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Regional Distribution of the Productive Development Policies and Regional Gaps in Productivity and Employment in Chile and Colombia

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Regional Distribution of the Productive Development and Regional Gaps Policies in Productivity and Employment in Chile and Colombia.[1]

SUMMARY

This work studies the main Productive Development Policies (PDPs) implemented in Chile and Colombia by their respective central governments during the first decade of the 21st century; it also studies the distribution of PDP resources among regions and their impact on the growth in labor productivity (LP), the growth in employment rate (ER) and the interregional gaps of these variables. The main results show that: (1) there is a high regional dispersion in the allocation of PDP resources, however, it has tended to decline in Colombia, but not in Chile; (2) with few exceptions, the allocation of PDP resources does not exhibit a significant correlation with the growth of LP and ER; (3) the impact of PDP on regional gaps in LP and ER is almost null, either because these policies are not designed with redistributive criteria or due to the low correlation between PDPs and the growth in LP and ER.

Keyword: Productive development policies, distributive policy, labor productivity, employment rate, regional gaps, Chile, Colombia.

Classification JEL: O25, O40, R11, R12

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1. INTRODUCTION

Following different experiences, between the mid-eighties and the beginning of the nineties, the governments of Chile and Colombia implemented a series of Productive Development Policies (PDPs) in order to respond to the changes in their economic systems. These systems went from an import substitution policy to a policy whose aim was and still is to promote productivity and competitiveness in order to meet the challenges of a greater economic openness to international markets. In this study, we understand PDPs as those policies whose objective has been to directly or indirectly affect the productivity, competitiveness and/or job creation.

In this paper we will analyze the main PDPs implemented in Chile and Colombia by their respective central governments over the past decades, the regional distribution of their resources and its impact on the growth of labor productivity (LP), the growth of employment rate (ER) and the interregional gaps in these indicators. We will concentrate our efforts exclusively on the major PDPs implemented by the central governments, which constitute the main policies implemented in both countries[2]. The way in which PDPs have affected regional gaps in LP and ER is of great public interest because of the large regional inequalities in terms of income, productivity and employment, not only in Chile and Colombia, but in the rest of the countries in the region as well. These inequalities have been widely reported in the literature (in the case of Chile see Arellano, 2004; Atienza and Aroca, 2012; Brida, London and Rojas, 2012; Larrañaga and Herrera, 2008; and Ramirez et al., 2009; among others. In the case of Colombia see Galvis and Meisel, 2010; and Cortes and Vargas, 2012; among others).

From a welfare point of view, there are at least two reasons why the regional distribution of PDPs is important. The first has to do with the reduction of inequalities among regions; if there are identical individuals that have different income just because of the region they live in, then to assign PDPs in order to reduce these gaps may lead to an increase in welfare. The second relates to the negative exogenous shocks the regions must face; regions facing such shocks require specific development policies to reduce the negative impact on their level of productivity and growth. Thus, PDPs act as insurance in the regions. Furthermore, there are theories that relate the distribution of PDPs with issues of economic efficiency (Romer, 1986, 1989; Krugman, 1991a, 1991b, 1992; Krugman and Venables, 1990, 1996). Under certain circumstances, particularly in the presence of increasing returns to scale, the market may lead to a regional overconcentration of the factors affecting the efficiency of their assignment. In this context, the distribution of PDPs among regions can lead to a better allocation of factors and to an increase in economic efficiency.

[2] In Colombia, unlike Chile, the regions have powers to develop PDPs. However, limited resources and little political interest of local governments have left that task exclusively in the hands of central government.

How can a better distribution of PDPs affect the growth of LP and ER in the regions? And if such an impact exists, how can it affect the regional gaps in these variables? Endogenous growth models suggest that PDPs affect factor productivity and growth (Aschauer, 1989; Barro 1990, Romer 1994, among others). In addition to the accumulation of physical capital and human capital, these models predict that the investment policies in public goods (such as infrastructure) and in innovation have positive effects on long term growth rates. Consequently, if these policies affect the factor productivity and, therefore, the growth rates of the regions, the way in which the resources of these policies are allocated among different regions can end up enlarging or reducing the interregional gaps in productivity and employment.

Our analysis period covers the first decade of the 21st century. For reasons of data availability, in Chile the 2002-2010 period is analyzed and in Colombia we analyze the 2001-2011 period. Regional aggregate data including all economic sectors and regional disaggregated data for 7 of the 9 sectors of the economy are used. In particular, we consider the following sectors: Manufacturing Industry, Construction, Trade, Restaurants and Hotels, Transport, Communications, Finance and Services.[3]

We found that there is a large regional dispersion in the allocation of PDPs in both countries. However, and with a few exceptions, we found that in Colombia said dispersion has tended to decline over time, while in Chile a significant decrease has not been observed. Moreover, we find that the growth of the PDP resources has not been higher in regions with worse economic conditions. One would expect that, had there been any redistributive component in the allocation of PDPs, the regions with the lowest initial LP and/or ER would had been favored the most by these policies; however, this is not what is observed. This result is not surprising given that the central governments of each country have not had, as an implicit objective, the redistribution in the allocation of these policies' resources, let alone based on these indicators.

As for the effects of PDPs on the economic outcomes of interest, we find that these policies do not have a major correlation with the LP growth rate nor with the ER growth rate. Some exceptions are found in Colombia in the case of investment in job training (which is positively correlated with the LP growth rate) and some PDPs in specific sectors. The low correlation between PDPs and LP and ER growth could suggest that, given the importance of resources invested in these policies, there are problems in their design and implementation. This hypothesis should be studied in more detail. Finally, we infer that PDPs have had little impact on interdepartmental gaps in LP and ER, either because their resources have not been allocated with redistributive criteria or because there is a low correlation between their allocation and the growth of these variables.

[3] For reasons we will explain, the sectors of mining,; agriculture; and electricity, gas and water are excluded, disaggregating them from the analysis.

This paper is related to at least three strands of literature. The first is made up by those studies that have analyzed the impact of PDPs on productivity growth and regional gaps. Many of these studies have focused on analyzing the impact of the Structural Funds of the European Union on growth and productivity (Cappelen et al., 2003; Beugelsdijk and Eijffinger, 2005; Ederveen et al., 2006; Dall'erba, 2005a; Ederveen et al. 2006;. Dall'erba and Le Gallo, 2008; Bussoletti and Esposti, 2008). These funds were created to allow the less developed regions of the European Union to increase their productivity levels through investment in infrastructure and education, and thus be able to tap the potential of a common market. It's important to point out that, in these studies, there is no consensus on the impact these funds have had on productivity growth and territorial cohesion. Other studies have examined the impact of other PDPs using different countries as a case study (Demurger, 2001; Demurger, et al., 2002; Garcia-Milà and McGuire, 2001; Dall'erba, 2005b; among others). It is important to mention that, unlike the Structural Funds in Europe, PDPs in Chile and Colombia have not been designed in order to intensively allocate resources in regions with lower levels of productivity (and, for our case, with lower ER levels).

The second group of studies is made up by those who have analyzed the existence of conditional convergence among regions in the neoclassical sense (a collection of illustrative articles both theoretical and empirical in regards to this can be found in George et al., 2004). Unlike these studies, we are interested to see the effect of PDPs on productivity and employment growth, rather than studying exclusively the existence of conditional convergence. Nevertheless, our work takes a step forward in regards to other jobs in the region by analyzing this type of convergence not only at the aggregate level, but also at the sectoral level; this type of analysis is interesting from a both theoretical and empirical standpoint (see Bernard and Jones, 1996).

The document is divided into 7 sections, with the introduction being the first section. In section 2, the most important PDPs implemented in Chile and Colombia during the last decades are described. In section 3, the data used in the study is described. In section 4, the regional distribution of PDPs is analyzed and, in section 5, an analysis of regional gaps in LP and ER is made. In section 6, the theoretical and methodological framework to analyze the relationship between the allocation of PDPs and the regional gaps in LP and ER is presented. In section 7, we present our results. In the last section, the main conclusions are presented.

2. MAIN PDP INSTRUMENTS DURING THE LAST DECADES

We use three criteria to identify the main PDPs that Chilean and Colombian central governments have maintained, delved into or implemented from the nineties to the date; these are continuity in time, the relative importance of the PDPs in terms of resources invested, and social recognition. For Chile, we have identified four relevant PDPs: the funds for productive development, the laws that have facilitated foreign direct investment, public investment in infrastructure and job training. For Colombia, we have identified six PDPs of relevance: job training, access to financing, investment incentives, public investment in infrastructure, the creation of public-private partnerships and the investment in science and technology. What follows is a brief description of each of these policies.[4]

2.1. PDPs in Chile

2.1.1. Productive Development

The government agency responsible for planning and promoting the different productive activities of the Chilean economy is the Production Development Corporation (Corfo, full name in Spanish: Corporación de Fomento de la Producción de Chile), which was created in 1939 and has had several structural changes related to the country's political situations. With the return to democracy in the early nineties, both Corfo's profile and scope were redefined in order to strengthen it as an agency which aimed to facilitate entrepreneurship, innovation and competitiveness of micro, small and medium enterprises.

The promotion policy was aimed at its inception to improve the management and coordination of networks through the creation, in 1992, of several instruments: the Technical Assistance Fund (FAT, full name in Spanish: Fondo de Asistencia Técnica), to support the improvement of management, and the Associative Development Projects (PROFO, full name in Spanish: Proyectos Asociativos de Fomento) to promote partnership between SMEs. In late 1997, the importance of improving the link between small and large businesses is identified, which led to create the Suppliers Development Program (PDP, full name in Spanish: Programa de Desarrollo de Proveedores) that supports the integration of smaller suppliers in the production chains of large corporate customers. In early 2000, the importance of generating more dynamic spaces for a better development of the regions and for the productive sectors in the regions is considered, which led to the creation of the Integrated Territorial Development Program (PTI, full name in Spanish: Programa de Desarrollo Territorial Integrado). Later, in 2004, one of the most important lines of work in the improvement of management is formalized, support in terms of

[4] A more comprehensive and detailed description of the policies can be found in Alvarez, 2002; Muñoz, 2009; Olivera and Maturana, 2005; Ramirez, et. al., 2011; Rivas, 2012, for Chile; and Garay, 1998; Martinez and Ocampo, 2011; Melendez and Perry, 2010; Nupia, 2014, for Colombia.

quality, with the program for the Promotion of Quality (FOCAL, full name in Spanish: Fomento a la Calidad). Finally, in 2007, the focus of locations is incorporated through the Local Entrepreneurship Program (PEL, full name in Spanish: Programas de Emprendimiento Local) which seeks to promote entrepreneurship in localities with low presence of SMEs.

2.1.2. Public Investment in Infrastructure

Since the nineties, the strategy of economic impulse aimed at developing exports allocated significant resources to the development of public investments that generate public goods conducive to support this process. While the decision to invest in public infrastructure (roads, airports, ports, bridges, railways, telecommunications, etc.) is neutral, they have an administrative allocation which tends to benefit the most populated and high-income regions.

2.1.3. Foreign Investment

Foreign investment was encouraged with the Decree-Law 600 (DL 600), enacted in 1974, which creates a mechanism that promotes the transfer of capital to Chile. Under this voluntary regime, foreign investors bringing capital, tangible assets or other forms of investment, request to sign a foreign investment contract with the State of Chile, in which a fixed tax rate of 42% for a minimum period of 10 and up to 20 years is established. The decree was modified in 2005 and, later, was repealed by the tax reform in 2014, from which a new institutional framework is created[5]. In addition to the DL 600, new incentives came along, such as the so-called Chapter XIX which ended up becoming an effective formula for the appropriation of assets (French-Davis, 1990).

The policy of foreign direct investment in Chile is characterized by being neutral and mainly oriented towards natural resources, so those regions with the greatest natural resources are the ones that benefit the most from this type of investment (see Graph 1).

2.1.4. Job Training and Employment

In order to create better job opportunities and conditions for the workers, the National Training and Employment Service (Sence, full name in Spanish: Servicio Nacional de Capacitación y Empleo) was established in 1976. Its objective is to help increase the competitiveness of the companies through tax incentives to train their personnel. The Sence regulations put an emphasis on tax exemption as a way to generate demand incentives through state subsidies and state subsidiary actions from government-funded training programs, implemented by public resources and executed by public or private organizations (Olivera and Maturana, 2005).

[5] See information at http://reformatributaria.gob.cl/

2.2. PDPs in Colombia

2.2.1. Job Training and Employment

The National Training Service (Sena, full name in Spanish: Servicio Nacional de Aprendizaje) has been mainly in charge of the implementation of the policy for technical and technological training of the Colombian workforce. The Sena was created in 1957 and its main objective is to provide training in order to increase national productivity and promote the country's economic and social expansion and development. The Sena has been financed most of the time with resources coming from a parafiscal tax on employers. However, as a result of the tax reform of 2013, this parafiscal tax was eliminated and its financing was left in the hands of the General Budget of the Nation. Sena's investment in training between 2000 and 2012 maintained a positive trend going from 0.2% to 0.3% of the GDP. Sena's resources are distributed among 117 training centers that currently exist and are located in the 32 departments of the country and its capital. During the period we will analyze, there was no clear rule on how Sena's budget was distributed among regions and training centers. There is an impression that, historically, there has been a strong political influence in the distribution of these resources and, in recent years, an effort has been made to clarify this situation.

2.2.2. Access to financing

In Colombia, there has been a long-standing tradition of intervening in the credit market to help with the financing of companies in different economic sectors. The main instrument that has been used to facilitate the access to credit for companies since the nineties is the Second-Tier Bank. The Second-Tier Bank has acted as a business development bank that provides liquidity to commercial banks at a lower rate than the market rate (discount rate) to facilitate access to credit for entrepreneurs. The allocation of such loans is done mainly on demand, that is to say, the interested companies request such loans to commercial banks. This second-tier bank task is in the hands of Bancóldex, which was created in 1992. Between 1995 and 2012, the total disbursements of Bancóldex as a percentage of the GDP have shown a negative trend, going from just over 1% in 1998 to nearly 0.3% in 2012.

2.2.3. Investment incentives

There are few permanent mechanisms to encourage investment that have existed in Colombia during our study period. An interesting case is that of the Free Trade Zones (FTZs). The first FTZs in Colombia were established in 1958 and their original purpose was to encourage exports through a series of tax breaks to companies that would be located in those areas. In 2005, a new FTZ law was introduced (Law 1004 of 2005), which significantly stimulated their creation. By this law, the FTZs were declared geographic

areas where industrial activities of goods and services or commercial activities are developed under special regulations in matters of tax, customs and foreign trade. Therefore, the type of economic activity that could develop within a FTZ was expanded, and fiscal incentives were created that did not depend exclusively on the exports made by the companies. The objective of the law was to make FTZs an instrument for creating jobs, attracting new capital investment and the creation of Clusters. After the implementation of this law, 3 already existing FTZs were expanded and about 90 new FTZs were created (18 times more than those created between 1990-2005). Creating a FTZ in the country is in the hands of private initiative. Anyone wishing to promote a FTZ must meet the requirements of the law and request its creation to the Central Government.

2.2.4. Public investment in infrastructure

Colombia is a country with a strong lag in infrastructure for its productive development (See Cardenas et al. 2005). The policy of investment in infrastructure has been present in all National Development Plans (PND, full name in Spanish: Planes Nacionales de Desarrollo) and documents of the National Council for Economic and Social Policy (CONPES, full name in Spanish: Consejo Nacional de Política Económica y Social) on policies of productivity and competitiveness over the past two decades[6]. Public investment in road infrastructure as a percentage of the GDP, between 1994 and 2012, has been around 0.6%, and, in recent years, has reached 1.1%. However, unlike Chile, Colombia has struggled to carry out their infrastructure projects and is still waiting for the development of their most important projects.

2.2.5. Strategic public-private partnerships

An important part of the efforts of the PDPs during the first decade of the century has focused on developing and strengthening strategic partnerships between the public and private sector. These programs have had different stages in which the goals and institutional framework have been refined. Due to the availability of data here, we will concentrate on the agreements of the Internal Agenda (IA); these agreements began to appear in 2004 through a process of dialogue in three dimensions: regional, sectoral and crosswise. Its objective was to define plans, programs and projects in short and medium term to capitalize on opportunities and mitigate risks associated with economic integration, particularly those associated with the free trade agreement with the United States. In the IA, 4,753 productive bets were identified, of which some were selected and implemented during the 2006-2010 period. Most of these bets involved second-tier banks (Bancóldex) and some of the agencies mentioned above such as Sena.

2.2.6. Science, technology and innovation

[6] The PND is the development plan of the central government, which is defined by each President at the beginning of his/her mandate.

Colombia has also had a long institutional history in science and technology policies. In spite of this, the resources invested by the central government in this activity have never exceeded 0.3% of the GDP. In 1968, Colciencias was created, the main public agency responsible for promoting and implementing the country's policy on Science, Technology and Innovation (STI). Since 1990, with the creation of the National System of Science, Technology and Innovation, coordinated by Colciencias, there have been several reforms that have aimed to turn research into a key element for the country's productive development.

STI policy has had different investment strategies, among which the disbursement of seed funding for the creation of Technological Development Centers, the promotion of Regional Centers of Productivity as entities that coordinate national policy with the regions, direct resource allocation in research projects developed by both public and private entities, and the possibility of access to credit to develop research projects through the second-tier banks are the ones that stand out the most. Most resources are allocated by calls and contests. However, the decisions about the types of calls, particularly on the research topics which are financed, respond to a mix of strategic and political interests.

3. DATA

A database on an annual update basis was built, for the 2002-2010 period in the case of Chile, and 2001-2011 in the case of Colombia. The difference in years between both countries is given by the availability of data. In Chile, we have information for the 15 geopolitical regions of the country, and for Colombia we have information for 24 of the 32 geopolitical regions[7]. Regional aggregate data including all economic sectors and regional disaggregated data for 7 of the 9 sectors of the economy are used, which include: Manufacturing, Construction, Trade, Restaurants and Hotels, Transport and Communications, Finance and Services. Disaggregated analysis is excluded from the mining, agriculture and electricity, gas and water sectors. The mining industry is excluded because there are not many regions that have mining resources for the development of such an activity; the agriculture sector is excluded because of the wide variety of policies and instruments which the sector has had in both countrieswhich deserves a special study for this sector; and the electricity, gas and water sector is excluded for lack of information on some indicators.

All data in monetary units are used in the respective local currencies and without adjustment due to the purchasing power parity. For this reason, absolute comparisons between economies are not possible, although one can compare the dispersion of PDPs

[7] The 8 excluded regions have no available data.

between countries. The monetary data for Chile is in 2008 prices, and for Colombia in 2005 prices.

We have three groups of variables: the first group consists of our variables of interest, that is, LP and ER. The LP by region is calculated as the ratio between the Gross Domestic Product (GDP, for Chile) or Aggregate Value (AV, for Colombia) and the number of employees. The ER by region is calculated as the ratio between the number of employees and the Working Age Population (WAP). The sectoral LP in each region is calculated in the same way but using sectoral data, while for the calculation of the sectoral ER in each region we use the regional WAP as a denominator. For Chile, the LP data was obtained from the Central Bank and the ER from the National Institute of Statistics. For Colombia, the AV data comes from DANE's Departmental Accounts, the data on the numbers of employees are built using the National Survey of Households departmental and the Great Integrated Households Survey departmental of the DANE. The WAP is taken directly from the population projections made by the DANE.

The second group of variables corresponds to indicators on the magnitude of the PDPs. The data for Chile was obtained from different sources. The stock of total infrastructure was obtained from Cerda (2012). This stock includes railways, roads, ports, irrigation, drinking water and sanitation, airports, subway and road concessions (see annex). The data on investment in productive development was obtained from Corfo. The foreign direct investment data taken from Foreign Investment Committee of Chile and the investment in training data taken from Sence are also partially analyzed. Due to unavailability of comparable and continuous data during the 2002-2010 period, the data for these two PDPs are not included in the econometric estimates. Due to availability of information, the PDP indicators in Chile are not disaggregated by economic sectors and correspond to the aggregate economy.

The data for Colombia also comes from different sources. SENA's investment in job training was built using investment data of the Regionalized General Budget of the Nation reported by the National Planning Department (DNP, full name in Spanish: Departamento Nacional de Planeación). Using actual data for each sector/department for the years 2001, 2003 and 2006, information for each sector/department for the remaining years was imputed (see details in the Statistical annex). The value of Bancoldex's disbursements (credits) disaggregated by department/sector comes directly from Bancóldex. The number of FTZs by department/sector was built from historical data of the Intersectoral Free Trade Zone Commission of the Ministry of Commerce, Industry and Tourism. The infrastructure stock valuation per square kilometer in each department only includes the valuation of roads. This stock was built using information from the road stock valuation calculated by the Ministry of Transport and INVIAS (1997), and the investment in roads reported in the Regionalized General Budget of the Nation (see details in Statistical annex). The number of productive bets agreed upon in the Internal Agenda (IA) by region

and sector for the years 2004-2006 was calculated based on information gathered by the DNP. The number of projects was assigned to each observation unit during each year starting from 2006, which was the year when the agreements were entered upon. Before 2006, all the observation units were attributed zero projects. Public investment in STI by region was obtained from data collected by the Observatory of Science and Technology of Colombia. The data on investment in STI, and the data on infrastructure stock, are not disaggregated by sector.

The last group corresponds to control variables we use in our econometric estimates. In Chile, the regional population growth was obtained from the National Statistics Institute (INE, full name in Spanish: Instituto Nacional de Estadísticas). The average years of education of persons aged 18 and over, by region, was obtained from the National Socioeconomic Survey (Casen, full name in Spanish: Caracterización Socioeconómica Nacional).[8] In Colombia, we have the savings rate for each department, which was built using information reported by the Superintendence of Finance. The savings rate was built by dividing the savings of the department by their respective total population. The average years of education of people aged 18 or over, was calculated using information from the National Survey of Households departmental and the Great Integrated Households Survey departmental of the DANE. The growth rate of the population is obtained directly from DANE. Table 1 presents the descriptive statistics of our variables. All variables in our data set are smoothed using centered and weighted moving averages in three sample windows.[9]

[8] Data for the years in which the survey was not done were estimated through interpolation and extrapolation of available data.

[9] The weighted moving average for each variable is computed as $x_{it} = \frac{1}{4}x_{it-1} + \frac{1}{2}x_{it} + \frac{1}{4}x_{it+1}$.

Table 1
Descriptive Statistics

		Aggregate		Manufacture		Construction		Trade, Restaurants and Hotels		Transport and Communications		Financial		Personal Services	
Variable	Obs	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
						CHILE									
Labor productivity (millions of pesos)	117	13,85	10,56	12,51	7,76	13,07	7,21	5,36	2,00	10,38	4,22	13,12	8,32	5,31	1,91
Employment rate	117	50,49	4,07	5,15	1,29	4,63	0,94	9,94	1,77	3,98	0,99	2,42	1,12	13,71	2,72
Productive development investment per capita (millions of pesos)	117	2780,81	1263,39	.	.	.	.	.	.	.	.	.	.	.	.
Infrastructure stock (millions of pesos per KM2).	117	70,79	120,00	.	.	.	.	.	.	.	.	.	.	.	.
Average years of education for people 18+	117	9,88	0,75	.	.	.	.	.	.	.	.	.	.	.	.
Population growth	117	0,01	0,02	.	.	.	.	.	.	.	.	.	.	.	.
Annual LP growth rate	117	0,01	0,05	2,83	8,19	7,03	19,83	1,32	5,79	-0,99	10,51	4,02	8,41	9,72	15,21
Annual ER growth rate	117	0,01	0,02	-0,86	7,92	2,62	4,98	3,81	4,97	1,61	4,72	-2,72	13,66	1,96	3,51
						COLOMBIA									
Labor productivity (millions of pesos)	216	15,51	5,44	17,50	12,51	21,59	10,16	7,75	2,60	16,93	5,82	48,40	16,73	14,92	3,28
Employment rate	216	0,52	0,04	0,06	0,02	0,02	0,01	0,13	0,02	0,04	0,01	0,02	0,02	0,10	0,01
SENA investment per capita (thousands of pesos).	216	13,07	5,79	2,26	2,19	1,20	1,25	1,02	0,53	0,65	0,33	1,08	0,71	1,69	1,05
Bancoldex disbursements per capita (thousands of pesos)	216	28,45	31,86	9,95	15,71	1,13	1,58	6,42	5,89	3,95	5,34	1,39	2,69	2,26	3,18
Number of Free Trade Zones	216	1,00	1,79	0,82	1,52	0,01	0,12	0	0	0,03	0,18	0	0	0,13	0,45
Infrastructure stock (millions of pesos per KM2).	216	38.971	36.703	.	.	.	.	.	.	.	.	.	.	.	.
Number of IA Agreements.	216	72,62	95,04	46,32	64,78	0,69	3,41	12,57	16,44	3,26	10,32	0	0	4,35	10,02
STI investment per capita (thousands of pesos).	216	8,49	13,41	.	.	.	.	.	.	.	.	.	.	.	.
Average years of education for people 18+	216	7,17	0,95	.	.	.	.	.	.	.	.	.	.	.	.
Savings per capita (thousands of pesos).	216	944	1.397	.	.	.	.	.	.	.	.	.	.	.	.
Population growth	192	0,01	0,01	.	.	.	.	.	.	.	.	.	.	.	.
Annual LP growth rate	192	0,03	0,05	0,02	0,10	0,02	0,13	0,01	0,05	0,01	0,07	-0,02	0,08	0,04	0,05
Annual ER growth rate	192	0,00	0,03	-0,004	0,09	0,03	0,07	0,01	0,04	0,04	0,05	0,05	0,06	-0,02	0,04

*All variables are smoothed using centered and weighted moving averages in three sample windows.

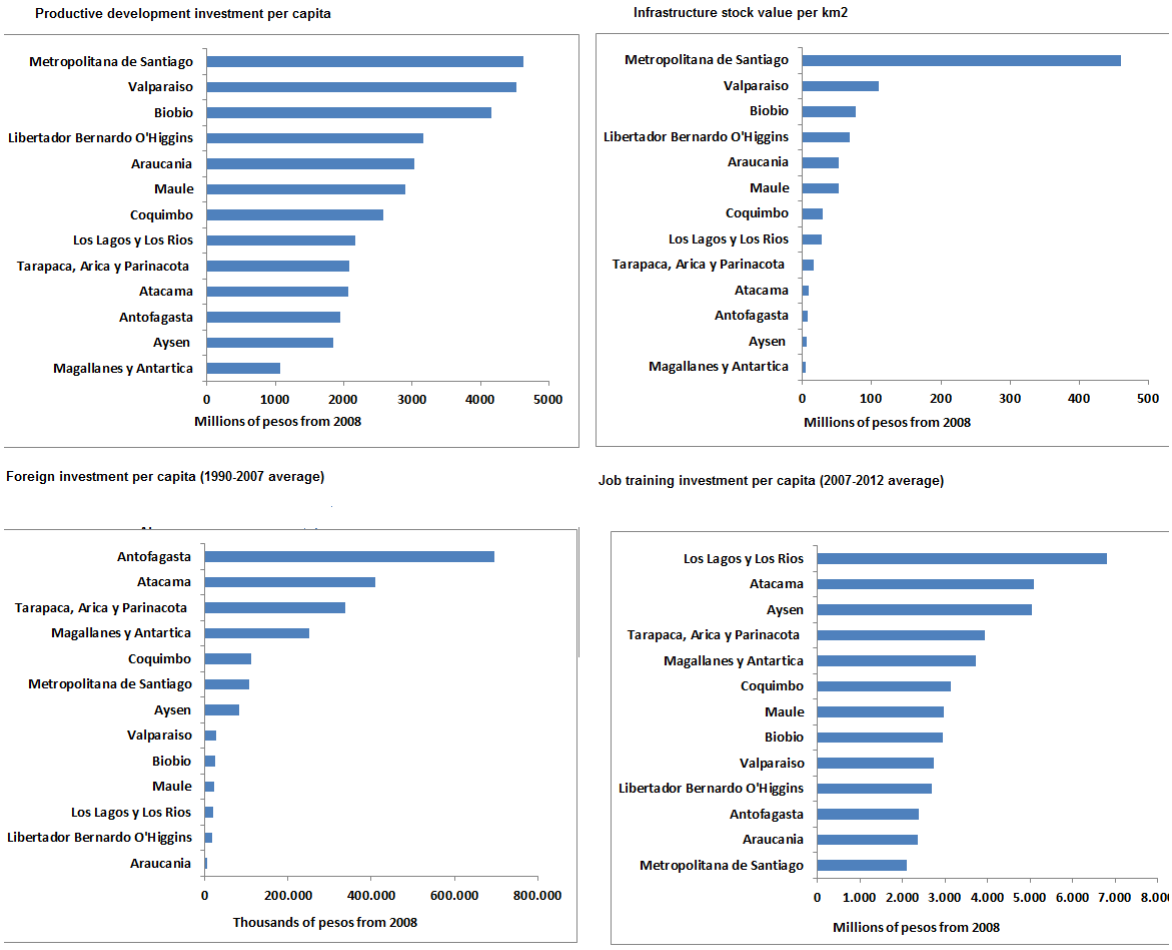
4. REGIONAL PDP DISTRIBUTION

In this section, we will analyze three aspects of the regional PDP distribution in Chile and Colombia. First, we analyze how their resources have been distributed among the different regions, then we study the behavior of such a distribution through our analysis period. The first analysis will help us detect the existence of gaps in the distribution of PDP resources, the second will help us identify whether such gaps have tended to decrease or increase over time. Finally, we analyze whether there have been criteria of regional PDP distribution based on the levels of the regions' LP and ER. If the PDPs have been redistributive, one would expect further growth in the resources allocated to regions with low levels of LP and ER. Remember that one of our goals is to see if PDPs and their distribution have helped reduce regional gaps in LP and ER, which largely depends on how the resources of these policies are allocated.

4.1. Regional PDP distribution

Graph 1 shows each PDP indicator's annual average for each region in Chile. The infrastructure stock value per squared kilometer and investment in productive development data correspond to the annual average for the period2001-2010. Foreign investment per capita corresponds to the average for the period 1990-2007 and investment in training per capita data corresponds to the average for the period 2007-2012.

Graph 1
Chile: Regional PDP Distribution
(2002-2010 Average)



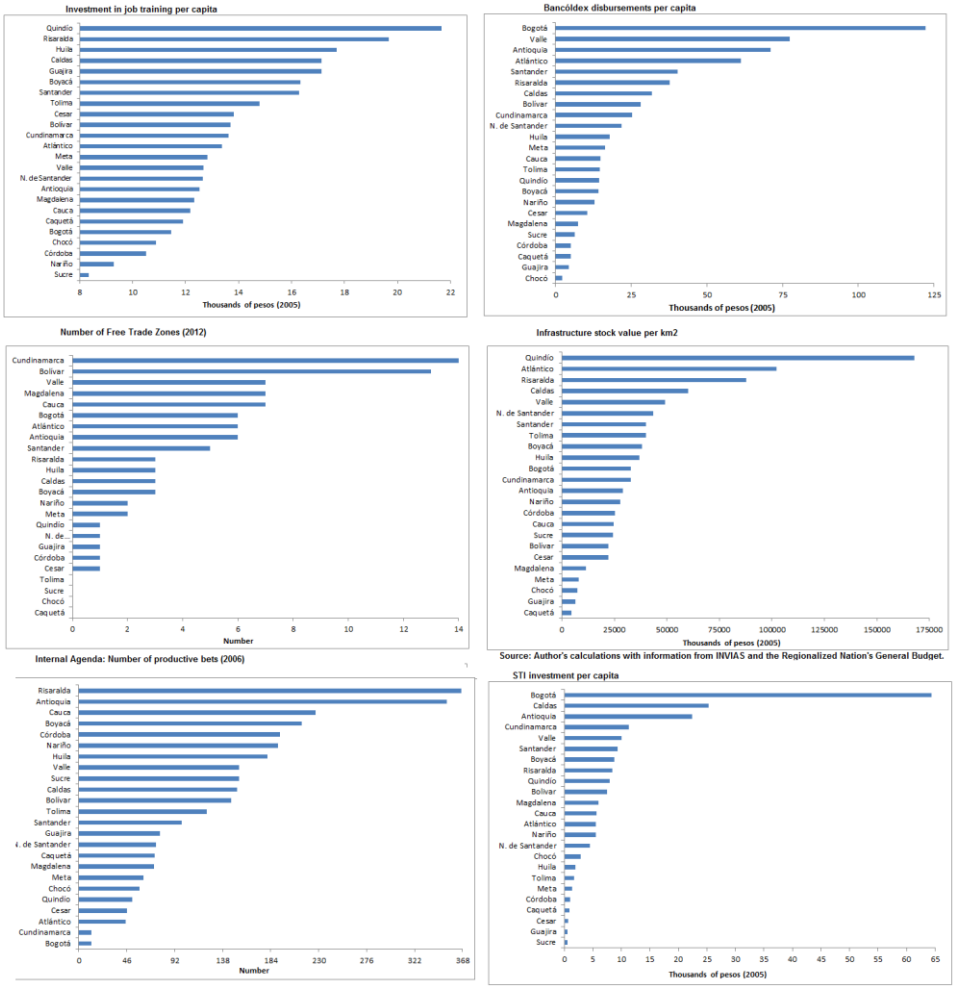
Source: Own calculations.

In general, we can see a high concentration of PDPs in a few regions and a slightly more even distribution among the regions' sub-group. For example, in the case of productive development policy, there are three regions—Atacama, Magallanes and Chilean Antarctica and Aysén—where such an investment has been concentrated. However, given the low number of inhabitants in relation to other more populated regions, the total value of the resources allocated to these regions is significantly smaller. The infrastructure stock is concentrated in the Metropolitan Region of Santiago (50% of the total), and is significantly higher than other regions. Then, there is a group of 5 regions that have achieved an accumulation of infrastructure stock of around 50 million and, finally, a group of regions with low infrastructure stock.

The annual average of foreign investment per capita has a greater volume in the mining regions of Antofagasta, Atacama, Tarapaca and Arica and Parinacota. Then, there is a group of 3 regions that has attracted some of this investment and, lastly, a group of regions that has attracted very little of this investment. Finally, the most favored regions in investment per capita of Sence were Los Lagos and Los Rios, followed by Aysen and Atacama. The distribution in the remaining regions is very even.

Graph 2 shows each PDP indicator' annual average for each region in Colombia: investment in job training per capita (Sena), Bancóldex disbursements per capita, number of FTZs, infrastructure stock value per square kilometer, number of productive bets in the IA and government investment in STI per capita. Except for the number of FTZs (distribution is presented in 2012) and number of agreements in the IA (2006 distribution is presented), all data correspond to the annual average for the period 2001-2011.

Graph 2
Colombia: Regional PDP Distribution
(2002-2010 Average)



Source: Own calculations.

As in Chile, a great dispersion is observed in Colombia in the PPD allocation among regions. Much of this dispersion can be explained because most of the PDPs have been designed to meet the demands of the regions (Bancóldex credits, FTZs, investment in STI) without taking into account the territorial specificities. This is why many of the policies are concentrated in the more developed regions of the country (Bogota, Antioquia, Valle, Cundinamarca, Santander). The less developed regions (Chocó, Córdoba, Cesar, Caquetá, Nariño, etc.) are usually the ones that are less favored by these policies.

It is striking that the regions belonging to the coffee belt (Quindío, Risaralda and Caldas)[10] are those with higher levels of road infrastructure stock in the country. This is due in large part to the work of the coffee institutions which took place during the golden age of the industry. The concentration of the number of productive bets of the IA is also noteworthy. Bogota and Cundinamarca had the lowest number of agreements in IA while Antioquia and Risaralda--the departments with the highest number of agreements—had 36.8 times more agreements than the first two departments. Political issues could explain this concentration.

4.2. Regional PDP dispersion

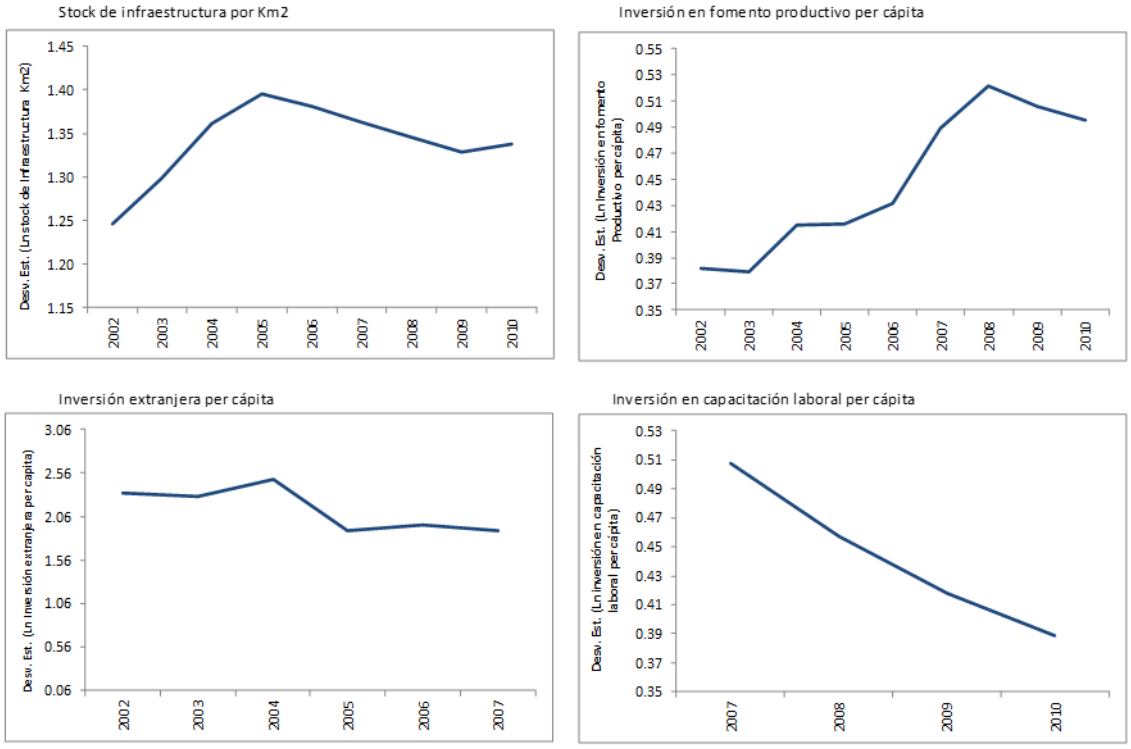
In this section we will analyze the behavior of interregional dispersion of each of the PDPs over time. If the distribution in the resource allocation of the policies has tended to improve, we would expect to observe a decrease in the dispersion of such an allocation over time. For Colombia, we exclude from this analysis the number of agreements in the IA because its implementation was made only once during the study period. Graphs 3 and 4 show the year-on-year interregional dispersion of the logarithm of our PDP variables for Chile and Colombia respectively. It is important to note that each graph has a different scale.

Graph 3 shows a generally positive trend in the dispersion of the infrastructure and investment stock in productive development in Chile. Furthermore, the increase is this last indicator is very significant (the dispersion almost doubled between 2002 and 2010). However, the infrastructure stock since 2006, and the investment in productive development in the last two years, have tended to decrease their dispersion. The fall in dispersion in investment in productive development is consistent with the Local Entrepreneurship Program's (PEL) locations approach, which we discussed above.

[10] This is how the area formed by those regions that have historically been the country's largest producers of coffee is known.

Graph 3

Chile: Inter-regional PDP dispersion, 2001-2011



Source: Own calculations.

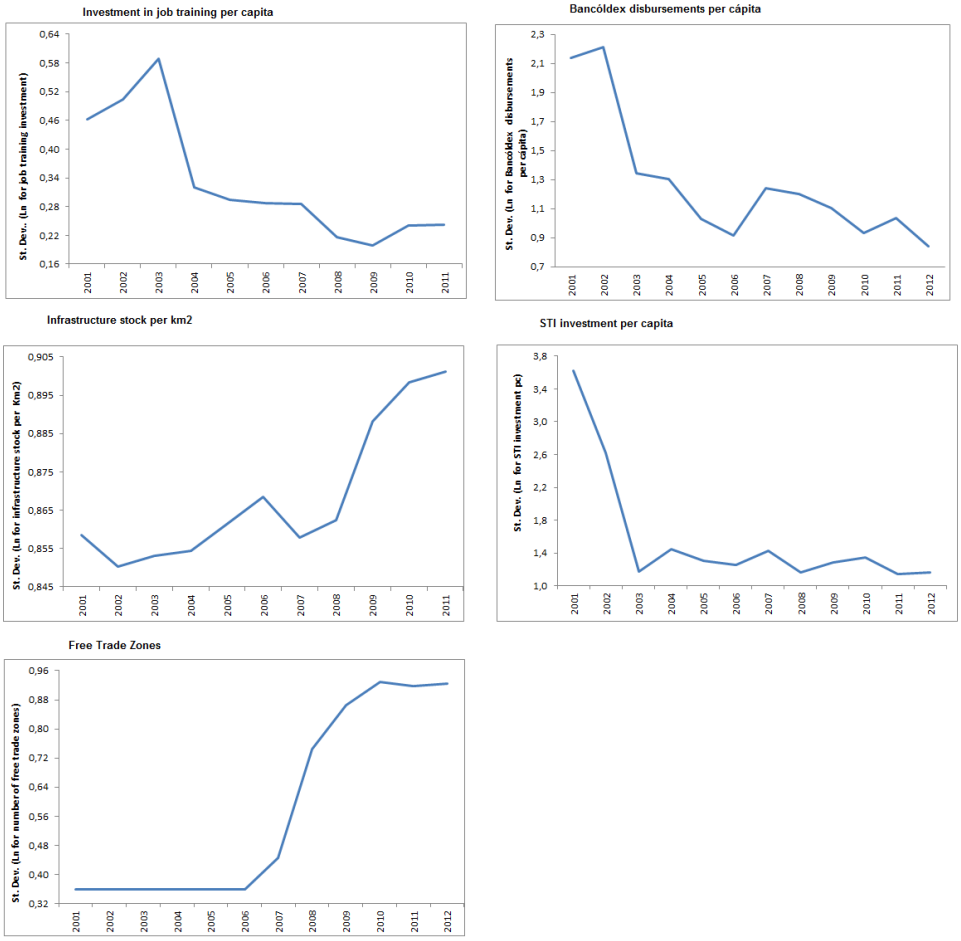
As for the investment in training, a permanent reduction in their dispersion is observed during the 2007-2010 period. This decline has not only been constant, but of significant magnitude (going from 0.51 to 0.38). The dispersion of foreign investment has remained more or less stable during the analysis period but exhibits a slight reduction in 2005. As stated earlier, this investment has been mainly concentrated in regions with mineral resources.

Graph 4 shows that—with the exception of infrastructure stock and the number of FTZs—PDPs in Colombia have shown a decrease in interregional dispersion in the study period. Notably, despite the high dispersion of these policies identified in the previous section, this dispersion has tended to decrease over time. However, it is important to carefully analyze this result. The most significant and stable reduction in the dispersion occurs with the Bancoldex disbursements (dispersion fell from 2.13 to 0.84). Something that might explain this decline is that, since 2003, Bancoldex extended their credit lines to small and medium enterprises, which are more dispersed in non-major cities. On the other hand, the large drop in the dispersion of investment per capita in STI is between 2001 and 2003 (falling from 3.6 to 1.2). This drop can be explained mainly because, before 2003, many departments had a very low or almost zero investment per capita in this kind of activities. The fact of having some investment, made the dispersion fall in this manner. However,

after this change in policy, the dispersion has remained almost stable most of the time. Finally, the fall in the dispersion in investment in training is also significant (it went from 0.58 to 0.24).

Graph 4

Colombia: Inter-regional PDP dispersion, 2001-2011



Source: Own calculations.

Contrary to these policies, the dispersion in the infrastructure stock and the number of FTZs has shown a positive trend over time. The first is explained by the country's long delay in terms of road infrastructure, which has made it necessary to concentrate large investments in a few regions, especially in those with greater economic activity. Regarding the dispersion in FTZs, it remained constant until 2005 (which is explained by the low creation of FTZs in this period). From that year on, due to the enactment of FTZs Law 1014, new areas were created, which focused mainly on those departments with increased economic activity. This explains the increase in the dispersion.[11]

[11] For Colombia it is also possible to calculate the interregional dispersion in the logarithm of investments in training and Bancoldex disbursements by economic sectors. It is observed that the decrease in the dispersion reported in Graph 4 is not common to all sectors. In the case of investment in training, the dispersion has declined in the Construction and Finance sectors. In the case of

4.3. PDP distribution according to initial conditions in LP and ER

Although the decrease in the dispersion of the PDP allocation is interesting from a redistributive point of view, for our purposes it is more important to analyze whether the regions with lower initial levels of LP and/or ER are the ones which have been most benefited by such a distribution or not. It is noteworthy to mention that if we find any relationship between the initial levels of LP and/or ER, and the allocation of resources in some PDP, the result would be a mere coincidence because, as discussed above, none of these policies has had the explicit objective of allocating their resources based on these indicators. Moreover, given the territorially neutral design of most PDPs, it is expected that, in most cases, the regions with better indicators in LP and/or ER are the ones that have benefited the most of the PDPs.

Table 2 reports the respective correlations between the initial levels of LP and ER (2002 in Chile and 2001 in Colombia) and the average annual growth of each of the PDPs (2002-2010 in Chile, and 2001-2011 in Colombia). These correlations are presented at an aggregate level for both countries, and at a sectoral level for those policies in which data is available for Colombia.

Bancoldex, the dispersion has declined in the Trade, Transport and Finance sectors. This data is not reported but available upon request.

Table 2
Correlation between the initial level of LP and ER and PDP growth

	Initial value (2002 Chile/2001 Colombia) in LP and ER													
	Aggregate		Industry		Construction		Trade		Transport		Financial		Services	
	LP	ER	LP	ER	LP	ER	LP	ER	LP	ER	LP	ER	LP	ER
Chile														
Average annual growth rate of infrastructure stock per km2 (2002-2010)	0,03	0,18	.	.	.	.	.	.	.	.	.	.	.	.
Annual average growth rate of productive development investment per employed person (2001-2011)	-0,21	0,23	.	.	.	.	.	.	.	.	.	.	.	.
Colombia														
Annual average growth rate of sena investment per capita (2001-2011)	0,01	-0,40	-0,05	-0,04	-0,20	0,08	-0,23	-0,25	-0,53	-0,13	-0,37	-0,29	-0,54	0,31
Annual average growth rate of Bancoldex disbursements per capita (2001-2011)	-0,10	-0,17	-0,32	-0,36	0,05	0,00	-0,24	-0,24	0,04	-0,13	-0,29	-0,46	-0,33	-0,51
Growth in the number of FTZ between 2001-2011	0,46	0,06	0,60	-0,08	-0,20	0,24	.	.	-0,05	0,19	.	.	0,49	0,25
Annual average growth rate of infrastructure stock per km2 (2001-2011)	-0,14	0,04	.	.	.	.	.	.	.	.	.	.	.	.
Number of agreements in the IA (2006)	-0,06	-0,13	-0,04	0,16	0,02	-0,09	-0,26	-0,30	0,15	0,27	.	.	-0,11	0,03
Annual average growth rate of STI investment per capita (2001-2011)	-0,40	-0,02	.	.	.	.	.	.	.	.	.	.	.	.

*There are no FTZ in Trade and Financial. There is no IA in Financial. In the case of FTZs we use the change in number between 2001 and 2011; and in the case of the IA we use the number of agreements in 2006. There are no FTZs in the Trade and Finance sectors. There are no agreements of the IA in the Finance sector.

In Chile, we found that, although many of these correlations are positive, its value is relatively low. This means that, while policies have focused more on the regions with higher levels of initial LP and ER, this correlation is not so high as to think that these policies have had adverse redistributive effects. It is striking to see the negative correlation between the growth of investment in productive development and the initial LP (-0.13). As well as being a low correlation, this correlation is mainly influenced by the region of Antofagasta, which suggests that there has been no effective redistribution of this policy among regions.

In Colombia, the correlations between the initial conditions of LP and ER and the PDP growth in the aggregate are also generally low. As in Chile, it is not something that is surprising, because there has not been a redistributive objective in the allocation of these policies. However, it is worth noting the potential redistributive effect of two policies: investment in training and investment in STI. The correlation between the initial ER and the growth of investment in training, and the correlation between the initial LP and the

growth of investment in STI are negative and relatively high (-0.4 in both cases). It is also striking to see the concentration of FTZs in regions with initially high LP (correlation of 0.46).

At the sectoral level, a generally low correlation is observed between the PDP growth and the initial LP and ER. However, three facts stand out: first, the negative and relatively high correlation between the initial ER and SENA's investment, which is observed in the aggregate, is not observed in the sectors reported in Table 2. Possibly this correlation is mainly explained by the unreported sectors. Nevertheless, a negative correlation between the growth of this policy and the initial LP in the Transport and Services sectors (-0.53 and -0.54 respectively) is observed. Secondly, there is a relatively high negative correlation between initial ER and the growth of Bancoldex disbursements in the Finance sector (-0.46) and the Services sector (-0.51). Finally, the positive correlation between the growth in the number of FTZs and initial LP observed in the aggregate is mainly concentrated in the Industry and Services sectors. It is precisely those sectors where more FTZs were created in Colombia.

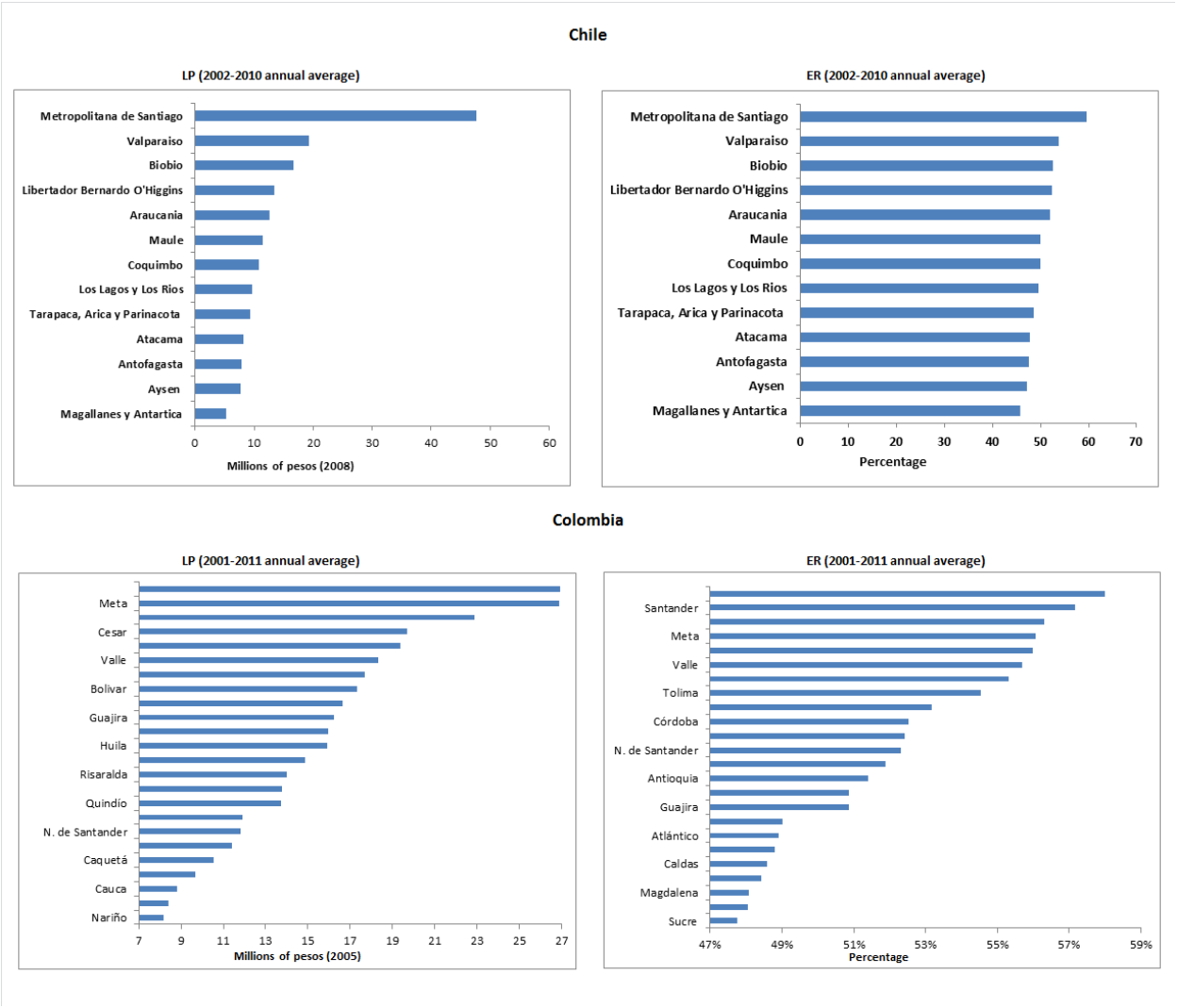
In short, at the aggregate level in Chile we have not found large redistributive effects. In Colombia, there are two cases in which the PDPs could have a redistributive component: investment in training has increased more in regions with low initial ER and investment growth in STI has been higher in regions with lower initial LP. On the other hand, there is a case in which the opposite has occurred: the increase in the number of FTZs has been higher in regions with higher initial LP. These results will be taken into account when analyzing the effect that these policies have had on LP and ER, and their respective inter-regional gaps.

5. REGIONAL GAPS IN LP AND ER

In this section, the departmental gaps between labor productivity (LP) and employment rate (ER) are studied. Graph 5 shows the annual average of LP and ER by region in each country. In the case of Chile, the average corresponds to the years 2002-2010 and in the case of Colombia this corresponds to the 2001-2011 period.

Graph 5

Labor Productivity and Employment Rate by region



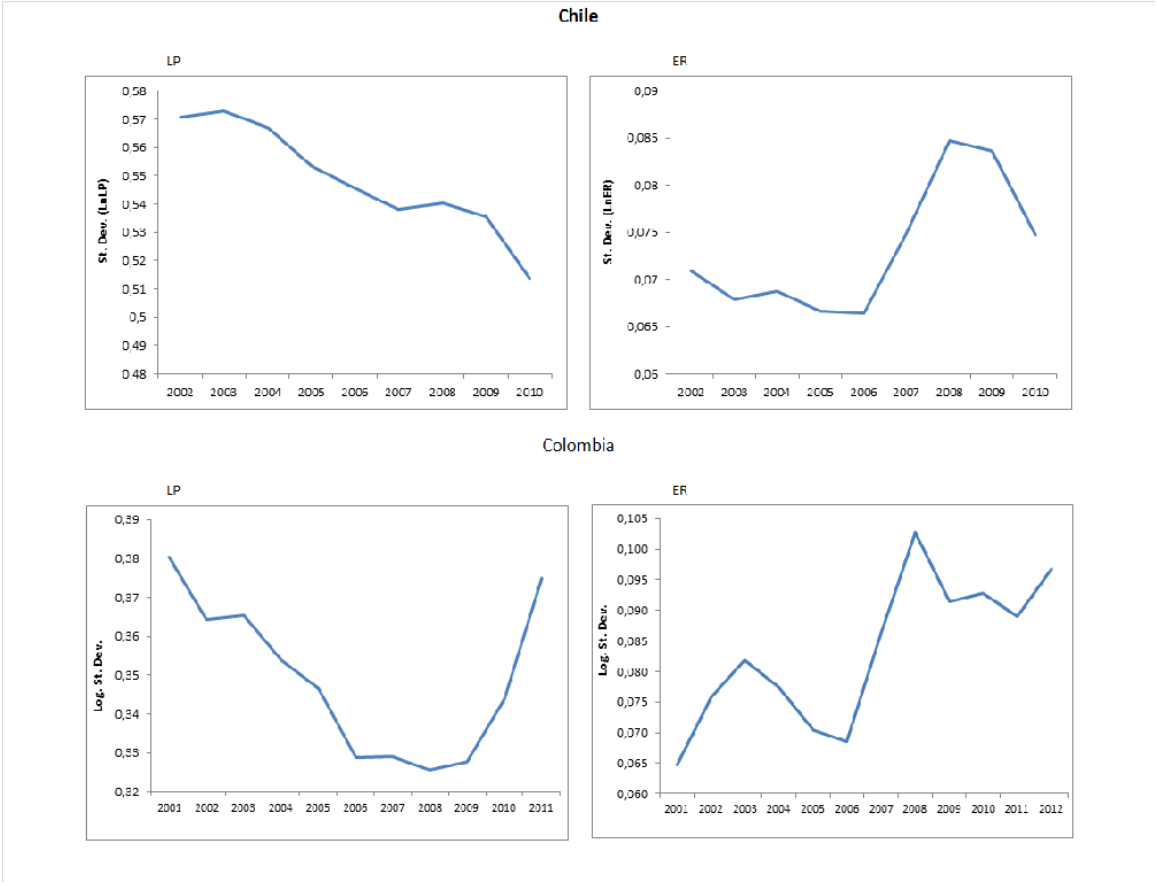
Source: Author´s calculations based on Departmental Accounts and GEH from DANE.

The main conclusion drawn from the data reported in Graph 5 is that, in general, the regional inequality is higher in Colombia than in Chile, especially in terms of ER. As for the LP, in Chile it is clear that Antofagasta is the region with more LP across the country; it is 4 times higher than the LP in regions such as Coquimbo, O'Higgins, Magallanes and Chilean Antarctica, and the Metropolitan Region of Santiago. The greatest contribution of the Antofagasta region is represented by its income from the mining sector. In Colombia, the LP in Bogota is almost 4 times higher than that of Chocó and Nariño. The LP in the other regions is distributed between these two extremes. The traditionally important regions, in the country's economic terms (except for Cesar), are the ones that have largest reported LP, while the Pacific region and many of the Caribbean are the ones with lowest reported LP. Without taking into account the LP of the metropolitan area in Santiago of Chile, the LP distribution is much more even in this country than in Colombia.

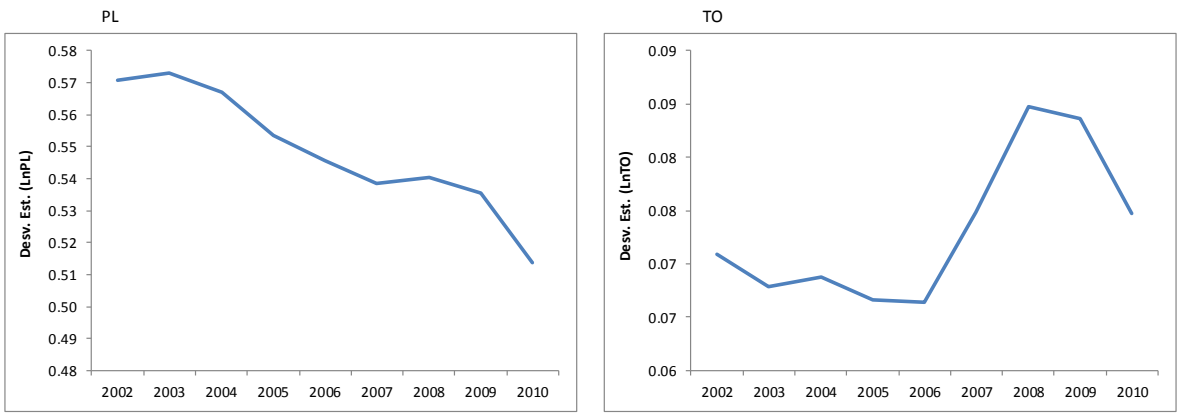
With regards to the ER, one can observe the great uniformity existing among Chilean regions; they all possess an ER of about 50%; in Colombia this distribution is more unequal. The ER of Bogotá is nearly 11 percentage points over Sucre. The departments with the lowest LP in the period generally belong to the Caribbean region. It is important to mention that good target indicators in Meta are due to, as in Antofagasta, its economy based on natural resources.

Graph 6 shows the annual interdepartmental dispersion in the logarithm of the LP and ER for the aggregate economy in each country. It is important to note that each graph has a different scale.

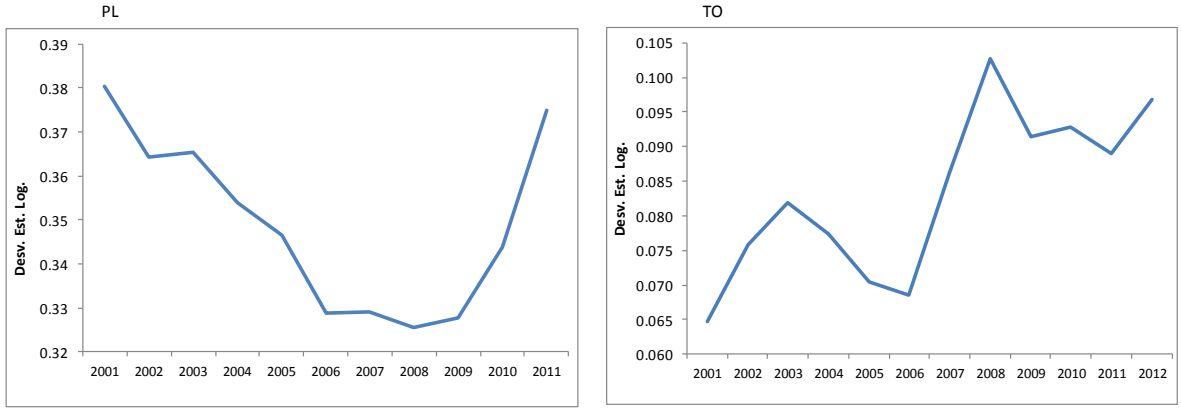
Graph 6
Interdepartmental dispersion of the LP and ER



Chile



Colombia



Source: Own calculations.

The interregional dispersion in LP and ER in both countries has tended to increase or remain stable. Since 2002, the interregional dispersion of LP in Chile has had a downward trend, however, the changes are very small (going from 0.57 to 0.52). For its part, the interregional dispersion of ER presents an upward shift starting from 2006 and then starts to decline in 2009, although, again, the changes observed are very small. Interdepartmental dispersion in LP in Colombia decreased until 2009, the year from which it began to increase significantly and ended up placing itself at a similar level at which it started. Furthermore, the interdepartmental dispersion of ER exhibits decrease and rise periods while maintaining a positive trend.

This analysis was also made for each of the considered economic sectors. In Chile, we found that, for the sectors of Construction, Trade, Restaurants and Hotels, the interregional gaps in LP have increased. Moreover, we found that, except for the sectors of Commerce, Restaurants and Hotels, the interregional gaps in ER have increased. In Colombia, the dispersion in LP and ER exhibits considerable heterogeneity across sectors. In general, the sectors which present a greater reduction of regional gaps in LP and ER are Commerce, Industry and Services. The sector that presents a more generalized increase in the gaps in LP and ER is Finance.

6. PDPs AND REGIONAL GAPS IN LP AND ER

Why can the regional allocation of the PDPs end up affecting regional gaps in LP and ER? To answer this question, we must first understand the impact these policies may have on growth rates in these variables. Our starting point is the theory of economic growth, particularly the models of "endogenous growth" (Aschauer, 1989; Barro, 1990; Romer, 1994, among others). This theory analyzes the determinants of economic growth, not only as a process in which the production factors play an important role, but also the public policies aimed at increasing their productivity and, therefore, growth rates. So, in addition to the accumulation of physical capital and human capital, the policies that are aimed at increasing the supply of public goods (such as infrastructure), for the productivity of factors (such as training of the workforce), to remove market barriers (such as financing policies) and to encourage innovation, could also have positive effects on the growth rates of the LP (and perhaps the ER) in the long term.

An important part of the literature has empirically studied the effect that PDPs have on long-term growth rates and, therefore, on interregional gaps in economic performance, sometimes broadly called "territorial cohesion" (Demurger 2001; Demurger, et al. 2002; Cappelen et al. 2003; Beugelsdijk and Eijffinger 2005; Ederveen et al. 2006; Dall'erba 2005a; Dall'erba and Le Gallo 2008, among others).

If the PDPs have positive effects on the growth rates in LP and ER, the way the resources of these policies are allocated among different regions may end up expanding or decreasing interregional gaps in these variables. For example, assigning, in relative terms, more policy resources to those regions with the lowest LP (and/or ER) could encourage the growth of these variables in these regions and, therefore, reduce the initial interregional gaps in these indicators. In fact, this was the premise with which the Structural Funds of the European Union was created. However, if the policy resources are allocated more intensively in regions with greater LP and/or ER, what we could observe is an increase in regional gaps. We come back on this discussion a few paragraphs later.

It is important to note that the effects discussed in the previous paragraph could operate independently of whether or not conditional convergence among regions exists. Apart from making predictions on the determinants of economic growth, one of the most studied predictions in neoclassical growth models is the existence of conditional convergence in growth rates among groups of countries and/or regions. In this context, convergence implies that economies with lower initial LP grow faster than those economies that start from a higher initial LP level. This process of convergence is conditional on a set of initial factors such as savings rates and population growth. However, it is not conditional on implementing PDPs.[12]

[12] A formal development of this theory can be found in Barro and Sala-i-Martin (2004). A collection of illustrative articles, both theoretical and empirical, is in George et al. (2004).

Returning to the argument above, to understand the effect of the PDPs on regional gaps in LP and ER, we must mix two elements: First, the effect that such PDPs have had on the growth of these variables. Second, the way the PDPs have been distributed among regions.

To analyze the PDP impact on LP and ER, we will estimate a standard growth equation from the literature, which is based on the theories of endogenous growth. The growth equation to be estimated is given by:

$$g_{it}^{y} = \lambda_i + \beta ln(y_{it-1}) + \gamma PDP_{it} + \theta X_{it} + \tau_t + \mu_{it} \qquad (1)$$

where *i* refers to the region and *t* to the year; g^y is the annual growth rate of the *y* variable (where *y* can be LP or ER); *PDP* is a vector of variables including our PDP measures; *X* is a vector of variables including the savings rate, measures in human capital and population growth; λ_i and τ_t are region-specific and time-specific parameters, and μ is the error term. Region-specific parameters are introduced to take into account unobserved structural differences in each region, which do not vary over time and affect the growth rates in the variables of interest (e.g., presence of mineral resources, geographical location, etc.). Time-specific parameters are introduced to capture temporary shocks affecting all regions equally, or changes in national policies that have affected equally all regions in each time period (e.g., macroeconomic policy).

Many of the variables included in the equation (1) are common in the literature on growth. The main novelty is that our equation includes different PDP measures in order to study their effects on the growth rates of our variables of interest. As previously discussed, public policy variables such as infrastructure investment and government spending, have been considered in previous studies (Demurger 2001, Cappelen et al. 2003; Beugelsdijk and Eijffinger 2005; Ederveen et al. 2006; Dall'erba 2005a; Dall'erba and Le Gallo 2008, among others). However, our equation includes several separate PDPs that have not been studied in past works, such as the policies of financing, job training and public-private partnerships.

On the estimation of Equation (1), the signs and the statistical significance of the parameters in the *γ* vector, will indicate the direction and the importance of the effect of each of the PDPs on the growth rate in the *y* variable. In general terms, a positive effect of the PDPs on the growth rates of our variables is expected. However, it is possible that this effect is zero if the policy in question has been poorly designed or implemented, regardless of the resources you have had. The possibility of having negative effects is not discarded. For example, this could be the case of the IA in Colombia where a good number of agreements could correspond more to issues of a lobbying power of unproductive sectors seeking protection for their activity (see Eslava and Melendez, 2009). Furthermore, there will be β-conditional convergence if the estimate of β is negative and statistically significant. Although the existence of β- convergence is a desired result in

terms of territorial gaps in LP and ER, our interest is in the effect of the PDPs on these gaps.

It is important to mention that the estimated parameters of the *γ* vector in Equation (1) can be biased by double causality. Although, as we have seen, the PDPs did not have a design that takes into account either the level of the regions' LP and/or ER, or their growth, it is possible those regions that have exhibited greater growth in LP and/or ER have managed to concentrate more PDP resources.[13] Given the difficulty in finding appropriate instrumental variables for each of these policies, our estimates do not correct these problems of endogeneity. Our estimates should be understood as correlations between the PDPs and the LP and/or ER, which can be transmitted to the interdepartmental gaps of these variables.

As mentioned above, the effect of a specific PDP on interdepartmental gaps in the *y* variable depends not only on the effect of the PDP on its growth rate, but also the way the respective PDP was assigned regionally. For example, in the case of the Structural Funds of the European Union, it is clear that these were distributed intensively in the less developed regions. Therefore, given its distribution, if these funds had affected the growth rates in LP in a positive way, a drop in productivity gaps among member countries as a result of the policy and its allocation should be observed. This is just one of the possible results derived from the combination of allocation policy and its effect on the growth rate. Following the same logic, the effects of the PDPs on regional gaps are summarized in Table 3.

[13] Please note that the presented analysis in section 4.3 is not related to this type of endogeneity. In this section we study whether the PDPs grew or decreased in the regions with lower "initial" LP and/or ER. The double causality problem is whether the PDPs are more or less concentrated in those regions with the highest "growth" in LP and/or ER during the study period.

Table 3
Expected effects of a PDP on interdepartmental gaps on y according to their interdepartmental allocation and its impact on g^y.

Combination of results	PDP affects g^y positively	PDP has no effect on g^y	PDP affects g^y negatively
PDP is concentrated in regions with lower *y*.	**Case 1**: PDP makes interdepartmental gaps in y fall in the long run.	**Case 3**: PDP has no effect on interdepartmental gaps in y in the long run.	**Case 4**: PDP makes interdepartmental gaps in y increase in the long run.
PDP is concentrated in regions with higher *y*.	**Case 2**: PDP makes interdepartmental gaps in y increase in the long run.		**Case 5**: PDP makes interdepartmental gaps in y decrease in the long run.

Cases 4 and 5 deserve further explanation. As discussed earlier, in principle it is not expected that a PDP would have negative effects on growth rates in some of our variables of interest. However, there are cases in which this could occur. For example, if a policy is aimed at protecting a specific sector, it could eventually affect the productivity of the sector negatively. If this policy is concentrated in regions with relatively low productivity in comparison to the others, in the end we could observe that regional gaps in productivity would eventually rise. This is the logic behind Case 4. On the contrary, if the policy is concentrated in regions with relatively higher productivity in comparison to the others, in the end we could observe that regional gaps in productivity end up falling. This is the logic behind Case 5.

7. PDP EFFECTS ON LP, ER AND THEIR REGIONAL GAPS

In this section, we present the results of the estimates of Equation (1) and we infer, using these results and the analysis in Section 4, the effect which the PDP have had on regional gaps in LP and ER. Equation (1) is estimated for each country and each y using aggregate data (which includes all sectors of the economy) and data for each of the 7 studied sectors. For sectoral estimates in both countries, we take the LP and ER of the sector. In the case of Chile, since it is not possible to obtain disaggregated measures of the PDPs by sector, the PDP variables that are used correspond to the aggregate. For Colombia, with the exception of the infrastructure stock (because of its nature) and investment in STI (due to data availability), the PDP data correspond to sectoral measures (i.e., the resources allocated to a particular sector).

Below, we present the results of our estimates and analyze the effects of the PDPs on interregional gaps in LP and ER. Except for the number of FTZs and the number of agreements in the IA (because of its nature) in Colombia, the estimates are presented using the PDP log. The estimates presented are made using fixed and time effects as shown in Equation (1).

7.1. Labor Productivity

Table 4 presents the estimates of Equation (1) for the aggregate economy and by sector in each country, using as a dependent variable the annual growth of the LP. The main result of the estimates is that, with few exceptions, the PDPs did not have a significant correlation with the growth of the LP both at an aggregate and a sectoral level.

Table 4
Estimate of equation (1)
Dependent variable: LP growth rate
Fixed Effects Estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Aggregate	Manufacture	Construction	Trade, Restaurants and Hotels	Transport and Communications	Financial	Personal Services
				CHILE			
Ln (LP (t-1))	-0,21	-15,52	25,05	-24,48	-6,89	-54,31	-13,53
	(0.11)*	(8.41)*	(20.84)	(9.09)**	(11.31)	(9.91)***	(14.25)
Ln (productive development investment per capita)	0,01	-0,76	-12,59	3,51	6,95	12,65	4,79
	(0.04)	(4.52)	(13.15)	(2.19)	(4.93)	(7.42)	(3.70)
Ln (Infrastructure stock per km2)	0,01	-5,62	49,13	-5,37	-7,71	14,75	1,99
	(0.07)	(14.73)	(31.14)	(5.70)	(4.08)*	(9.09)	(7.00)
Ln (Average years of education for people 18+)	0,35	211,31	-96,74	-43,71	96,91	-32,20	-20,94
	(0.64)	(120.22)	(231.08)	(43.65)	(77.19)	(78.52)	(74.99)
Population growth	8,00	-6350,59	29290,25	2365,05	-3966,53	2697,23	3381,86
	(29.77)	(1847.79)***	(14292.19)*	(1502.77)	(4143.49)	(4352.40)	(5013.23)
Observations	104	104	104	104	104	104	104
R-squared	0,24	0,37	0,42	0,73	0,82	0,50	0,93
Number of regions	13	13	13	13	13	13	13
				COLOMBIA			
Ln (LP (t-1))	0,053	-0.245***	-0.360***	-0.175**	-0.235***	-0.257***	-0.174***
	(0.096)	(0.053)	(0.059)	(0.064)	(0.053)	-0,045	(0.051)
Ln (SENA investment per capita)	0.029*	-0,018	0.049*	-0.029*	-0.019	0,024	-0.023
	(0.015)	(0.026)	(0.029)	(0.015)	(0.022)	(0.020)	(0.015)
Ln (Bancoldex disbursements per capita)	-0.014	-0.023	-0.001	-0,009	0.011	-0.009	0,005
	(0.009)	(0.014)	(0.021)	(0.011)	(0.013)	(0.008)	(0.010)
Number of Free Trade Zones	0,001	0,000	0,027		0,045		-0.006
	(0.002)	(0.004)	(0.035)		(0.037)		(0.008)
Ln (Infrastructure stock per km2)	-0,050	0,072	-0.143	-0,014	-0.203**	0,044	-0,027
	(0.045)	(0.089)	(0.123)	(0.034)	(0.090)	(0.051)	(0.043)
Number of IA Agreements	-0.000**	-8.83e-05	-0.007***	-0.000	0,000		-0.000
	(5.71e-05)	(0.000)	(0.002)	(0.000)	(0.001)		(0.000)
Ln (STI investment per capita)	0,014	-0,004	-0,003	0,009	0,018	0,023	0,002
	(0.024)	(0.052)	(0.042)	(0.013)	(0.030)	(0.030)	(0.018)
Ln (Average years of education for people 18+)	-0,077	0.623	0.204	-0.164	-0.460	-0.366	-0.896***
	(0.353)	(0.669)	(0.593)	(0.153)	(0.436)	(0.293)	(0.235)
Ln (Savings per capita)	-0.088*	-0.113	-0.117	-0.113***	-0.186*	0,047	-0,029
	(0.043)	(0.097)	(0.124)	(0.037)	(0.096)	(0.038)	(0.037)
Population growth	-1.745	8.276	16,970	-8.949**	-6.171	-4.480	13.680***
	(3.659)	(7.965)	(15.850)	(3.477)	(13.310)	(5.807)	(2.543)
Observations	192	190	189	192	192	192	190
R-squared	0.566	0.465	0.434	0.610	0.413	0.486	0.361
Number of regions	24	24	24	24	24	24	24

*Robust standard errors in parentheses. *** Significant at 99%, ** Significant at 95%, * Significant at 90%. All regressions include time effects. All variables were smoothed using centered and weighted moving averages in three sample windows.

In Chile, no positive and statistically significant correlation between the PDPs and the growth of the LP is found. It is striking to observe the negative and significant correlation between the infrastructure stock and the LP in the Transport and Communications sector.

This result is quite unexpected, not only because of the sign of the correlation, but also the sector in which it is observed.

In Colombia only one PDP, investment in training, presents a positive and significant correlation with the growth rate of the LP at the aggregate level.[14] This correlation is mainly concentrated in the Construction sector. However, a significant negative correlation is found between these two variables in the Trade sector. Furthermore, the negative and significant correlation between the infrastructure policy and the growth rate of the LP in the Transport sector is surprising. This result will be better understood when we study the correlation between this policy and the growth of the ER (see next section).

Regarding the existence of conditional convergence, some differences emerge between Chile and Colombia. In Chile, there is evidence of convergence in LP, in the aggregate and in three of the six analyzed sectors of the economy: Manufacturing; Trade -Restaurants and Hotels; and Business-Financial Services. In the other sectors, no evidence of convergence is found. In the sectors with convergence, it tends to be slow but is consistent with other empirical studies in Chile (e.g., Duncan and Fuentes, 2005). In Colombia, despite the existence of convergence in the LP in each of the six analyzed sectors, no such convergence is observed in the aggregate. This result, apparently contradictory, can be explained by the three economic sectors included in the aggregate, but which are not analyzed separately (Agriculture; Mining; and Electricity, Gas and Water). Together, these sectors are very important in most departments and may be explaining the aggregate result. Hence the importance of our disaggregated analysis by sector.

Using the estimates in Table 3 and the analysis of Section 4, it is possible to make some inferences about the effect of the PDPs on regional gaps in LP. In general, it can be inferred that the PDPs have had little effect on interdepartmental gaps in LP. This is not due solely to the low correlation between these policies and the growth of the LP, but the way in which the resources of these policies have been distributed. In general, the policies with some correlation with the growth of the LP have not been distributed, more or less, intensively in regions with lower initial LP (See Table 2). More precisely, the low correlation between the distribution of the infrastructure stock and the initial LP in Chile, and between the distribution of investment in training and infrastructure stock and the initial LP in Colombia, suggests that these policies have not had a significant impact on regional gaps in LP.

14 The number of agreements in the IA has a negative and significant correlation with the growth rate of the LP at the aggregate level. However, the magnitude of the effect is zero from an economic point of view.

7.2. Employment Rate

Table 5 reports the estimates of Equation (1) for the aggregate economy and by sector in each country, using as a dependent variable the annual growth of ER. Again, the main result is that there is generally a low correlation between the PDPs and the growth rate of ER.

Table 5
Estimate of equation (1)
Dependent variable: ER growth rate
Estimates of Fixed Effects

	(1)	(2)	(4)	(5)	(6)	(7)	(8)
	Aggregate	Manufacture	Construction	Trade, Restaurants and Hotels	Transport and Communications	Financial	Personal Services
				CHILE			
Ln (ER (t-1))	-0,17	-33,37	-19,32	-28,72	-11,01	-24,97	-13,45
	(0.05)***	(11.10)**	(9.07)*	(7.30)***	(7.17)	(7.62)***	(6.24)*
Ln (Productive development investment per capita)	-0.03	-10,31	2,45	-4,15	-2,29	7,45	-1,26
	(0.01)*	(3.19)***	(4.26)	(3.54)	(4.76)	(10.14)	(4.08)
Ln (Infrastructure stock per km2)	-0.04	-1,64	-7,29	4,05	-1,09	-23,64	-7,12
	(0.01)**	(8.35)	(6.88)	(4.19)	(7.57)	(12.56)*	(4.14)
ln (Average years of education in people 18+)	0,09	-38,71	-41,90	-18,76	-64,35	163,47	86,86
	(0.32)	(47.31)	(75.22)	(46.42)	(62.14)	(100.25)	(37.92)**
Population growth	0.45	-2093,63	3985,85	1889,09	5749,81	-7689,94	-1758,67
	(8.75)	(2242.99)	(1639.09)**	(2767.62)	(2043.31)**	(4027.78)*	(1316.55)
Observations	104	104	104	104	104	104	104
R-squared	0,52	0,75	0,16	0,70	0,16	0,78	0,50
Number of regions	13	13	13	13	13	13	13
				COLOMBIA			
Ln (ER (t-1))	-0.133***	-0.260***	-0.334***	-0.205**	-0.252***	-0.309***	-0.224***
	(0.041)	(0.041)	(0.039)	(0.076)	(0.078)	(0.080)	(0.052)
ln (SENA investment per capita)	0,003	0,031	0,002	0,019	0,028	-0,003	0.028*
	(0.014)	(0.029)	(0.014)	(0.013)	(0.018)	(0.020)	(0.014)
ln (Bancoldex disbursements per capita)	0,004	0,013	0,011	0,006	0,002	0,009	-0,003
	(0.008)	(0.016)	(0.008)	(0.012)	(0.012)	(0.009)	(0.007)
Number of Free Trade Zones	-0,001	0,006	0,013		-0,023		0,006
	(0.001)	(0.004)	(0.013)		(0.018)		(0.005)
Ln (Infrastructure stock per km2)	0,023	-0,012	0.093*	0,044	0.167*	0,007	0,038
	(0.023)	(0.075)	(0.051)	(0.037)	(0.091)	(0.064)	(0.042)
Number of IA Agreements	1.56e-05	4.83e-05	0,001	0,000	-0.000		6.26e-05
	(4.95e-05)	(0.000)	(0.002)	(0.000)	(0.001)		(0.001)
ln (STI investment per capita)	0,005	0,003	-0,006	-0,003	-0,008	-0,005	-0,006
	(0.014)	(0.047)	(0.029)	(0.017)	(0.024)	(0.030)	(0.015)
ln (Average years of education in people 18+)	0,014	-0.644	0.522**	0.267	0.439	0.771***	1.039***
	(0.238)	(0.680)	(0.243)	(0.156)	(0.320)	(0.262)	(0.181)
ln (Savings per capita)	0,039	0.123	0.158**	0.089**	0.127	-0,055	0,022
	(0.029)	(0.092)	(0.062)	(0.036)	(0.079)	(0.058)	(0.039)
Population growth	-3.839	-21.05**	-18.21***	5.781*	2.648	1.007	-9.970***
	(2.278)	(7.810)	(5.657)	(3.248)	(8.983)	(5.526)	(3.361)
Observations	192	190	189	192	192	192	190
R-squared	0.480	0.371	0.400	0.381	0.238	0.427	0.463
Number of regions	24	24	24	24	24	24	24

Robust standard errors in parentheses. *** Significant at 99%, ** Significant at 95%, * significant at 90%. All regressions include time effects. All variables were smoothed using centered and weighted moving averages in three sample windows.

As in the case of the LP, for Chile, no positive and statistically significant correlation between the PDPs and the growth of ER is found. On the contrary, the negative and significant correlation between the two analyzed PDPs and the growth of ER in the aggregate economy is surprising. At the sectoral level, the negative correlation between investment in productive development and growth in ER is mainly observed in Manufacturing, while the negative correlation between infrastructure and growth of ER is mainly observed in the Finance sector. Nevertheless, more evidence of convergence is found in ER than in LP. In the aggregate and in most sectors, except Transport and Communications, the estimated parameter is negative and statistically significant.

In Colombia, the PDPs do not show any significant correlation with the growth of the ER at the aggregate level. Nevertheless, some interesting effects are found at the sectoral level. For example, the training policy has a positive and significant correlation with the growth of the ER in the Services sector; and the infrastructure policy has a positive and significant correlation with the growth of the ER in the Construction and Transport sectors. This last result could explain the negative correlation between this policy and the growth of LP in the Transport sector, suggesting that the potential increase in the ER in this sector is not reflected in a proportional increase in production, so the LP falls. It is worth mentioning that our estimates show that there has been regional convergence in ER, both at the aggregate level and in all sectors.

As in the case of the LP, given the low correlation between the PDPs and the growth of the ER, and how these policies have been distributed in both countries, one cannot infer any important effect of the allocation of PDPs on regional gaps in ER.

8. CONCLUSIONS

After making the above analysis, we can conclude that regional gaps in LP in Chile and Colombia have remained high in recent decades. In Chile these inequalities are mainly explained by the high LP in the Metropolitan Area of Santiago, while in Colombia they are explained by the great dispersion among all regions. Regional gaps in ER in Colombia have also remained high, while in Chile the dispersion of the ER among regions is more homogeneous.

From a theoretical point of view, the PDPs could function as an instrument to encourage LP and ER in the regions and, according to their geographical distribution, help reduce regional gaps in these indicators, enabling people from different regions to have similar economic opportunities. However, in terms of the regional distribution of the PDPs, a high dispersion was found in the allocation of resources in both countries and is mainly explained by the design of such policies, which has not explicitly incorporated any criteria of regional redistribution. For example, there are few cases where the distribution of the PDPs has favored, in relative terms, those regions with lower levels of LP and/or ER. In

spite of this, and for reasons that do not necessarily follow a policy objective, we found that in Colombia the regional dispersion of most PDPs tended to decrease during the study period. Contrary to this, in Chile the dispersion has, generally, increased or remained constant.

A disturbing finding in our study is the low correlation between the allocation of the studied PDPs and the growth of LP and ER, especially in Chile. This low correlation could perhaps be explained by poor design and/or improper implementation of policies in the regions. There is an impression in the regions that the PDPs are designed by the central government without thinking about their needs and potentials. If so, investing a lot of resources in the regions could end up being underutilized. However, this hypothesis should be examined further in future work.

Finally, we infer that the PDPs have had little impact on interdepartmental gaps in LP and ER. This result is due to the interaction of two factors: first, the PDPs resources have not been assigned with redistributive criteria; second, that there is a low correlation between the allocation of resources and the growth of LP and ER. Maybe the good news of this result is that the allocation of PDPs have not helped expand regional gaps, something one might expect given the large regional dispersion which exists in the allocation of their resources.

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Statistical Annex

Infrastructure Stock

Chile

The data source for this variable is Cerda (2012) who used the perpetual inventory method and the methodology proposed by Harberger (1972) to quantify the public capital stock in productive infrastructures between 1853-2010. The assets discussed in this variable are: Railways, Highways, Ports, Irrigation, Water Supply and Sanitation, Airports, Subway and Road concessions. The series is deflated to 2008 and divided by the regional surface in KM2.

Since the infrastructure stock obtained from Cerda (2012) is the aggregate (national), the public investment variable flow calculated by the Central Bank of Chile was used to make a proxy to represent the regionally disaggregated data stock. In order to do this, we applied an assessment of the participation of each region in the national total to the infrastructure stock obtained from Cerda (2012).

Colombia

The stock of departmental roads is built per km². For its construction, the roads stock estimated by the Ministry of Transport-Invias (1996) was taken as the initial assessment. The investment in infrastructure was taken from the INVIAS investment of the General Budget of the Nation Regionalized published by DNP. To deflate the national variable, the national CPI based in 2005 was used. The data of departmental surface in km2 was obtained from the Geographic Institute Agustín Codazzi (IGAC, full name in Spanish: Instituto Geográfico Agustín Codazzi). The initial roads stock was taken and the annual investment was added. This stock was depreciated using an annual rate of 3%. Finally, the infrastructure stock was divided by the departmental surface in km².

SENA's investment in training

With the data from the General Budget of the Nation Regionalized, we calculated SENA's total investment in training in each department. To calculate the investment per sector, we have investment information per training center in each department for the years 2001, 2003 and 2006. Each training center can serve more than one sector, particularly, the Multisectoral centers. We use the participation of each center in these years to attribute SENA's spending in the other years. Specifically, the participations of 2001 were attributed to 2002, 2003 was attributed to the years 2004 and 2005, and 2006 was attributed to the years between 2007-2011. With this, we have SENA's investment per training center in each department, I_{cj} where c is the center and j is the department.

To attribute Sena's investment in each sector, we use the AV participation of the sector in the total aggregate value of the department: $\theta_{ij} = \frac{VA_{ij}}{VA_j}$, where i is the sector. Therefore, Sena's investment in each sector is calculated as:

$$I_{ij} = \sum_{c(i)} \frac{\theta_{ij}}{\sum_{i \in c} \theta_{ij}} I_{cj}$$

Where "c (i)" refers to the group of centers serving sector i and "$i \in c$" refers to the sectors that are served by center c.