

INDUSTRIAL POLICY, LAND & ETHNIC CONFLICT:
IS A FORESTRY WORKER BETTER OFF IN THE CHILEAN REGIONS OF THE ARAUCANÍA
AND LOS RIOS THAN IN ALTERNATIVE PRODUCTIVE SECTORS?

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By

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ABSTRACT

At present 21.5% of Chile's national territory is under forestry use, with the industry contributing approximately 3% of the nation's GDP and 20% of its exports. Though Chile is explicitly attempting to diversify and grow in the service industries; the largest revenues from exports today and in the near future are still to come from its natural resource sectors. Here, clearly the forestry industry's development has a strategic role to play, today and in the country's sustainable long-term growth strategy, especially regarding its advantage as a carbon emissions capture sector.

Chile's forestry development is subject to diverse criticism that questions its true economic, social, and environmental impact on national, regional and local grounds. Through the lens of an intra-industry wage differential analysis, this study looks at the impact of the forestry sector on workers' wages comparing two regions with ideal soil and climatic conditions for further forestry expansion, the Araucanía (heartland of the Mapuche indigenous nation) and the contiguous region of Los Ríos. When analyzing the implications of the coefficients on region, it is important to underscore that the premium of working in Los Ríos or the negative effects of doing this in the Araucanía is not necessarily static; the coefficient may be capturing the implication of history within the region. Though history cannot be changed, current and future circumstances can certainly be improved. Here lies the space for public policy. Opening the opportunity for indigenous small and medium-sized landowners to participate in an initiative such as the forestry securitization bond can help promote "development with identity" through an inclusive scheme.

The research and writing of this thesis
is dedicated to Nils, for the wait and unrelenting support.
A special thanks to my advisor
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Muchas gracias,
LEAH M. POLLAK

TABLE OF CONTENTS

INTRODUCTION	1
A Comparative Regional Analysis Approach	2
BACKGROUND	4
The Creation of the Araucanía: The Heartland of the Mapuche Territory	5
Law Decrees and Land Rights	7
LITERATURE REVIEW	11
CONCEPTUAL FRAMEWORK AND HYPOTHESIS	14
DATA AND METHODS	16
SOCIOECONOMIC ANALYSIS FOR THE PRIMARY FORESTRY REGIONS	19
Discussion	19
<i>Income</i>	20
<i>Poverty</i>	21
<i>Education</i>	22
Comparisons by Productive Sector for the Araucanía & Los Ríos Region	26
REGIONAL REGRESSION ANALYSIS OF WAGE	29
POLICY DISCUSSION	34
Land, A Factor of Sociocultural & Productive Development	36
The Forestry Securitization Bond	
CONCLUSION	40
APPENDIX A	43
APPENDIX B	44
BIBLIOGRAPHY	45

INTRODUCTION

Saturday, September 26th, 2009 – Chile.- *La Tercera* newspaper announces that the: Chilean forestry company Arauco S.A. will paralyze the work of approximately 35,000 laborers, given the blockade of its plants in the southern regions of Bio Bio, the Araucanía, and Los Rios¹. Subcontracted workers restricted access to ten Arauco industrial complexes, petitioning the company to demand from its service providers a minimum monthly salary of \$250,000 pesos (\$450 USD)² and a monthly bonus of \$130,000 pesos (\$236 USD) for their employees. Arauco requested that police forces clear the plants, while authorities refrained from carrying out this petition. The Chilean Central Government has left the conflict to be dealt by regional institutions.

At present 21.5% of Chile's national territory is under forestry use, with the industry contributing approximately 3% of the nation's GDP and 20% of its exports. Among the natural resource industries, this places the forestry sector second to the impact of copper on GDP, and first among the renewable natural resource industries. If Chile's copper sector is often referred to as "the salary of Chile" and the agrarian reform was coined "its bread"; a country that heavily relies on exports for growth, certainly can think about its forestry industry as its "lung". Chile's bet on a cluster-based development agenda stewarded by its National Council on Competitiveness relies heavily on its natural resource endowment, having 5 of its 8 strategic sectors strongly dependent on these goods (CNIC 2008). Though Chile is explicitly attempting to diversify and grow in the service industries of offshoring, financial services, and tourism; the largest revenues from exports today and in the near future are still to come from its natural resources (O'Ryan

¹ Between 450 and 900 kilometers south of the capital city of Santiago.

² Chile's minimum monthly wage is set at \$165,000 (\$305 USD).

2008). Here, clearly the forestry industry's development has a strategic role to play, today and in the country's sustainable long-term growth strategy, especially when accounting for its advantage as a carbon emissions capture sector (Flores 2009).

Worker mobilizations like the recent Arauco case are not particular to the forestry industry; they are present in today's mining, aquaculture, and even educational and health sectors. These are the pangs of a country seeking to grow with equity, while experiencing the distributional income divergence of nations facing stages of rapid growth. Having said this, Chile's forestry sector since its take-off in the mid-seventies and commercial liberalization process faced complex challenges that are particular to this industry. Its rapid growth, effects on rural localities where it establishes, expansion in apparent competition with native forests, often generate conflicting views through the various echelons of Chilean society. Given this situation, Chile's forestry development is subject to diverse criticism based on perceptions and positions that question its true economic, social, and environmental impact on national, regional and local levels (O'Ryan 2007).

A Comparative Regional Analysis Approach

Forest resources are represented by 13,6 million hectares of native forests and 2,3 million hectares of forest plantations. Natural forests concentrate in the southern zones of Chile, with 75% of the total area in the Regions of Los Lagos, Aysén and Magallanes.³ In terms of the Chilean forest resource, the Araucanía represents the third most important region, with 937.3 Mha of native forest and 442.1 Mha of planted forest (INFOR 2009). However, the forestry sector's long-term investments in the area are steadily declining due to continuous ethnic conflict and land disputes.

³ Southernmost regions of Chile

The next region south is Los Ríos, with 849.8 Mha of native forest and 180.7 Mha of planted forest (INFOR 2009). Recently created on October 2nd 2007, by subdividing the Region of Los Lagos, Los Ríos was established considering its territorial, historical and geographic endowments, taking into accounts its main forestry sector economic activity. This is a separation from its agricultural, cattle-raising and fishing sectors of its former provinces. In light of this regional geopolitical division, a novel approach is to study the impact of the forestry sector on workers' wages comparing the regions of the Araucanía and Los Ríos.

In this context, the underlying research questions for this investigation are: in the Chilean regions of the Araucanía and Los Ríos, where soil and climatic conditions present ideal factors for the further development of the forestry sector: do workers earn higher wages in the forestry industry rather than in alternative productive activities? Additionally, do these earnings vary meaningfully by region? Lastly, are their significant wage differentials controlling for ethnicity? If this is the case, what are possible public policy implications in light of a national cluster-based development approach and the persistent indigenous conflict in the Araucanía?

BACKGROUND

To briefly examine the various debates associated to the economic and social aspects regarding the development Chile's forestry sector, it is important to distinguish two moments in its expansion: the period of the establishment of forestry plantations, followed by the development of the cellulose industry. Though the latter is the main focus of current opposition to further expansion, especially when considering its environmental implications, the debate always touches upon both topics to a greater or lesser extent. These are generally triggered either by future forestry investment or by political and legislative processes particular to the industry.

After the Law Decree 701 of 1974, Chile starts a rapid growth stage of its forestry plantations. The major debate has to do with the practice of native forest substitution by plantations, to which recurrent alerts point to the loss of natural capital and its effect on potential impoverishment of rural populations. In contrast, there are those that support the aforementioned policy, arguing that actual substitution is minimum and that the greatest percentage of land subject to forestation was originally deforested by agriculture. Supporters suggest that forestry has had positive effects, contributing to recover the land for productive use, with social and economic benefits, as well as environmental (O'Ryan 2007). Nevertheless, in the mid 90s, a new stakeholder group gathered an important presence within this debate, the Mapuche. Chile's largest indigenous population, grew strong as a movement and captured greater media presence for its fierce opposition to the expansion of forestry plantations in territories predominantly occupied by *campesinos* belonging to this indigenous group.

A million Mapuche, along with fifteen million “Chileans”, inhabit a nation-state that erased any trace of indigenous identity from its constitution. “First-Nation” movements make particular claims for indigenous rights associated with time and place. Peoples⁴ claim rights to a territory usually usurped by imperial conquest, thus the use of the word “first” to indicate the priority of their claims. As cultural anthropologist James Clifford explains, “[t]hey occupy the autochthonous end of a spectrum of indigenous attachments: people who deeply ‘belong’ in a place by a dint of continuous occupancy over an extended period of time (1997).” Precisely how long it takes to become indigenous is always a political question. And although the Mapuche were present before the creation of the Chilean nation-state, they appeal to international conventions, constitutional recognition, and legal treatises within the political realm of the country unit as a means to fight for land and rights to self-determination within Chile.

The Creation of the Araucanía: The Heartland of the Mapuche Territory

At inception, the fledgling nation-states of Chile and Argentina sought to incorporate the Mapuche into their countries, since this indigenous peoples cut Chile in half and spread over the Andes into Argentina. The first century of the Chilean state was spent trying to close the territorial divide of approximately four hundred kilometers between the Bío-Bío and Valdivia regions (Contreras 2003).

The Chilean state tried to create reality by declaring it so. With no formal war declaration or territorial control, in 1852 the Chilean Republic annexed the Mapuche

⁴ From here on I used the word “peoples” to describe the Mapuche, because the translation “peoples” is *pueblo* and “people” is *población* or population, which is a demographic descriptor as opposed to a collective notion of nation. Being recognized as a nation would grant the Mapuche special indigenous rights as defined by the U.N. and the International Labor Organization (ILO).

territory by decreeing a law that created the Province of Arauco. The new legislation read:

The new province of Arauco is established, and is constituted by the demarcated indigenous territories south of the Bío-Bío River and north of the province of Valdivia... The departments and subdelegations are now completely subject to constitutional authority, which for now form part of our province, will be ruled over by the same civil servants that govern the rest of our State provinces. The territories inhabited by indigenous peoples and the adjacent areas will be subject to these authorities and regime will attend to their circumstances as determined particularly by the president of the republic (Anguita 1898).

Congress on its part decreed that everyone born in this territory was considered a Chilean. Chileans understood that the new nation-state was a political and judicial unit that recognized only one cultural community, one territory, one tongue, and one flag. Since cultural homogeneity did not exist, it had to be created.

During the first three decades of the twentieth century, the Mapuche confronted the encroachment of their land by the Chilean state under a policy of linguistic, territorial, and spiritual “Chilenization” that sought to stabilize the Araucanía (Núñez 2001). The territorial dismemberment of the Mapuche, as historian Bernardo Berdichewsky explains, created the new Mapuche private landowner as well as the new urban worker.

While Indians live primarily on reservations, they can also be found as small independent agricultural landowners, as tenants of small farms and large haciendas, as day laborers, or as workers in the reformed areas of the economy on the *asentamientos* and *centros de reforma agraria*, in expropriated lands or “taken” lands. A small percentage of them live in the urban zones... especially Temuco... Concepción and Santiago (1980).

While the Chilean state had various governments with diverse political ideologies in power, among them right-conservatives, Popular Front or Christian Democrats, all of them shared similar policies of Mapuche assimilation into a hegemonic western “Chilean” culture. Although the promulgation of law 17.729 under Socialist president Salvador Allende’s agrarian reform recognized and returned part of the territory back to

the Mapuche, this policy was quickly halted by the Pinochet military government in 1973.

Law Decrees and Land Rights

Having the Araucanía a source of ideal soil and climatic conditions, the area felt the expansion of business and the development of the forestry industry in its region. The Law Decree (DL) 701 passed in 1974 played a major role laying the groundwork for today's success of Chile's forestry sector. DL 701 established the absolute inability of expropriation of forestry land, and added a 75% bonus towards total cost of forestation and plantation management, while introducing exemptions and reductions to territorial taxes, as well as profit gains made from exploiting forests, both natural and artificial. At the beginning of the Pinochet regime, there was little private sector interest to invest in radiata pine. The unstable political-economic context (concerning property rights), undeveloped markets for processed radiata pine, and absence of secondary markets for young forests (high risk scenario for investors who would have to hold on to their investment for 20 years) (Katz 1999) were major concerns. All these factors together help explain the government's choice of a subsidy to promote the industry in the region—a major success from an industrial policy promotion stance.

Moreover, in 1979, General Pinochet decreed the non-existence of indigenous lands and peoples. This legislation virtually terminated the totality of the Mapuche collective ownership of lands, as it read: “these lands will no longer be called indigenous nor indigenous those who inhabit them” (Núñez 2001). As historian Luis Campos explains, “The cornerstone of this strategy was the legal transformation of ownership—from collective to individual—of the productive unit by liberalizing land transactions

(Campos). Moreover, this new *proyecto país* included the introduction of its new economic model of neoliberalism. The neoliberal model stressed a policy of free-trade, export production, and doctrine of comparative advantage with an emphasis on individual competition and self-reliance (Chasteen). As prices rose, the indigenous communities, unable to participate in this new economic paradigm were the hardest hit.

In response to an economic and political system that did not recognize their ancestral rights to land, the Mapuche mobilized against the dictatorship at the end of the 1970s (Núñez 2001). To help overthrow Augusto Pinochet, the Mapuche signed the *Acuerdo de Nueva Imperial* with Patricio Aylwin, presidential candidate of the *Concertación de Partidos por la Democracia* (CPD) in 1989. In this accord, the Mapuche, together with other indigenous nations, agreed to support “this coalition in its effort to reestablish democracy in exchange for the legal and constitutional recognition of the rights they claimed” (Aylwin 1999).

But how did the Mapuche go from political alliances with the government to violent mobilizations and discussions of autonomy? Although the CPD kept its commitment to an indigenous law, the economic policies of the following governments reinforced a burgeoning sense of betrayal. As Richards explains, “[f]or many Mapuche, guarded optimism has given way to disillusionment as the state has demonstrated that indigenous rights are not a priority when national development is at stake” (Richards 2003). In the same manner, José Aylwin, son of Patricio Aylwin and Comparative Indigenous Law specialist, suggests that the CPD governments after 1994 led to indigenous disappointment and contributed to the call for autonomy: “Whenever there has been a conflict between initiatives which could result in economic investment and the

participatory land rights granted to Indigenous people by the 1993 law, the government has clearly opted for these initiatives” (Aylwin 1999).

Mapuche organizations and communities are currently approaching their struggles for indigenous rights through diverse strategies. The control of local government and participation in state-led development programs are methods within the current framework of the Chilean state. The most noticeable tactics, however, are the occasional violent land seizures in agricultural and forestry property. The latter approach severely agitated the state and interest groups with assets in the region. These actions have led to a dwindling of investments, leading forestry companies to consider the contiguous region of Los Ríos (O’Ryan 2003), or even to internationalize and take the advantage of foreign attraction incentives in Brazil and Uruguay (Flores 2009).

If we take a closer look at the Araucanía today, the latest Regional Competitiveness Index Report for 2008, placed the region 13th out of 13, and particularly last on the a) economic index factor (product, exports, investments, and coefficient of specialization), b) company index factor (magnitude and potential of company productivity), and c) people factor index (considering education, training of labor force, health). If this bleak context is added to the backdrop of Chile’s innovation-based-development agenda with a cluster development strategy: “*Chile potencia alimentaria y forestal*”, the underlining questions of analysis gain importance: does the development of the forestry industry bring greater benefits to the areas where it establishes, as opposed to alternative productive activities in the region? And at the level of the individual: does participating in the forestry sector bring greater benefits to those who work in it as opposed to working in alternative industries?

For this analysis I will draw on the efficiency wage theory model (wages above the competitive market salary), developed for inter-industry comparisons developed by Kruger and Summers (1988) and later applied to the Chilean context by Romaguera (1990). All else constant, when looking at the effect of industry on salary, we can isolate the importance of sector affiliation. With regards to public policy, Katz and Summers (1988) did ask the question “can inter-industry wage differentials justify strategic trade policy? Dickens (1995), later followed to look at industrial policies targeting efficiency wage industries, and how the promotion of employment in these areas can increase GDP (in addition to some measures of welfare), however he posits that the effects on developed economies are likely to be very small, though this has yet to be analyzed in the context of a developing nation. As Romaguera presents, Chile not only has an efficiency wage job market structure but also the forestry sector is one of the higher wage paying industries. These implications are important, when looking at the further development or contraction of the forestry sector in Chile, its economic benefits for the people that participate in it, in addition to its national positive externalities as a carbon emissions capture sector. In this context, I will not only add to the literature on efficiency wage theories and trade policy, applying it to a developing nation, but also add to the literature on the impact and benefits of the forestry sector, by looking at its implications on the Araucanía region and the adjacent region of Los Ríos.

LITERATURE REVIEW

The efficiency wage hypothesis (EWH) posits that a firm or industry may pay a higher than market-wage to increase productivity. For over the last three decades, efficiency wage theory has been used to question the traditional neoclassical theory of the firm (Akerlof 1982), explain involuntary unemployment (Solow; Akerlof 2002), and rationalize the inexplicably ample variation in wages through firms and industries (Krueger and Summers 1988).

A number of economic models of firm behavior helped explain this apparent contradiction. The shirking model suggests that it is in the firm's best interest to pay workers above market-clearing salaries to persuade them from 'shirking' and thus enabling the firm to cut down on monitoring costs (Shapiro and Stiglitz 1984). Stiglitz argues that a wage premium can be utilized to draw and retrain a more competent group of workers in light of heterogeneous skills. Solow (1979) and Akerlof (1982) posit that higher wages could be treated as 'gift-exchange,' increasing worker loyalty and therefore productivity. In all the above models, the underlining assumption is that greater efficiency wages lead workers to be more productive, in so reconciling efficiency wages to profit maximization.

With regards to inter-industry efficiency wage theory applied to the context of developing nations, despite the sharp contrast between Latin American and United States, research shows more similarities than differences: wage differentials are substantial and persist over time, the differentials are correlated across occupations and, to a lesser degree, across company size (Romaguera 1990; Abudhaba & Romaguera 1993; Gatica, Mizala & Romaguera 1995). Romaguera building on Summers & Kruger's model (1988)

looks at the particular case of Chile in detail, and concludes that efficiency wages also hold in this context (1990). This investigation seeks to build on Romaguera's initial conclusions, but takes on the particular lens of looking at sectors that greatly benefited from trade policy interventions, as the case of Chile's forestry sector illustrates.

Furthermore, the literature characterizing the impact of Chile's forestry industry is diverse. Its focus of analysis can be grouped into three broad categories: economic, social indicators, and the industry's direct and indirect effects via product input multipliers. Studies focusing on economic aspects and industry structure are primarily analyzed through variables on production, exports, and direct and indirect employment generated through time at the national level (Morales & Fischer 1992; Escobar et al 1993, 1994; Katz et al 1999). In this area of research, there are no studies focusing on the particular regional impacts of the forestry sector expansion. The present investigation will also contribute to deepening research on this aspect. With regards to studies incorporating social indicators, there is one regional study focusing on the socioeconomic impact of forestry plantation in ten districts of the region of los Lagos (UCC 1996). The present study will focus on the previous two regions north, the region of the Araucanía (the heartland of the Mapuche ancestral territory) and the contiguous region of Los Ríos (also with important Mapuche presence). This makes a comparison of the impact of the forestry sector in the Araucanía and Los Ríos regions more appropriate, especially when thinking in terms of the influence of the Mapuche conflict on forestry expansion. Lastly, studies that include the direct, indirect and induced effects of the forestry industry, Soto and Marshal (2006) analyze the effect that the private company CELCO has had on the

region of Los Lagos, through a methodology that includes aggregate data, data on production inputs, and data provided by CELCO.

Ultimately, I will base and build my work off a national study carried out by O’Ryan (2007, 2008) for the National Wood Corporation (CORMA). In these studies O’Ryan looks and the economic and socio economic impact of the forestry sector on a national scale. He utilizes the Chilean National Socioeconomic Characterization Survey (CASEN) for the years 1996, 2003 and makes an addendum to his first study with data for 2006. This study will utilize the same CASEN data set for 2006. Therefore, this investigation will add to the previous body of work on the impact of the forestry sector, but will focus on its implication at a regional level through a framework of national trade development policy.

CONCEPTUAL FRAMEWORK AND HYPOTHESIS

Given the importance of looking at the variation in salary for a worker in the Chilean forestry sector versus alternative productive activities, the basis for this conceptual framework will be grounded in the work of Alan Krueger and Lawrence Summers on efficiency wages and inter-industry wage structure.⁵ Their findings suggest that if industry wage differences are noncompetitive they have far greater impacts on the allocation of resources than do the wage differences associated with unions or discrimination. In brief, Krueger and Summers conclude that there are important variation in wages which cannot be explained by standard competitive theories.

Al else equal, an efficiency wage structure framework helps focus on the role of industry affiliation after controlling for human capital variables and a variety of job characteristics. Additionally, when thinking in terms of controlling for regional variation of salary and ethnicity, theory on efficiency wages helps explain why if firms pay high wages to some groups of workers – perhaps because they are in short supply or for other efficiency-wage reasons such as shirking – then demands for fairness will lead to a compression of the pay scale, and wages for other groups within the firm/ group/ ethnicity/region will be higher than in other industries or firms.

With regards to the hypothesis for this investigation, it is expected that all else constant, a worker in the forestry industry will earn a higher salary than working for alternative productive activities in the regions of the Araucanía and Los Ríos.

Additionally, when considering the role of property rights and stability in region, based on efficiency wage theory there may be an expected premium on salary, therefore, it can

⁵ Krueger, Alan and Lawrence Summers. *Efficiency Wages and the Inter-Industry Wage Structure*. *Econometrica*, Vol. 56, No. 2 (March, 1988), 259-293

be suggested that all else constants, a worker in the forestry industry in the region of Los Ríos will earn a higher salary than a worker in the forestry industry in the region of the Araucanía. Nevertheless, ultimately it is not expected that regional differences should appear for workers in the forestry industry with a Mapuche background when controlling for all the factors in the model.

To test these different hypothesis the F-test that industry wage differentials jointly equal 0 shall be run, the sign on the coefficient will signal if a salary is greater against the other. Efficiency wage theory posits that any wage differentials suggest that other factors besides opportunity cost are important in explaining wages. Additionally, t-tests on the different coefficients will help explain if there are wage differentials given different backgrounds. This will be especially useful, when looking at the broader context of ethnic conflict and its controversial relation in the region of the Araucanía.

DATA AND METHODS

The Chilean National Socioeconomic Characterization Survey (CASEN) is undertaken every three years, measuring the country's progress in the economic and social spheres. It investigates how many people in Chile are able to satisfy their basic needs – defined by a market basket of goods and services. The survey is led by the Chilean Ministry of Planning (MIDEPLAN), carried out by the Economics Department of the University of Chile, and validated by the U.N.'s Economic Commission for Latin America and the Caribbean (ECLAC).

In brief, the CASEN survey is carried out to serve the following general objectives: to know periodical population and household situations, especially those under poverty conditions and priority groups, regarding: demographics, education, health, housing, occupation, and income aspects. The sampling framework of the CASEN survey for 2006 and 2003 is based on the 2002 Chilean Population and Census data, taking into account cartographic material, such as population and housing. The type of sampling is geographically stratified.

- Sampling Details for CASEN 2006

The CASEN survey was applied between November 7th and December 20th 2006, to a national total of 73,720 homes and 335 municipalities. The population sample size of 268,873 can be expanded to a household population of 4,337,066 and an expanded national population of 16,152,353. Particularly for the Araucanía, this covered the 32 municipalities of the region, surveying a total of 7,012 homes, 3,396 in urban areas and 3,616 in rural areas. This is the equivalent to 25,248 people surveyed. Additionally, for Los Ríos, the survey covered the 12 municipalities of the region, surveying a total of

2,477 homes, 1,285 in urban areas and 1,192 in rural areas. This is a total of 8,874 people surveyed. With regards to error, considering a maximum variance and a confidence level of 95%, a total sample error of 0.036 was predicted at a household level.

- Population of Analysis

Given that this investigation is looking at the variation in salary for a worker in the Chilean forestry sector versus alternative productive activities in the regions of the Araucanía and Los Ríos, the following subpopulation within the CASEN data will be used: working males and females of ages 15 and over residing in the regions of interest. MIDEPLAN created an aggregate variable for national employment and the working population, using age 15 as the lowest cut-off. Most studies that use CASEN data utilize this aggregate variable when looking at the employed and unemployed population. For literature consistency, I will use the same criteria when looking at this subpopulation of interest. When taking these cut-off points into consideration, the sample size for the Araucanía shows 8,181 respondents while Los Ríos presents 2,931 respondents.

- Regression Model

Within this framework an ordinary least squares model is appropriate, particularly a linear first differencing model.

THE STATISTICAL MODEL

Based on the following linear first difference model:

$$\Delta w = \Delta D^* \alpha + \Delta \varepsilon$$

where Δw is the change in wage, ΔD^* is a K vector of change in industry dummy variables, α is a K vector of parameters, and $\Delta \varepsilon$ is a mean disturbance. The symbol Δ denotes a change in a variable. There are $K+1$ industries and N observations. Because of collinearity, only K industries are in equation.

To look at the importance of industry affiliation in explaining relative wages, one must control for human capital, demographic background, and working conditions. Since the interest is wage differentials between industries, the dependant variable will be a worker's monthly income from a particular productive activity. The employment condition of each individual was controlled for with a dummy variable for contract.

Independent variables accounting for human capital characteristics will be an individual's gender, controlled by a binary dummy variable for male and female, a respondent's age in years starting with age 15, and a person's ethnicity controlled by a binary dummy variable that accounts for self-reporting on indigenous origin. A respondent's conjugal status will be accounted for by a dummy variable controlling for single or married. A worker's education attainment level will be controlled through a dummy variable taking on the following characteristics: no formal education, incomplete primary education, complete primary education, incomplete secondary education, incomplete secondary technical-professional education, complete secondary education, complete secondary technical-professional education, incomplete technical or university education, and technical or university degree attained. A worker's occupation will be accounted for by a dummy variable separated into the following CASEN categories: public sector employee, private sector employee, and armed forces. To control for regional factors a dummy variable will be included for an individual's place of residence, the Araucanía or Los Ríos. Ultimately, to look at productive activity wage differentials, various industry dummies were included: forestry, agribusiness, food, manufacturing, infrastructure, commerce, services, financial sector, and other. To fit the data better, within this model's specification age was squared.

SOCIOECONOMIC ANALYSIS FOR THE PRIMARY FORESTRY REGIONS

This section will cover the general socioeconomic trends taking place in the regions where forestry activities are concentrated. Income, poverty, and education are the primary parameters analyzed for forestry communities, regional averages (VII to X), and overall national statistics. The evolution of these indicators was constructed with CASEN data from 1992 to 2006, using people as the basic unit of information, grouped in a community, regional, and national level. It is also important to underscore that an individual is considered to work for the forestry sector, when he or she has self-identified to work for this industry regardless of a contractual agreement. CASEN begins its surveys in 1992, at the time; these regions already presented the lowest socioeconomic indicators for the country.

Discussion

As highlighted in table 1, regions where forestry activities are concentrated (VII to X) present the greatest poverty rate in Chile. For this table, income per capita is constructed as the sum of an individual's monthly income (payment of all productive factors) and subsidies, where the Araucanía earns approximately 22% less than the country average for 2006. With a national poverty rate of 14%, regions VII, VIII, and IX show indicators between 4 and 7 percentage points higher, in addition to the lowest regional income per capita on a country scale. With regards to illiteracy, the national rate averages at 4%, while regions VII-X peak at 6% and 7%. Regardless of how low these socioeconomic indicators may be, it is important to underscore that they do not imply causality, meaning that the main productive activities of these regions should not be understood as the sole determinant of these outcomes (O'Ryan 2008). Furthermore, this

cross-sectional photograph fails to capture the positive trend occurring in forestry communities, which arises when looking at the evolution of these indicators though time.

Table 1: Regional Socioeconomic Variables for 2006

Region	Total Income per Capita 2006*	Percentage of Poor & Indigent	Illiteracy Rate
I	\$306.796	14%	2%
II	\$366.090	7%	1%
III	\$361.589	11%	2%
IV	\$271.607	16%	4%
V	\$285.778	15%	3%
VI	\$267.040	11%	6%
VII	\$240.818	18%	7%
VIII	\$273.493	21%	6%
IX	\$266.020	20%	7%
X	\$290.884	14%	6%
XI	\$326.893	9%	4%
XII	\$382.792	6%	3%
M.R.	\$418.395	10%	2%
Country	\$341.326	14%	4%

*Total income for this chart considers an individual's income and subsidies.
Source: University of Chile based on CASEN 2006

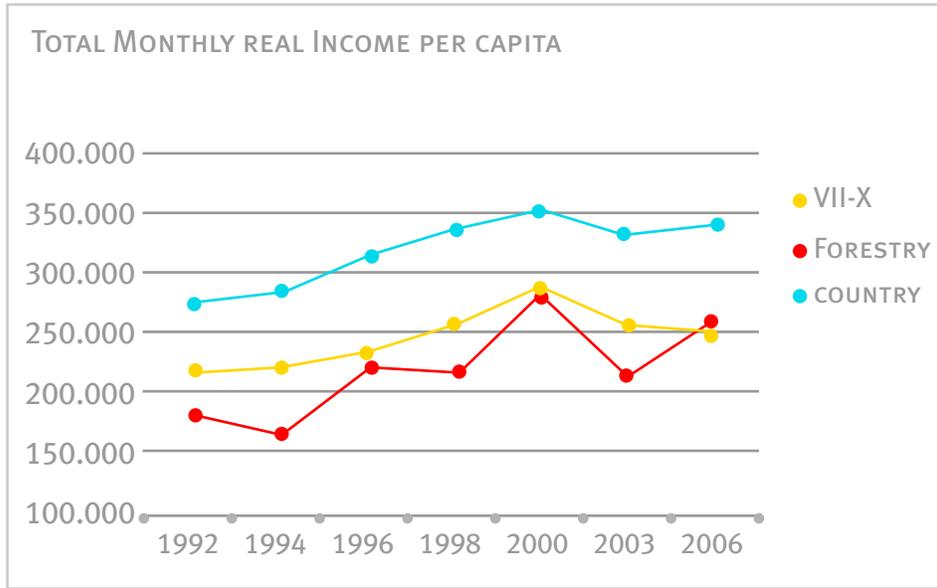
Income

Graph 1 shows that although average income for regions VII-X decreased between 2000-2006, the income of families working in the forestry sector actually increased for the 2003-2006 period. Though this is a similar pattern that is present in the national average, this shows an even steeper increase than the country trend.

Historically, the average national income is greater than that exhibited by the forestry communities. Nevertheless, the gap decreases considerably after 2003—year of maximum distance recorded by CASEN. It is important to notice that 2003, also shows that average income per capita of the main forestry regions was greater than the actual

average income of workers within the sector. However, this difference greatly decreases by 2006, becoming not statistically different from the regional average.

Graph 1: Total Monthly Real Income per Capita
At a Forestry Community, Regional, & National Level

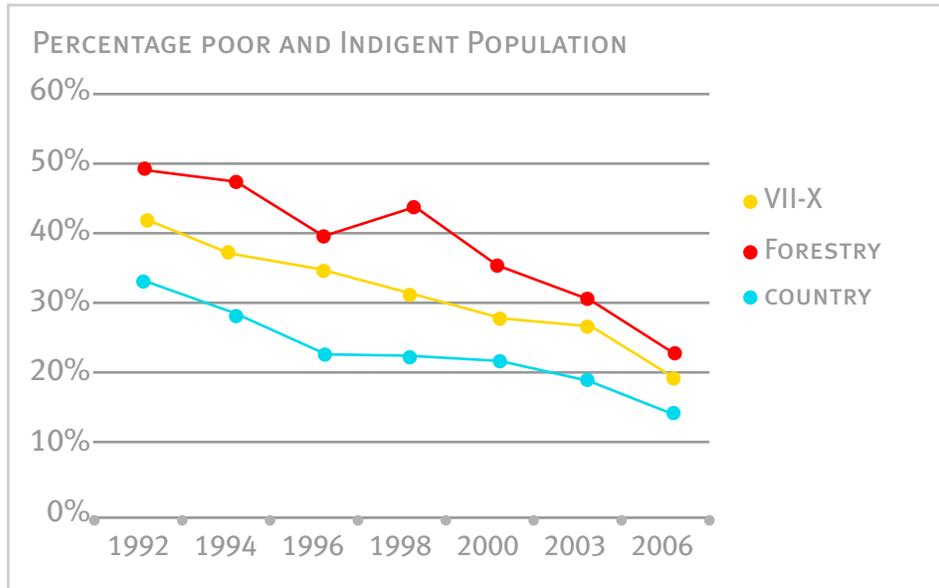


*Total income for this chart considers an individual's income and subsidies.
Source: University of Chile based on CASEN

Poverty

Over the last twenty years, Chile's poverty levels greatly declined in the regions where forestry activities are concentrated. As present in the indicators above, forestry communities exhibit greater poverty rates than their regional averages, as well as with the rest of the country. Even so, as graph 2 illustrates, the gap between forestry communities and regional averages decreased starting in 2003, becoming non statistically significantly different by 2006.

Graph 2: Percentage of Poor and Indigent
At a Forestry Community, Regional, & National Level

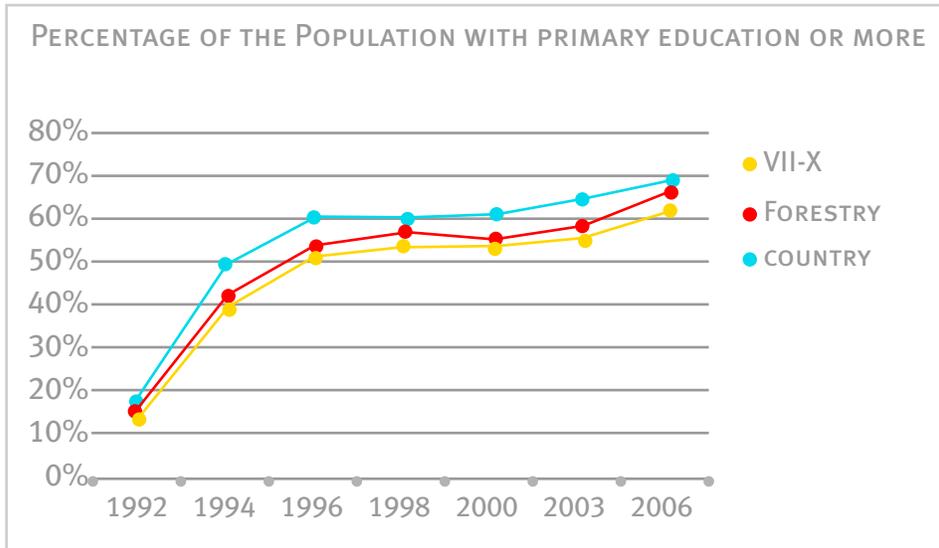


Source: University of Chile based on CASEN

Education

Graphs 3, 4, and 5 show the evolution of the various levels of education attainment. Graph 3 presents the growth in time by population with the greatest amount of education. This twenty-four year period shows how population educational achievement greatly increased from a convergence at 15% in 1992, to moving beyond 60% in 2006 with a primary education or more. Forestry communities exhibit education indicators slightly above their regional averages. This improvement becomes greatly apparent by 2006, when education levels for forestry communities ultimately converge with the national average, with a difference that is not statistically significant from zero.

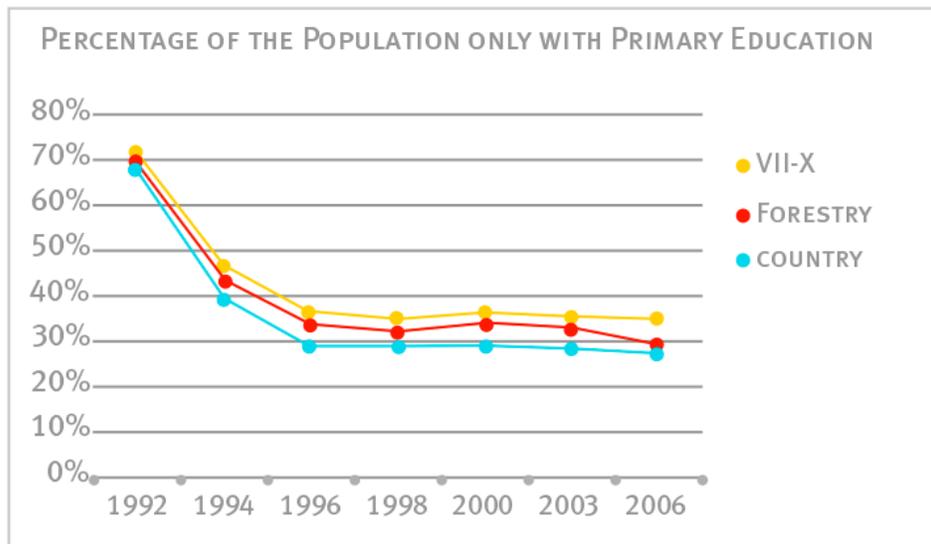
Graph 3: Percentage of Population with Primary Education or More At a Forestry Community, Regional, & National Level



Source: University of Chile based on CASEN

Graph 4 below shows the percentages of population with only a primary education by grouping. The period 1992-2006 presents an important decrease of about 40 percentage points for this target group. Starting at a national average of 70% of the population with only a primary education level, this segment decreases to below 30% in 2006. As present also in the trends of graph 3, forestry communities once again converge with the nation's average, and any apparent differences become none statistically significant.

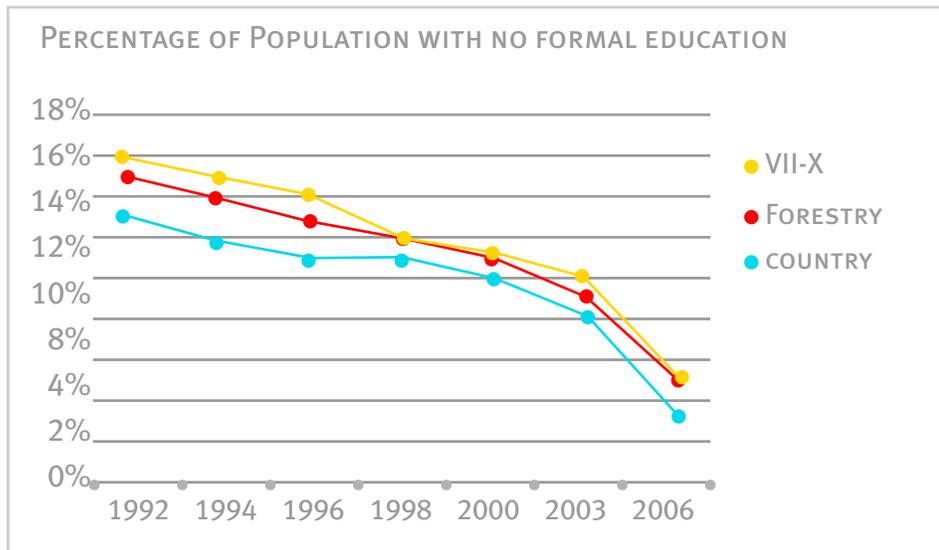
Graph 4: Percentage of Population with only a Primary Education At a Forestry Community, Regional, & National Level



Source: University of Chile based on CASEN

Finally, graph 5 presents an important down trend in the population with no formal education, a pattern that decreases even more considerably between 2003 and 2006. For this three-year period, the actual indicator practically decreases by half. Though all three trends for the various population groups are downward sloping showing a drastic improvement, the no-formal education in forestry communities does not fall as markedly as the national and regional trends; however, its stays within its regional rate.

Graph 5: Percentage of Population with No Formal Education on a Forestry Community, Regional, & National Level



Source: University of Chile based on CASEN

In conclusion, with regards to education and the population living within forestry communities, the great reduction of those with no formal education shows how these groups actively attained greater educational levels, which ultimately put them towards a convergence with national trends. Though the actual population with no formal education did greatly decrease within these regions, it still lags behind the national average. Thus, education as a public good should certainly remain a concern for public authorities in these regions.

Comparisons by Productive Sector for the Araucanía & Los Ríos Region

Upon reviewing the evolution of socioeconomic indicators of the areas where forestry is a major productive activity, the following section will focus solely on the particular regions of the Araucanía and Los Ríos, which are the primary regions of concern for this investigation.

As previously mentioned, CASEN 2006 respondents self-reported the sectors in which they work. From these answers, categories were collapsed into industry groupings. For the purpose of this study, the forestry industry includes also the wood and paper product sector. The variable for agribusiness accounts for the fresh produce and cattle sector. Manufacturing includes the chemical and textile industries. The variable for food contains processed and canned goods, as well as alcohol and tobacco respondents. The services category also incorporates the utilities, restaurant, and hotel business. While the infrastructure variable additionally takes on the transportation and communication industry. Commerce stands both wholesale and retail, while the variable for capital includes the financial and insurance sector. Finally, given that aquaculture and mining are not major productive activities in both of Araucanía and Los Ríos, they have been grouped into the category labeled “other”, in addition to any respondents falling under the category of CASEN’s “unspecified industries”.

Tables 1 and 2 present frequency distributions of workers classified by industry and region. Both Araucanía and Los Ríos are similarly distributed, with the largest percentages concentrated in the agribusiness, services, infrastructure, and forestry sectors respectively. However, there is a difference in actual levels of concentrations. The Araucanía presents a higher degree of activities in the renewable resources industry, with

47% of the working population in agriculture and forestry or almost half of the workforce of the region, while 38% of Los Rios is concentrated in these productive sectors.

Table 1: Frequency Distribution of Workers by Industry in the region of the Araucanía

Industry	Freq.	Percent %	Cum. %
Forestry	900	11	11
Agribusiness	2,959	36.17	47.17
Manufacturing	268	3.28	50.45
Food	180	2.2	52.65
Services	1,946	23.79	76.43
Infrastructure	940	11.49	87.92
Commerce	722	8.83	96.75
Capital	167	2.04	98.79
Other	99	1.21	100
Total	8,181	100	

Table 2: Frequency Distribution of Workers by Industry in the region of Los Ríos

Industry	Freq.	Percent %	Cum. %
Forestry	298	10.17	10.17
Agribusiness	821	28.01	38.18
Manufacturing	92	3.14	41.32
Food	87	2.97	44.29
Services	714	24.36	68.65
Infrastructure	399	13.61	82.26
Commerce	315	10.75	93.01
Capital	67	2.29	95.29
Other	138	4.71	100
Total	2,931	100	

With regards to the contractual situation of workers, both regions exhibit an equal percentage of their workforce with no contracts at 14.4% (see tables 1 and 2 in Appendix A for details), and from this segment of the population, 30% self-reported as indigenous.

When comparing the actual breakdown between the two renewable natural resource industries, on a total scale, 21.6% of forestry workers do not have contracts, in contrast to 10.5% of those in agribusiness. When these percentages are further decomposed by regions, 24.2% of forestry workers in the Araucanía do not have

contracts, in contrast to 13.7% in Los Rios. However, when looking at the regional breakdown of the agribusiness sector, the reverse situation appears to happen, 9.9% of workers in the Araucanía do not have contracts, in contrast to 12.7% in Los Rios.

To further deconstruct these statistics and deepen the analysis, with regards to the ethnicity of forestry workers with no contract in the Araucanía, 32.6% are indigenous in contrast to 46.4% in the agribusiness sector. In the region of Los Rios, 29% of forestry workers with no contract are indigenous, while 34% of agribusiness workers also share these characteristics. It is important to note that the agribusiness sector has a high demand for seasonal work dependent on planting and harvest seasons. Consequently, it is safe to assume that the population working with no contract in this industry can be considered the most vulnerable, given the precariousness of their employment and constant fluctuation of seasonal labor demand. Within this uncertain work scheme, almost half of this group is indigenous within the Araucanía.

REGIONAL REGRESSION ANALYSIS OF WAGES

In the context of understanding the effects of industry on wage and further delving deeper into this regional investigation, it is appropriate to analyze the results of the aforementioned multivariate regression following the models present in efficiency wage economic literature.⁶ Given the particular interest of regional variations in wages by industry, a dummy variable was added, and labeled “araucania”, to capture any regional effect. To any differences with regards to ethnicity, a dummy variable was included and labeled “nonind”. This dummy represents all those who self-reported being non-indigenous in CASEN 2006. Therefore, the base line for this OLS regression is an indigenous female worker in the region of Los Rios, with no contract, single, and no formal education. Given that the dependent variable of this model is an individual’s monthly wage solely from his or her productive activities (excluding possible subsidies received by each respondent), results are reported in 2006 Chilean pesos with robust standard errors.⁷

VARIABLES	(1) wage
male	52,419*** (5,487)
age	2,563*** (606.0)
age2	-17.87** (7.709)
nonind	5,482** (2,360)
araucania	-10,412*** (3,282)
married	16,461*** (3,468)

⁶ For a description of each coefficient please see appendix X

⁷ One dollar observed for 2006 was \$530.28 Chilean Pesos (CLP), Chilean Central Bank
<http://si2.bcentral.cl/Basededatoseconomicos/951_455.asp?f=A&s=TC-OBS-MES>

less than high school	22,038*** (4,655)
high school	65,871*** (5,815)
some college	123,215*** (11,380)
technical school	149,201*** (12,544)
college	355,834*** (15,926)
postgraduate	540,447*** (57,617)
public	35,985*** (7,539)
domestic	17,480*** (6,245)
armed forces	167,329*** (21,073)
forestry	9,186*** (3,462)
manufacturing	20,593** (8,488)
food	26,070*** (8,651)
services	-987.9 (5,090)
infrastructure	21,662*** (4,030)
commerce	7,029 (4,461)
capital	37,863*** (12,258)
other	41,142*** (10,462)
contract	43,782*** (2,464)
Constant	-64,939*** (12,225)
Observations	6520
R-squared	0.406

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

As the results of the above regression show, 41% of the variation in a worker's salary is explained by the factors included in this model. Additionally, given that most of the variables introduced are dummies, a correlation matrix was run to insure that no variables were highly correlated, potentially taking away explanatory power from the

regression. As presented in Appendix B, most results were under 0.1 and none over 0.5; therefore, it is safe to assume that coefficient accurately represent their portion of the variance in salary.

As anticipated by the economic literature, the estimates on gender, age, marriage, education, and contract are all positive and statistically significant on all conventional levels (p-value of 0.00). A male worker is projected to earn CLP\$ 52,419 more than a female. This is practically USD\$100 more in salary a month. When taking into consideration that the average real income (accounting for salary and subsidies) for the Araucanía was USD \$502, this difference is about 20% of the average regional income. If we also take into account employment stability, and look at the coefficient on contract, an individual is projected to earn CLP\$ 43,782 more a month if they are in a legal contractual relationship with their employer. This is about USD\$ 83 more in salary, or an additional 17% within the average regional income for the Araucanía. Consequently, with all other factors in the model held constant, a male worker with a contract is anticipated to earn about 37% more than a female worker without a contract, in the context of the average regional income for the Mapuche heartland.

If we take a closer look at the forestry sector, in the Araucanía only 2% of respondents with no contract were female, and of those 20% were indigenous. In Los Rios, 2% of those with no contract in forestry were also female, however, 100% were ethnically indigenous. With regards to agribusiness, of the respondents with no contract in the Araucanía, 11% were female, and of those 36% were indigenous. In the region of Los Rios, 10% of women working in agribusiness had no contract, of those 30% were indigenous. So if we look at these answers in the context of the above regression results,

all other factors held constant, a non-indigenous male with a contract in the forestry sector is projected to earn approximately USD\$210 more than a female indigenous worker with no contract in the agribusiness sector. If we add the regional effect that is statistically significant at all conventional levels, this difference increases by USD\$ 20, where the same forestry laborer in Los Rios is anticipated to earn USD\$230 more than an indigenous female agribusiness worker in the Araucanía, a case that represents 36% of laborers with no contract in this region.

With regards to other industry coefficients, it is important to underscore the negative yet not statistically significantly difference in salary for a worker in the services sector, compared to one in agribusiness. A positive relationship is found for those working in commerce, when contrasted to the base category, however this difference is also not significantly different from zero. It is also important to highlight that though the coefficient on other sectors is positive and highly significant, this captures the answers of respondents in the mining and aquaculture industries, which are productive activities that are not greatly expandable in these regions, given their particular natural endowments and geography. Additionally, it is also important to note that the estimate on “other” is also capturing the information on all respondents with unspecified industries. Therefore, it is best to focus on the coefficients on the financial, food, infrastructure, and manufacturing industries, which are all positive and show statistically significant results.

However, if one returns to tables 1 and 2 and looks at the concentration of workers by industry and region, of the highest salary premium by sector—found in the financial and food industry, these sectors register a concentration of working population of around 2%, while the manufacturing sector increases to 3%. Finally, the infrastructure

sector represents about 12% of the workforce in the Araucanía, while about 14% in Los Ríos. The infrastructure coefficient also takes into account transportation and communication activities, which help build the backbone support of further development for any regional cluster expansion. As illustrated by the regression results, working in the infrastructure sector has a salary premium that is statistically significant on all conventional levels, and is estimated to be an additional USD\$41 above the salary of an agribusiness worker, holding all other factors constant.

When comparing the coefficient on infrastructure to that of one in the natural resources area, the dummy variable may actually be capturing part of the importance of more sophisticated technology use and application within the industry. Gatica, Mizala and Romaguera (1995) previously suggested this idea when looking at inter-industry wage differentials and the manufacturing sector in Brazil, suggesting a “relationship between technology and wages that extends beyond the size effect.” Ultimately, an expansion of any vertical sector is going to create a higher demand for infrastructure; thus, creating a virtuous cycle between cluster development and supporting industries.

POLICY DISCUSSION

Land, A Factor of Sociocultural & Productive Development

Land is not the only factor, though it is certainly at the core of State-led programs targeting Chile's indigenous peoples, via its Land & Water Fund (FTAI) and the Ministry of National Assets. The close relationship between indigenous culture and territory, posits the underlining assumption that land and water constitute the basic drivers for further socioeconomic development of the country's indigenous peoples, particularly those in the rural areas (see tables 3-4 below for indigenous land subsidy distribution). It is however important to recognize that the urban indigenous are also a very relevant segment, given that a great part of the Mapuche actually live in cities. Inhabiting and working in urban contexts dates back extensively, thus strategies for indigenous socioeconomic development should probably move beyond land as the sole factor of production and foundation of intervention.

Table 3: Indigenous Land Acquisition Subsidy 1995-2008

Year	Nº of Families	Surface	Assigned Subsidy in CLP
1995	121	1,675	\$1,002,035,851
1996	139	1,397	\$1,373,180,307
1997	120	1,523	\$1,472,798,427
1999	298	3,089	\$3,754,174,541
2001	328	3,310	\$3,682,589,370
2002	336	3,425	\$4,811,040,021
2003	19	194	\$366,657,466
2004	158	1,665	\$1,962,000,000
2005	392	3,320	\$4,357,178,557
2006	562	4,137	\$5,447,637,539
2007	426	3,493	\$6,600,675,480
2008	386	12	\$6,247,450,000
Total	3,285	27,240	\$41,077,417,559

Source: CONADI

However, for the indigenous peoples in rural communities of the Araucanía and Los Ríos, more land and of better quality can help lessen rural migration to cities. This

can strengthen identity and culture while creating positive benefits, if they are accompanied by the promotion of productive activities related to land with technological improvement. Additionally, indigenous land subsidies are an attempt to repair and/or compensate the historical debt of the Chilean State with regards to the loss of indigenous territorial patrimony, and seek to reduce or mitigate conflicts that can perturb Chile's international country risk perception.

Table 4: Indigenous Land Acquisition Subsidy by Region 1995-2008

Region	Nº of Families	Surface	Assigned Subsidy in CLP
Araucanía	1,609	15,007	\$22,525,601,139
Bío-Bío	855	4,931	\$9,291,493,355
Los Lagos	450	3,774	\$4,922,622,552
Los Ríos	279	2,646	\$3,605,488,391
Magallanes	21	311	\$22,600,000
Magallanes & Antartica Ch.	68	570	\$668,612,122
M.R.	3	3	\$41,000,000
Total	3,285	27,242	\$41,077,417,559

Source: CONADI

As previously mentioned, law decree 701 is perhaps the most significant public intervention in the development of Chile's forestry wealth. The planting of one million hectares of radiata pine and eucalyptus subsidized through this policy produced important economic and environmental benefits for the country. Easy access to technology and capital enabled the forestry industry to make extensive use of this public instrument. However, for the period 1974-1995, small property owners and indigenous communities only received 5% of total funds assigned by the State. Amendments to the law in 1998 and then in 2000, sought to correct this favoring of large corporations, extending benefits to small landowners, in addition to generating incentives for the recuperation of eroded soil, and prevention of desertification and land degradation (Borregaard et al 2008).

Furthermore, the alternative use of land is inevitably an issue when discussing different productive activities for the regions of the Araucanía and Los Ríos. When

focusing on the effects of scale, Haltia and Keipi (2000) compared net environmental benefits from cattle farming investment versus forestry activities in Chile and Brazil. The authors suggested that when taking into account scale, planting pine and eucalyptus resulted in significantly greater environmental benefits than cattle farming. Highlighted positive effects were CO² sequestration and prevention of soil erosion. Furthermore, environmental benefits can be reinforced if forestry operations are plantation-based, not replacing native forest, and located in land previously used for agriculture. This is not to suggest that Chile should relinquish its aspirations of becoming a world-renowned food exporter, however, it does posit that it should do this in a comprehensive manner conjointly with the forestry industry. Foreign markets are becoming more demanding with regards to a foreign product's carbon footprint. Attaining a carbon neutral agribusiness sector will certainly require joint collaboration with the forestry sector, particularly when it comes down to the most effective and efficient land use in this regard.

The Forestry Securitization Bond

An Alternative for Small Indigenous Land Owners

The securitization bond was a pioneering innovation in Latin America, developed by SIF S.A., *Sociedad Inversora Forestal*, originally a Fundación Chile⁸ subsidiary. It is a fixed income instrument, acquired by investors in capital markets, which is backed by usufructs on radiata pine forests and land planted by SIF in Regions VII and VIII. With support from the Chilean Economic Development Agency (CORFO) and the Ministry of Agriculture, the bond resolved the need of small farm owners, while it generated

⁸ Fundación Chile is a public-private partnership, between the government of Chile and the International Telephone and Telegraph Corporation of the United States. For more information see www.fundacionchile.cl

important environmental benefits in favor of the country's south. The successful placement of the first bond for US\$13 million, with AA minus and A plus classifications, at an 8% rate of issuance in dollars, opened the way for generating a virtuous cycle of economic, environmental and social benefits. When Fundación Chile began the SIF project no other entity used this financial instrument. Today, there are three forestry funds in Chile implementing such a model. With the help of the investment bank Asset Chile, over 1,564 hectares of eucalyptus and 4,333 hectares of radiata pine were sold in February 2009. This project generated an investment of US\$40 million and additional forestation of 15 thousand hectares (www.fundacionchile.cl).

In the end, the modification of Law 701 in favor of small to medium-sized companies/ landowners, to protect the environment and encourage the recovery of poor land, showed mixed results. The shift gave smaller landowners more opportunities, but most did not have the financial capacity to support the long planning cycle of plantations. Managed by SIF, land use agreements facilitated the conversion of eroded land within small and medium farms into forestry plantations. Under these agreements, small and medium landowners received regular payments from the Fund for land use during the forestry cycle. This way the landowner could avoid making direct investments, while having to wait many years for his or her return on investment.

The areas targeted by the Fund were dry, eroded sectors without irrigation, primarily used for extensive livestock production. Other land was used for limited crop cultivation, but income potential was low. In 1998, Fundación Chile prepared a study looking at income derived from lands similar to those in the SIF initiative. Results for the investigation showed that the great majority of alternative uses of the land, such as

livestock production (cattle and sheep) and agriculture (wheat and lentils), yielded less than US\$40 per hectare in returns to each owner. Based on the gathered data, SIF paid US\$40 per hectare planted to each project participant. The majority of landowners in the SIF initiative generally had pre-project monthly incomes of \$500. Most landowners retained land for personal use. However, through the sale of their land use rights, they were also able to increase their annual income by 25% to 300%. Additionally, Fundación Chile estimated that the project on average would employ 275 forest workers daily over the next 25 years.

Actual logging work was contracted to Forestal Mininco and Forestal Masisa, two of the largest forestry companies in Chile. Internationally recognized CertforChile⁹ independently certified all plantation practices, to insure that sustainable forest management and chain-of-custody standards were met. The structure, sale and operation of the Fund were registered in the Chilean Stock Exchange. This offered Chilean institutional investors new alternatives to invest in the country's forestry sector. The Fund subsequently introduced a forestry-backed security to the Chilean capital market, supported by the net proceeds of the harvests and commercialization of these forestry assets. Additionally, all contracts were covered under long-term administrative and off-take agreements with Forestales Mininco and Masisa.

In line with the environmentally virtuous cycle of this initiative, a SIF Carbon Sequestration Project was included. By expanding the total area of carbon sinks in the

⁹ CertforChile is a national standard created under the leadership of Fundación Chile and the Instituto Forestal (the Chilean government agency for forest research and official statistics) and the internationally recognized PEFC (Program for the Endorsement of Certification Schemes). CertforChile seeks to improve forest management practices through the application of sustainable development principles, taking into account environmental, social and economic dimensions of sustainability and explicitly protecting special and unique forest areas, including sites of cultural or ecological significance.

country, the SIF initiative sequesters up to 385,280 tons of additional carbon during the lifetime of this project. The program will result in a net addition of approximately 55.04 tons of carbon storage per hectare for the lands included in the initiative.

Ultimately, at its initial phase SIF intentionally only purchased land use rights in Chile's VII and VIII regions. This was explicitly done to avoid intervening in areas with potential conflicting claims to land, such as those in the IXth Region—the Mapuche heartland. Then again, the success of the SIF model could be an interesting development alternative not only for the more stable region of Los Ríos, but also for the indigenous families benefitting from CONADI land rights within the Araucanía.

Participating in a SIF initiative can give small and medium-sized indigenous landowners the possibility of not only making use of their soil for subsistence agriculture, but also complementing their income by participating in a larger project of sustainable forestry. This solution not only helps improve their socio-economic standing, but also helps foster their socio-cultural tie to the land, as Mapuche or “people of the earth”. In the context of a SIF scheme, indigenous small and medium sized indigenous landowners do not have to find themselves in a dichotomous bind between subsistence agriculture and trying to make ends meet competing in a greatly disadvantaged situation (less access to credit and infrastructure) within a market structure. Consequently, having the possibility to participate in a SIF scheme would provide a virtuous framework for land use, positive externalities, market participation, sustainable development, and socioeconomic improvement for the indigenous communities of la Araucanía and Los Rios.

CONCLUSION

Development is generally defined as a process constituted by activities leading to the use, improvement or conservation of natural or economic assets and services, with an objective of maintaining or improving the quality of human life. Although this definition can be applied to all societies and nations, when focusing on economic wellbeing, it becomes less applicable to indigenous peoples. Within the indigenous world, development cannot be conceived independent from a particular culture and/or cosmovision (CONADI).

In this context, the Inter-American Development Bank currently proposes a more adequate term under “development with identity”. This concept focuses on a holistic approach to reducing unequal conditions, marginalization, and low income, in favor of an increase in access for gender equity, as well as opportunities in economic and social development. All within a framework of strengthening identity, culture, territory, natural resources and social organization, under the premise that sustainable development requires a leading role of its beneficiaries. In addition to an appreciation and respect for individual and collective rights, in the understanding that indigenous peoples development to a great extent benefit society as a whole.

Within this discussion, this study between the regions of the Araucanía and Los Ríos, sought to look at two comparable geopolitical areas regarding natural resource and climatic factor endowments. This was done through the lens of various productive alternatives currently present in the regions, while attempting to isolate the effects of a particular industry on wage. While reviewing the various statistical results and thinking

about their implications for public policy, one cannot look at this information without acknowledging particular limitations.

This inter-industry wage regression explains about 41% of the variation in an individual's salary, holding other factors in the model constant. It is a cross-section analysis of the year 2006, which will certainly benefit from new upcoming data found in CASEN 2009 (yet unreleased). All this said, it is safe to assume that even with this new information, actual industry "effects" would not be anticipated to change drastically. When analyzing the implications of the coefficients on region, it is important to underscore that the premium of working in Los Ríos or the negative effects of doing this in the Araucanía is not necessarily static; the coefficient may be capturing the implication of history within the region. Though history cannot be changed, current and future circumstances can certainly be improved. Here lies the space for public policy.

When taking a second look at the regression model results, one cannot expect hoards of agribusiness workers attempting to move into the finance sector, given the understanding that there is a premium effect to working in this particular industry. Nor should this regression ever be interpreted to support advocating direct intervention in favor of a particular industry over another. But, when looking at these results in the context of who these workers may be and their areas of concentration, i.e. an indigenous small-sized landowner attempting to make it through subsistence farming, while complementing a household income with temporary work. This contextual analysis can help shed light on potential development projects benefitting some of the more marginalized sectors of Chilean society.

Opening the opportunity for indigenous small and medium-sized landowners to participate in an initiative such as the forestry securitization bond can help promote “development with identity” through an inclusive scheme. SIF is an initiative that not only brings together the financial sector, the forestry industry, the public sector (for oversight and regulation) and the non-profit area, but also promotes sustainable development practices, by closely abiding to international standards, strong oversight and persistent auditing that is embedded within such internationally recognized certification.

Chile’s bet on cluster development as part of its country competitiveness strategy should certainly look at the implications of explicitly targeting certain sectors. Within the clusters that are greatly land intensive, agribusiness stands out when thinking of particular factor endowments in the regions of the Araucanía and Los Ríos. However, when faced with limited resources, it is important to underscore the benefits and positive externalities of also having a thriving forestry sector in the area. The potential to offset carbon emissions for the region’s productive activities, will surely be key to the future of export promotion. Ever growing concern with CO² and global warming is creating more demanding consumers when it comes down to a product’s carbon footprint—true for produce and various forms of meat, staples of Chilean export.

Ultimately, this investigation seeks to be a contribution in a regional approach to the implications of different productive activities and their move towards a more inclusive country project of development with identity. Chile must strive to push its agenda forward making it inclusive of its various peoples and industries, so they can not only participate in the nation’s wealth creation but also partake in reaping its benefits.

APPENDIX A

Table 1: Percentage of Workforce with No Contract by Industry in the Araucanía

Industry	Freq.	Percent	Cum.
Forestry	218	18.51	18.51
Agribusiness	295	25.04	43.55
Manufacturing	30	2.55	46.1
Food	23	1.95	48.05
Services	376	31.92	79.97
Infrastructure	154	13.07	93.04
Commerce	56	4.75	97.79
Capital	19	1.61	99.41
Other	7	0.59	100
Total	1178	100	

Table 2: Percentage of Workforce with No Contract by Industry in Los Ríos

Industry	Freq.	Percent	Cum.
Forestry	41	9.74	9.74
Agribusiness	104	24.7	34.44
Manufacturing	11	2.61	37.05
Food	5	1.19	38.24
Services	142	33.73	71.97
Infrastructure	71	16.86	88.84
Commerce	30	7.13	95.96
Capital	6	1.43	97.39
Other	11	2.61	100
Total	421	100	

APPENDIX B

. cor araucania male edad edad2 nonind married contract lhgh high scolg tech col post owner self pub dom fam arm forest manu food serv infra com cap other
(obs=6712)

	arauca-a	male	edad	edad2	nonind	married	contract	lhgh	high	scolg	tech	col	post	owner	self	pub	dom	fam	arm	forest	manu	food	serv	infra	com	cap	other
araucaania	1.0000																										
male	-0.0136	1.0000																									
edad	-0.0335	0.0464	1.0000																								
edad2	-0.0336	0.0524	0.9842	1.0000																							
nonind	-0.1006	-0.0568	0.1160	0.1133	1.0000																						
married	-0.0068	0.1240	0.4239	0.3846	0.0891	1.0000																					
contract	-0.0389	0.0484	0.0740	0.0571	0.0801	0.1264	1.0000																				
lhgh	0.0008	0.1831	0.2583	0.2455	-0.1323	0.0834	-0.1532	1.0000																			
high	-0.0049	-0.0443	-0.2859	-0.2698	0.0417	-0.1028	0.0669	-0.7174	1.0000																		
scolg	0.0130	-0.0644	-0.1080	-0.1053	0.0529	-0.0450	0.0208	-0.1607	-0.1850	1.0000																	
tech	-0.0267	-0.1160	-0.0384	-0.0482	0.0595	-0.0034	0.0577	-0.1510	-0.1739	-0.0389	1.0000																
colg	0.0220	-0.1544	0.0949	0.0855	0.0936	0.0707	0.1109	-0.2053	-0.2363	-0.0529	-0.0497	1.0000															
post	0.0053	-0.0248	0.0174	0.0120	0.0235	0.0212	0.0282	-0.0596	-0.0686	-0.0154	-0.0144	-0.0196	1.0000														
owner
self
pub	0.0138	-0.2008	0.1490	0.1427	0.0734	0.0838	0.1630	-0.1954	-0.0540	0.0658	0.1181	0.3481	0.0672	.	.	.	.	.	.	.	.	.	.	.	.	.
dom	0.0139	-0.4151	0.0288	0.0232	-0.0297	-0.0893	-0.2401	0.0883	-0.0083	-0.0401	-0.0503	-0.0764	-0.0222	.	.	.	.	.	.	.	.	.	.	.	.	.
fam
arm	0.0073	0.0549	-0.0309	-0.0346	0.0231	0.0351	0.0446	-0.0781	0.0660	0.0032	0.0470	-0.0132	-0.0075	.	.	.	.	.	.	.	.	.	.	.	.	.
forest	0.0306	0.2318	-0.0273	-0.0272	-0.0399	-0.0206	-0.0651	0.1194	-0.0404	-0.0533	-0.0572	-0.0865	-0.0283	.	.	.	.	.	.	.	.	.	.	.	.	.
manu	0.0066	0.0580	-0.0453	-0.0419	0.0106	0.0093	-0.0131	-0.0441	0.0601	0.0004	-0.0124	-0.0184	-0.0114	.	.	.	.	.	.	.	.	.	.	.	.	.
food	-0.0229	0.0502	-0.0416	-0.0406	-0.0101	0.0025	0.0487	-0.0261	0.0579	-0.0035	-0.0083	-0.0412	-0.0029	.	.	.	.	.	.	.	.	.	.	.	.	.
serv	0.0399	-0.5070	0.1176	0.1069	0.0699	0.0163	0.0217	-0.1952	-0.0129	0.0797	0.0882	0.2765	0.0837	.	.	.	.	.	.	.	.	.	.	.	.	.
infra	0.0040	0.2031	-0.0151	-0.0212	0.0194	0.0092	-0.0234	0.0048	0.0531	-0.0100	-0.0220	-0.0715	-0.0168	.	.	.	.	.	.	.	.	.	.	.	.	.
com	-0.0050	-0.0974	-0.1248	-0.1130	0.0637	-0.0483	0.0410	-0.1576	0.1541	0.0573	0.0396	-0.0541	-0.0135	.	.	.	.	.	.	.	.	.	.	.	.	.
cap	-0.0038	-0.0006	-0.0418	-0.0388	0.0364	-0.0075	0.0387	-0.0074	0.0344	0.0653	0.0832	0.0023	-0.0002	.	.	.	.	.	.	.	.	.	.	.	.	.
other	-0.0627	0.0491	-0.0447	-0.0441	-0.0091	-0.0246	0.0319	-0.0070	0.0155	-0.0117	-0.0031	-0.0094	-0.0105	.	.	.	.	.	.	.	.	.	.	.	.	.
		arm	forest	manu	food	serv	infra	com	cap	other																	
arm	1.0000																										
forest	-0.0371	1.0000																									
manu	-0.0149	-0.0566	1.0000																								
food	-0.0183	-0.0695	-0.0279	1.0000																							
serv	0.1371	-0.2710	-0.1087	-0.1334	1.0000																						
infra	-0.0377	-0.1431	-0.0574	-0.0785	-0.2749	1.0000																					
com	-0.0277	-0.1053	-0.0422	-0.0518	-0.2823	-0.1068	1.0000																				
cap	-0.0164	-0.0624	-0.0250	-0.0307	-0.1198	-0.0633	-0.0465	1.0000																			
other	-0.0138	-0.0524	-0.0210	-0.0258	-0.1006	-0.0531	-0.0391	-0.0231	1.0000																		

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