength and direction of the relationships varies from factor to factor. I found strong and positive relationship between state funding (measured by AFD and AFI) and research activity (measured by research funding, number of projects, and indexed publications) and DPI. I also found a strong and positive relationship between institutional age (number of years), faculty (FTE), enrolment, and DPI. I found a moderate relationship between institutional scope (ordered
by the number of fields of study) and the student/faculty ratio\textsuperscript{60} and DPI. Finally, I found no statistical relationship between faculty holding graduate degree and the number of branches and DPI.

As described before, the shape of the distribution of DPI among universities is quite asymmetrical and it may be represented in an exponential growth shaped line, plotting several universities with little or no DPI, up to few universities with a high number of DPI. This shape represents the uneven distribution of DPI and high concentration among few universities. A similar type of distribution appears in several of the factors explored in this research. Indeed, Chilean universities are diverse and the distribution of funding, resources, students and faculty, among others factors, is quite asymmetrical as well.

Few universities stand out because of their state funding, research, faculty qualifications, and many other factors. These are elite traditional universities, the oldest universities in the country, offering programs in many fields of study, but in a limited number of branches. They used to be large size universities for the Chilean context, although they are not the largest of the country any more.

At the opposite side, there are many other universities, mostly private and non-elite. The amount of state funding they receive is very low, if any. They have almost no research and no internationally indexed publications to their credit. These universities are commonly young universities, devoted to teaching, with varied size and number of

\textsuperscript{60} The direction of the relationship between the student/faculty ratio and DPI is negative; this is, the higher the number of students per faculty, the smaller the number of DPI.
branches. Some are comprehensive universities with a wide range of fields of study, and other are specialized in certain areas.

The middle is much more mixed than the extremes, comprising several very different types of universities, CRUCH and non-CRUCH, metropolitan and regional. Even if most of the time in a moderate to low level, these sorts of universities receive some state funding. Most have little research, some not at all. The faculty statistics and its size and number of branches vary greatly.

Ultimately, this is the case of a differentiated university sector, with asymmetrical distributions in most of the variables examined in this research. This is a usual characteristic in many higher education systems in the region and worldwide, and a consequence of transformations encouraging institutional differentiation.

The asymmetrical distribution of DPI and the strong and positive association between DPI and certain institutional factors suggest that the conditions and possibilities for program innovation occur in very different ways among universities (as well as funding and research, i.e.). What has been usually theoretically separated and distinguished as different issues (program innovation and institutional differentiation), this study has found to have many relationships. Innovation occurs mainly in universities that differentiate from the rest on certain institutional characteristics. On the one hand, there is great dynamism in terms of program innovations in the university sector overall (the magnitude of DPI), on the other, dynamism is disproportionately focused, by and large, on a number of universities that usually occupy the highest places in most of the factors explored in this research. The implications of these findings reflect the relevance of the internal perspective on program innovation (Clark, 1983), that is, the importance of
the academic work and disciplinary specialization, firmly attached to research activity and the faculty profile of universities.

6.2. Final remarks – scope and limitations

In the field of higher education, there is great attention to the issue of differentiation and diversity. At a program level, most research has debated what leads to innovation and differentiation, considering that this matter contributes to the enrichment of higher education opportunities and diversity overall. At the same time, there is great concern about what circumstances halt differentiation and diversity.

This research advances new insights in at least three central points.

First, it applies the concept of innovation in the realm of the debate on differentiation and diversity. For a number of theoretical and operational reasons discussed in Chapter 2, this concept offers an alternative approach overcoming some complex problems present in previous empirical research on DPI. The use of this concept aids in focusing on the innovation itself, the product, or the outcome instead of the process that may or may not end with an innovation. However, the challenge is to clarify and delimit what counts as innovation. In this research we have argued that innovation is, by definition something new, therefore the way to approach the study of innovations is by comparison (when something new emerges, compared to all what exists in a certain moment).

Second, whereas most previous literature has confronted this issue from an aggregate point of view, discussing several factors and dynamics promoting and/or
limiting processes of program innovations and differentiation at the higher education systems overall, this research examines country case evidence about the asymmetrical distribution of DPI within a system. Few universities are the ones that are most involved in program innovations, and most other universities show a minimal contribution to DPI, if at all. We have learned that the evolution of DPI has its own patterns, not necessarily similar to others such as enrolment or program proliferation. We have also learned that the distribution among universities is deeply irregular and that a key issue for a better understanding of this matter is to turn the attention to the institutions and their differences. This research discovers much about the differences between the universities that innovate and those that do not. More research in different settings is needed, but paying more attention to the universities in a disaggregated manner would allow better understanding of this issue.

Third, because we have examined disaggregated data, the way relationships are assessed differ from previous research, offering a more in depth appraisal, and recognizing the differences within higher education systems and sectors. Previous arguments such as having the competition for resources encouraging greater program differentiation and higher education institutions looking for new markets niches are dismissed when looking closer to the few institutions that actually contribute to differentiation. Program innovations may well be relevant figure within a period, but this research suggests that it is marginal when looking among all institutions. While some innovate because of their unique combination of internal and/or external factors, most adopt a risk adverse behavior, contributing to isomorphic program proliferation.
Innovation means pushing on the margins and creating something new, an organizational behavior that needs special conditions.

Where less governmental control and greater autonomy was said to lead to more innovation and differentiation, this research suggests that regulations may apply in different ways to different institutions. Again, disaggregating data offer a new perspective, more accurate than previous research provided. Indeed, the implication of regulations on DPI seems to depend on how regulations operate and affect universities. This research found that regulations affected universities in different ways. Where some universities are willing to innovate under the regulator rules, other considered regulations as barriers to innovation, and thus avoiding going through the procedures.

In sum, the relationships between program innovation and the several factors examined in this research actually tend to vary from one type of university to other. The factors that have been identified as influencing program innovations work differently across different universities.

Methodologically, the design and procedures have proven suitable to this matter when historical registries are available. In the case of the available information in Chile, even if several problems existed, it was possible to design certain procedures and protocols to manage difficulties. Further research should examine the applicability of the methodological definitions and procedures in other regions, with the needed adjustments according contrasting findings internationally.

The several factors that literature suggested leading to program innovation and differentiation have different magnitudes and varied expressions among different universities. Studies in other country settings should examine the new suggestions about
DPI evolution and characteristics disaggregating data and pay more attention to institutional differences and inter-institutional dynamics.

This study has helped describe DPIs when they emerge, and explores relationships to understand its evolution and characteristics within a higher education system. However, there is a wide new research agenda which entails tracking innovations after they emerge, looking to see if they survive or fail, and if they are imitated by others and to what extend and with what results. Perhaps new relationships can be discovered in the realm of differentiation and diversity dynamics.
REFERENCES


Bernasconi, Andrés. 1996. La universidad de mercado. Estudios Sociales, No. 87. Corporación de Promoción Universitaria, Santiago de Chile.

Bernasconi, Andrés and Gamboa, Marta. 2002. Evolución de la legislación de educación superior en Chile. IESALC, UNESCO, Caracas.


Brunner, José Joaquín, and Elacqua, Gregory. 2003. Capital humano en Chile. Universidad Adolfo Ibáñez y La Araucana, Santiago de Chile.


Campbell, Juan Carlos. 1995. La educación superior en Chile; experiencias de la década de los 80 y sus proyecciones. In: Esquivel, Juan (Coord.) La universidad hoy y mañana: perspectivas latinoamericanas. Centro de Estudios sobre la Universidad, Universidad Nacional Autónoma de México, and Asociación Nacional de Universidades e Instituciones de Educación Superior. DF, México.


‘Guía de admisión’ (The national yearly application guidelines for the universities members of the CRUCH). Consejo de Rectores de las Universidades Chilenas y DEMRE. Santiago de Chile.

CRUCH. 1982 to the present, 2002 to present in electronic databases. Anuario estadístico (Statistic yearly series from the CRUCH). Consejo de Rectores de las Universidades Chilenas. Santiago de Chile.


Huisman, Jeroen and Beerkens, Erik. 2000. Early and late adoption of knowledge products: strategic or institutional behavior?’ In : Kalleberg, R. F. et al (eds.)


(accessed in December, 2011).


OECD, World Bank.


APPENDICES
APPENDIX 1: Universities members of the Rector’s Council – CRUCH

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<th>Year</th>
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<td>Universidad de Talca</td>
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<td>Universidad Metropolitana de Ciencias de la Educación UMCE</td>
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<td>24</td>
<td>Universidad Técnica Federico Santa María</td>
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## APPENDIX 2: New private universities

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<td>6  Universidad Bernardo O Higgins</td>
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<td>7  Universidad Bolivariana</td>
<td>1988</td>
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<tr>
<td>8  Universidad Católica Cardenal Raúl Silva Henríquez</td>
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<td>9  Universidad Central de Chile</td>
<td>1982</td>
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<td>10 Universidad Chileno Británica de Cultura</td>
<td>2006</td>
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<td>11 Universidad de Aconcagua</td>
<td>1990</td>
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<tr>
<td>12 Universidad de Artes, Ciencias y Comunicación, UNIACC</td>
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<td>13 Universidad de Arte y Ciencias Sociales, ARCIS</td>
<td>1989</td>
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<td>16 Universidad de Las Américas</td>
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<td>Universidad Santo Tomás</td>
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<td>34</td>
<td>Universidad Tecnológica de Chile – INACAP (ex U. Vicente Pérez Rosales)</td>
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APPENDIX 3: Private universities (closed until 2008)

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<th>Name</th>
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<td>4 Universidad de Rancagua</td>
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<td>5 Universidad de Temuco</td>
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<td>13 Universidad Regional El Libertador</td>
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<td>14 Universidad San Andrés</td>
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